Graduate Education Catalog
Fall 2012

Note: Information in this PDF is current as of Oct. 1, 2012. It is subject to change without notice. Many departments make changes in their degree requirements and course descriptions between updates of the online catalog and PDF. For up-to-date information, see www.catalogs.umn.edu/grad/index.html, or check with the department offices.

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>2</td>
</tr>
<tr>
<td>Mission</td>
<td>2</td>
</tr>
<tr>
<td>University Policies</td>
<td>2</td>
</tr>
<tr>
<td>The Campus and Community</td>
<td>3</td>
</tr>
<tr>
<td>University Counseling and Consulting Services</td>
<td>4</td>
</tr>
<tr>
<td>Libraries and Research Opportunities</td>
<td>4</td>
</tr>
<tr>
<td>Research Involving Human or Animal Subjects or Research Involving Recombinant DNA or Potentially Hazardous Materials</td>
<td>4</td>
</tr>
<tr>
<td>University Research Centers</td>
<td>4</td>
</tr>
<tr>
<td>Administration</td>
<td>5</td>
</tr>
<tr>
<td>General Information</td>
<td>6</td>
</tr>
<tr>
<td>Basic Admission Requirements</td>
<td>6</td>
</tr>
<tr>
<td>Tuition and Fees</td>
<td>6</td>
</tr>
<tr>
<td>Assistantships and Fellowships</td>
<td>6</td>
</tr>
<tr>
<td>Other Financial Assistance</td>
<td>7</td>
</tr>
<tr>
<td>International Student and Scholar Services</td>
<td>8</td>
</tr>
<tr>
<td>Office for Diversity in Graduate Education</td>
<td>8</td>
</tr>
<tr>
<td>Student Grievance Procedures</td>
<td>9</td>
</tr>
<tr>
<td>Housing</td>
<td>9</td>
</tr>
<tr>
<td>Council of Graduate Students</td>
<td>9</td>
</tr>
<tr>
<td>Graduate and Professional Student Assembly</td>
<td>9</td>
</tr>
<tr>
<td>Preparing Future Faculty</td>
<td>9</td>
</tr>
<tr>
<td>Registration</td>
<td>10</td>
</tr>
<tr>
<td>Grading System</td>
<td>10</td>
</tr>
<tr>
<td>Satisfactory Progress Toward the Degree</td>
<td>10</td>
</tr>
<tr>
<td>Termination of Graduate Student Status</td>
<td>11</td>
</tr>
<tr>
<td>Definitions</td>
<td>11</td>
</tr>
<tr>
<td>Degree Clearance</td>
<td>11</td>
</tr>
<tr>
<td>Majors and Degrees Listing</td>
<td>12</td>
</tr>
</tbody>
</table>

© 2012 Regents of the University of Minnesota. All rights reserved. The University of Minnesota is an equal opportunity educator and employer. This publication/material is available in alternative formats upon request. Direct requests to the Office of Disability Services, ds@umn.edu, 612-626-1333 (V/TTY).
Introduction

Mission
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—To 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—To 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 multicultural and multiracial world.

Outreach and Public Service—To 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; provides an atmosphere of mutual respect, free from racism, sexism and other forms of prejudice and intolerance; assists individuals, institutions and communities in responding to a continuously changing world; is conscious of and responsive to the needs of the many communities it is committed to serving; creates and supports partnerships within the University, with other educational systems and institutions, and with communities to achieve common goals; and inspires, sets high expectations for and empowers the individuals within its community.

University Policies

Catalog Use—The information in this catalog PDF and other University catalogs, publications, or announcements is subject to change without notice. University offices can provide current information about possible changes.

This electronic publication is available in alternative formats upon request. Contact the Office of Disability Services, ds@umn.edu, 612-626-1333 (V/TTY).

Equal Opportunity—The University of Minnesota shall provide equal access to and opportunity in its programs, facilities, and employment without regard to race, color, creed, religion, national origin, gender, age, marital status, disability, public assistance status, veteran status, sexual orientation, gender identity, or gender expression.

Inquiries regarding compliance may be directed to the director, Office of Equal Opportunity and Affirmative Action, University of Minnesota, 274 McNamara Alumni Center, 200 Oak Street S.E., Minneapolis, MN 55455 (612-624-9547, eoaa@umn.edu). Visit the website at diversity.umn.edu/eoaa.

Disability Services—The University’s mission is to provide optimal educational opportunities for all students. The University recognizes that students with disabilities sometimes have unique needs that must be met in order for them to have access to campus programs and facilities. In general, University policy calls for accommodations to be made on an individualized and flexible basis. It is the responsibility of students to seek assistance at the University and make their needs known.

The first place to seek assistance is Disability Services. This office promotes program and physical access, which means ensuring the rights of students with disabilities and assisting the University in meeting its obligations under federal and state laws. Disability Services provides direct assistance such as information, referral, support, and academic accommodations for enrolled and prospective students, as well as consultation to faculty and staff to ensure access to their programs and facilities.

The office also assists students with disabilities in obtaining services from other University or community resources and serves as a liaison between the University and the Division of Rehabilitation Services. Campus accessibility maps also are available from Disability Services and general building accessibility information is also available at the online Department Directory, www.umn.edu/systemwide/directories/building.html. More detailed accessibility information for campus buildings is available by selecting the appropriate building from the menu at campusmaps.umn.edu/tc.

For more information, contact Disability Services, University of Minnesota, 180 McNamara Alumni Center, 200 Oak Street S.E., Minneapolis, MN 55455 (612-626-1333 voice or TTY; ds@umn.edu). For online access, go to ds.umn.edu.
Access to Student Educational Records—In accordance with Board 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. To review the Regents policy, and to learn more about policy exceptions, private versus public student data, how to suppress public information, and students’ rights to review their educational records and to challenge the contents of those records, see http://onestop.umn.edu/grades_and_transcripts/student_records_privacy.html, or contact the One Stop Services Center 333 Science Teaching & Student Services (612-624-1111; helpingu@umn.edu).

Immunization—Students born after 1956 who take more than one University course are required under Minnesota law to submit a Student Immunization Record Form. The form, which is accessed through the official graduate online admission letter, should be downloaded, filled out, and returned to Boynton Health Service as soon as possible, but absolutely no later than 45 days after the beginning of the first term of enrollment, in order for students to continue registering for courses at the University. Complete instructions accompany the form.

Smoke-Free Campus Policy—Smoking is prohibited in all facilities of the University of Minnesota, Twin Cities campus except for designated private residence hall rooms.

Email—Email is the University’s official means of communication with students. Students are responsible for all information sent via their University email account. Students who forward their University email account are still responsible for all information, including attachments, sent to the account.

The Campus and Community

On the Twin Cities campus, graduate students enjoy the vast academic and cultural opportunities of a major university and a unique metropolitan area.

Two Campuses in One—The Twin Cities campus, the largest and oldest in the University system, is technologically two separate campuses: one just east of downtown Minneapolis on the Mississippi River, the other just west of the State Fairgrounds, a few miles from downtown St. Paul. The Mississippi River divides the Minneapolis campus into two banks connected by the double-decker Washington Avenue Bridge. The picturesque mall of the East Bank is bordered by stately traditional buildings. At the head of the mall is Northrop Memorial Auditorium and its plaza. At the opposite end of the mall, overlooking the Mississippi, Coffman Memorial Union offers a good place to relax between classes. Nearby are the health sciences complexes. Just across the river is the West Bank. Newer and smaller, it boasts sleek brick buildings including the Elmer L. Anderson and Wilson Libraries, the Humphrey School of Public Affairs, Mondale Hall (the Law School), Ted Mann Concert Hall, the Carlson School of Management, and the Arts Quarter.

Three miles away and connected by a free express transit way, is the St. Paul campus, where animal barns, croplands, flowers, and wooded areas evoke a small college atmosphere.

Urban Diversity—The Dinkytown, Stadium Village, Seven Corners, and Cedar-Riverside areas near the Minneapolis campus, and the St. Anthony Park neighborhood bordering the St. Paul campus, all feature shops and restaurants tailored to students’ interests and budgets.

Minneapolis (the largest city in Minnesota) and St. Paul (the state capital) are both flourishing centers of commerce, industry, and the arts, and where grandiose historic buildings complement bold new skyscrapers. Focal points of a progressive metropolitan area of more than 3 million people, the two downtowns offer many opportunities for entertainment, research, volunteer or part-time work, internships, and careers.

Arts and Entertainment—The Twin Cities are renowned for their innovative and varied cultural attractions, such as the Guthrie Theater, Ordway Music Theater, Orchestra Hall, Science Museum, and Omnitheater. Northrop Memorial Auditorium, the campus centerpiece, hosts performances by popular musical and dance artists and outstanding University bands and ensembles. Students can see or star in plays at the Rarig Center. Or they can enjoy the Walker Art Center and the Minneapolis Institute of Arts, the Minnesota and Como Zoos, the Mall of America, the Renaissance Festival and Valleyfair, and the Minneapolis Aquatennial and St. Paul Winter Carnival. Overlooking the Mississippi River is the University’s own Frederick R. Weisman Art Museum, with award-winning design by Frank Gehry.

Recreation and Sports—The University’s Recreational Sports program, one of the largest of its kind on any campus in the country, offers curling, cycling, racquetball, crew, ballroom dance, and 100 other teams, clubs, and fitness activities. Sports fans can attend Golden Gophers football at the new TCF Bank Stadium on campus, Minnesota Vikings football at the Metrodome, Twins baseball at the new Target Field, Timberwolves basketball at the Target Center, and Wild hockey at the Xcel Energy Center. Many women’s and men’s intercollegiate athletic events also take place right on campus. Outdoor enthusiasts can explore the Twin Cities’ 150 parks and 200 lakes, which are ideal for picnicking, hiking, biking, swimming, canoeing, sailing, fishing, roller blading, ice skating, cross-country skiing, or simply sitting and thinking. The Boundary Waters Canoe Area Wilderness, one of the most unsullied wilderness treasures in the entire nation, is only a few hours drive north.

The warmth of spring, greenery of summer, and bright colors of autumn are followed by at least three months of winter snow, but even then, daytime temperatures generally average an invigorating 10 to 30 degrees above zero.
University Counseling and Consulting Services

University Counseling and Consulting Services (UCCS), 340 Appleby Hall on the East Bank and 199 Coffey Hall on the St. Paul campus (612-624-3323 for both), offers counseling for academic, career, personal, or relationship concerns. Besides counseling, UCCS features a variety of services including a series of workshops for graduate students and ongoing dissertation support groups. For more information, see uccs.umn.edu.

Libraries and Research Opportunities

The University of Minnesota Libraries include 14 library facilities on the Twin Cities campus, holding nearly 7 million volumes with current subscriptions to more than 90,000 journals. Five major library buildings provide anchors on both sides of the Mississippi River in Minneapolis and St. Paul: Wilson Library (humanities and social sciences), Walter Library (physical sciences and engineering), Biomedical Library, Magrath Library (natural, agricultural, environmental, and biological sciences), and Elmer L. Andersen Library (archives and special collections).

To support the many disciplines at an institution as comprehensive as the University of Minnesota, the University Libraries acquire, catalog, and maintain information in practically every field of knowledge, in every language, from every time period, and in every format. The online catalog, MNCAT, provides a nearly complete listing of book and journal holdings and serves as a gateway to local, national, and global information sources including e-books, full-text periodicals, academic journal articles, and newspapers.

In addition to strong comprehensive research collections, subject librarians specialize in different research areas and are available for research assistance. The Libraries also offer a variety of free workshops on database literature searching and using the more complicated research materials and resources in the collections. Information about these and other services tailored especially to graduate students is available at www.lib.umn.edu/services/grads.

Research Involving Human or Animal Subjects or Research Involving Recombinant DNA or Potentially Hazardous Materials

All research on the Twin Cities, Duluth, Morris, Crookston, and Rochester campuses that involves the use of human or animal subjects, recombinant DNA, or potentially hazardous materials must be reviewed and approved before initiation by the Institutional Review Board: Human Subjects Committee (IRB), the Institutional Animal Care and Use Committee (IACUC), and/or the Institutional Biosafety Committee (IBC). This policy, approved by the Board of Regents, applies to funded and unfunded faculty, staff, and student research.

For more information, contact the Human Research Protection Program (for IRB and IBC), University of Minnesota, MMC 820, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-5654; fax 612-626-6061; irb@umn.edu or ibc@umn.edu); or the Office of Animal Welfare (for IACUC), University of Minnesota, MMC 79, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-4625; iacuc@umn.edu; www.research.umn.edu/iacuc).

University Research Centers

The University of Minnesota is home to more than 200 research centers, institutes, and interdisciplinary graduate programs. Most of these are described online at www1.umn.edu/twincities/centers. This site will help prospective graduate scholars identify, learn about, and contact these units.
Administration

University Regents

Linda A. Cohen, At Large, Chair
David M. Larson, Congressional District 3, Vice Chair
Clyde E. Allen Jr., Congressional District 7
Richard Beeson, Congressional District 4
Laura Brod, At Large
Thomas Devine, Congressional District 2
John Frobenius, Congressional District 6
Venora Hung, Congressional District 5
Dean Johnson, At Large
David McMillian, Congressional District 8
Maureen Ramirez, At-Large
Patricia S. Simmons, Congressional District 1

University Administrators

Eric W. Kaler, President
Karen Hanson, Senior Vice President for Academic Affairs and Provost
Robert J. Jones, Senior Vice President for System Academic Administration
Aaron Friedman, Vice President for Health Sciences and Dean of the Medical School
Kathryn F. Brown, Vice President for Human Resources
R. Timothy Mulcahy, Vice President for Research
Pamela A. Wheelock, Vice President for University Services
Richard Pfuntenreuter, Vice President and Chief Financial Officer
Mark B. Rotenberg, General Counsel
R. Scott Studham, Vice President and Chief Information Officer
**Basic Admission Requirements**

Students with a U.S. bachelor’s degree or a comparable foreign degree from a recognized college or university may apply for admission to graduate study at the University of Minnesota. The University establishes minimum admission requirements for master’s and doctoral degrees. Colleges and graduate programs publish and maintain their own admission requirements, which may be more stringent (e.g., include an undergraduate GPA standard). Individual graduate programs make all admission decisions. For information about specific admissions standards and application requirements, contact the individual college or graduate program. For information regarding University-wide policies governing graduate education admission, refer to the Graduate Students section of the University’s Policy Library at [www.policy.umn.edu/Policies/Education/index.htm](http://www.policy.umn.edu/Policies/Education/index.htm).

**Tuition and Fees**

Tuition for the various categories of graduate registration and fees are listed in the Class Schedule online at [http://onestop.umn.edu/finances/costs_and_tuition/tuition_and_fees](http://onestop.umn.edu/finances/costs_and_tuition/tuition_and_fees). Summer session tuition and fees are listed in the Summer Session Catalog online at [www.cce.umn.edu/Summer-Term](http://www.cce.umn.edu/Summer-Term).

**Residence**—Because the University is a state institution, Minnesota residents pay lower tuition than nonresidents. For more information on eligibility requirements for resident status, contact the Resident Classification and Reciprocity Office, University of Minnesota, 240 Williamson Hall, 231 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-6330), or review the document at [http://admissions.tc.umn.edu/PDFs/ResidencyReciprocity.pdf](http://admissions.tc.umn.edu/PDFs/ResidencyReciprocity.pdf).

**Reciprocity**—For residents of North Dakota, South Dakota, Wisconsin, or Manitoba who qualify for reciprocity privileges, tuition rates are lower than for nonresidents and are, in some cases, comparable to resident rates. For more information, contact the Resident Classification and Reciprocity Office (see above) or visit [http://onestop.umn.edu/finances/costs_and_tuition/tuition_and_fees/reciprocity/index.html](http://onestop.umn.edu/finances/costs_and_tuition/tuition_and_fees/reciprocity/index.html).

**Resident Tuition Benefit**—For information on resident tuition for graduate assistants, fellows, and trainees, see Assistantships and Fellowships. For information on the benefit for underrepresented and educationally disadvantaged students, see Office for Diversity in Graduate Education in this section.

**Assistantships and Fellowships**

**Resolution of the Council of Graduate Schools in the United States**—Acceptance of an offer of financial aid (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by an enrolled or prospective graduate student completes an agreement that both the student and University expect to honor. When a student accepts an offer before April 15 and subsequently desires to withdraw, the student may submit a written resignation from the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student to that financial aid offer; she or he may not accept any other offer without first obtaining a written release from the institution to which the outstanding commitment was made.

Similarly, an offer made by an institution after April 15 is conditional on presentation by the student of a written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to this resolution that a copy of the resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer.

**Graduate Assistantships**

Graduate assistantships are academic appointments reserved for graduate and professional students. Appointments to teaching assistant, research assistant, or administrative fellow positions are offered through various departments. A teaching assistant helps teach students in a specified course or courses under the general supervision of the academic staff and may be assigned primary responsibility for an entire course. A research assistant carries out activities connected with research studies assigned by the supporting department or principal research investigator. An administrative fellow performs duties of a specialized nature connected with academic administration.

**Benefits**

All graduate assistants holding appointments as teaching assistants, research assistants, and administrative fellows may become eligible for the following benefits:

**Tuition Benefits**—Upon reaching minimum qualification for eligibility (refer to the graduate assistant services website above), students receive a tuition benefit equal to twice the percentage of appointment. For example, a 40 percent appointment for the full payroll semester period includes an 80 percent tuition benefit, which applies only to tuition. The maximum benefit is 100 percent and applies to a maximum of 14 credits each academic term. Tuition benefits are equal to standard Graduate School tuition rates. The tuition benefit does not cover course, technology, collegiate, or student services fees.

**Resident Rate Privilege**—Upon reaching minimum qualification for eligibility (refer to the graduate assistant services website above), students receive a non-resident waiver, which is credited on the fee statement in conjunction with the tuition benefit. This privilege applies concurrently to members of the immediate family (spouse or registered same-sex domestic partner, and children).

**Extended Resident Rate Privilege**—When a graduate assistant has completed two qualifying terms of assistantship, the resident rate break continues for the number of terms the appointments were held, up to a maximum of four terms. This privilege applies also to the student’s immediate family (see above). **NOTE:** For the student and family, this privilege
does not extend beyond three years from the termination of
the last or most recent qualifying appointment.
Each department sets its own financial aid application
deadline.
Graduate assistants are compensated according to a pay
range established each year by the University’s central
administration and approved by the Board of Regents. The
current pay range for graduate assistants is available from
the department, online at www.umn.edu/ohr, or by contacting
Graduate Assistant Employment Services 612-624-7070.
Graduate students may not hold appointments for which there
is no monetary compensation, nor are they allowed to hold
appointments for which they receive only course credit or
resident tuition rates.
More information may be obtained from either the hiring
department offering the appointment or Graduate Assistant
Employment Services, which maintains the graduate
assistant services website. More information about graduate
assistantships at the University may be obtained from
Graduate Assistant Employment Services, University of
Minnesota, 545 West Bank Office Building, 1300 South 2nd
Street, Minneapolis, MN 55455 (612-624-7070; fax 612-625-
9801; gaesinfo@umn.edu; www.umn.edu/ohr/gae).
Graduate Assistant Health Care Plan—University-
subsidized health insurance is available to most graduate
or professional school students who hold appointments as
teaching assistants, research assistants, or administrative
fellows (some other fellows and trainees enrolled in graduate
programs are also eligible). For these students, the University
pays 42.5 to 95 percent of the insurance premium during the
academic year (fall through spring), the percentage depending
on the level of appointment. To receive this coverage, eligible
students must apply for it by the end of the second week of
classes. To apply and for more information, contact the Office
of Student Health Benefits, N-323 Boynton Health Service,
410 Church Street S.E., Minneapolis, MN 55455 (612-625-
6936; umgahbo@umn.edu; www.shb.umn.
edu).
Postsecondary Teaching and Learning Assistantships—
Graduate students are eligible to apply for teaching
assistantships in the Department of Postsecondary Teaching
and Learning in mathematics, natural sciences, social
sciences, ESL, and the humanities. The department offers
first-year curriculum for entering students, with a particular
emphasis on multiculturalism.
All graduate teaching assistantships for postsecondary
teaching and learning are posted on the University’s online
employment system (http://employment.umn.edu) for at
least five business days or up to 14 days. Notices of vacancies
in postsecondary teaching and learning are routinely sent to
related academic departments in University colleges.
Graduate Fellowships
Graduate fellowships, awards based on academic merit, are
available to new and currently enrolled graduate students.
The Graduate School Fellowship Office, 314 Johnston
Hall, administers several fellowship programs; a number of
individual academic departments also administer field-
specific fellowships. Entering students should contact their
prospective graduate program. Currently enrolled students
should consult the Fellowship Office and their graduate
program office for current information on fellowship
opportunities. The Fellowship Office also processes
applications for several international competitions, such as
Fulbright Grants for graduate study abroad.
Contact the Graduate School Fellowship Office for additional
information at 612-625-7579 or gsfellow@umn.edu; or visit
www.grad.umn.edu/fellowships.
Resident Benefit for Graduate Fellows and
Trainees—Graduate students who hold fellowships or
traineeships are eligible for resident tuition rates, provided
the University administers the award and the stipend is
at least equal to a 25-percent-time graduate assistantship.
This eligibility also extends to members of the student’s
immediate family (i.e., spouse, dependant child, or ward).
For details and updates on this policy, contact the Graduate
School Fellowship Office, 314 Johnston Hall (612-625-7579;
www.grad.umn.edu/fellowships).
For New Graduate Students
Fellowships and Scholarships Administered through
Departments—Many academic departments have
fellowships and awards from private endowment income,
gifts, and other sources. Complete information is available on
award amounts and purposes, deadlines, and the application
process from individual departments. Students should inquire
directly.
Fellowships Available for Underrepresented and
Educationally Disadvantaged Students—Because
eligibility varies depending on the fellowship, students should
contact the appropriate program office to see if they are
eligible. Information can also be obtained from the Office for
Diversity in Graduate Education (ODGE), 333 Johnston Hall
(612-625-6858; https://diversity.umn.edu/gradeducation/
financing; odge@umn.edu).
Diversity of Views and Experiences Fellowship
(DOVE)—Students planning to enter a graduate program for
the first time in the fall semester are eligible for these one-
year fellowships, which provide a stipend of approximately
$22,500 plus tuition and health insurance (fees not included)
for the academic year. Departmental support following the
fellowship year is included. All applicants must be nominated
by the graduate program they plan to enter. About 18
fellowships are awarded each year.
Other Available Fellowships—The availability of
other fellowships for underrepresented and educationally
disadvantaged students changes yearly. They include the
Ford Foundation Pre-doctoral and Dissertation Fellowships
for Minorities, the GEM Master’s Fellowship, the GEM Ph.D.
Engineering and Natural Science Fellowship, and others.
Contact the Office for Diversity in Graduate Education, 333
Johnston Hall, for information. In addition, underrepresented
and educationally disadvantaged students should check all
regular sources of support described in this catalog.
Other Financial Assistance
Student Employment—Student Employment Programs
(part of the Office of Human Resources) offers graduate
students a wide range of nonacademic employment
opportunities both on campus and throughout the Twin
Cities area. All jobs are posted using the University’s online

employment system (employment.umn.edu; employ@umn.edu). Contact Student Employment Programs (612-626-8608) for more information, including registration requirements for graduate student eligibility for student employment.

In addition to University (on-campus) employment, Student Employment Services offers programs for off-campus employment: the Job Location and Development (JLD) Program helps locate career-related opportunities with private and public employers in the Twin Cities; Community Service Programs helps arrange employment on and off campus with nonprofit organizations and agencies for students awarded work-study funding.

**Office of Student Finance (OSF)**—Graduate students must complete the Free Application for Federal Student Aid (FAFSA) at www.fafsa.ed.gov to be considered for federal aid. To be eligible for federal aid, a student must be a U.S. citizen or an eligible non-citizen. To find out more about who qualifies for federal aid, see the One Stop link: http://onestop.umn.edu/finances/financial_aid/basics/eligibility/index.html, or review the online FAFSA information. International graduate students must contact International Student and Scholar Services for possible financial support opportunities (see below). Visit the One Stop home page for general financial aid information: http://onestop.umn.edu/finances/financial_aid/index.html.

Prospective students may apply for admission to the University, but the Office of Student Finance downloads FAFSA data only after a student is admitted.

Graduate students are considered for the following aid according to their degree program, student status, and other qualifying criteria: the Ford Federal Direct Unsubsidized Loan and the Ford Federal Direct Graduate Plus Loan. If available, work study funds will be awarded upon request to students who have need and who have positions requiring work study funds. Health Profession loans and Health Profession grants from the Department of Health and Human Services are limited, need-based funds that are awarded to certain groups of health professional students who provide parent data on the FAFSA, and who meet other eligibility criteria. The availability of the Nursing Student Loan (NSL) and the Primary Care Loan (for medical students) varies from year to year.

Admitted students may be offered University of Minnesota scholarships, fellowships, assistantships, traineeships, or tuition waivers by their college department. Students are also recommended to search for scholarships. For scholarship search tips, see the One Stop site: http://onestop.umn.edu/finances/financial_aid/scholarships/index.html.

For detailed financial aid information, contact One Stop in person, via email, or by phone. Contact information is available at the One Stop home page: http://onestop.umn.edu. To receive information in an alternative format, call the disability services liaison for financial aid at 612-625-9578; TTY 612-626-0701.

**International Student and Scholar Services**

International Student and Scholar Services (ISSS) provides counseling, advising, and educational and career services to international students and scholars on non-immigrant visas. ISSS staff members offer counseling and advising services regarding visa requirements and other immigration issues; personal, health and safety, and financial matters; international and intercultural educational opportunities; academic issues; and English language requirements.

International students new to the University of Minnesota must participate in ISSS’s International Student Orientation Program, which provides guidance on maintaining legal status, and introduces students to academic and practical matters relevant to their study in the United States. In addition, ISSS coordinates many cross-cultural programs and events for University students, faculty, staff, and their families. All admitted international students and scholars are mailed materials pertaining to pre-arrival, arrival, and transition to the University system. Prospective student inquiries may be addressed to International Student and Scholar Services, 190 Hubert H. Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612-626-7100; isss@umn.edu). Prospective student information can be found at www.passport.umn.edu. For general information visit www.isss.umn.edu.

**Office for Diversity in Graduate Education**

The Office for Diversity in Graduate Education (ODGE), 333 Johnston Hall (612-625-6858; odge@umn.edu; https://diversity.umn.edu/gradeducation) works closely with other University of Minnesota offices that are concerned with diversity and multiculturalism. The office

- provides service to prospective and currently enrolled graduate students, faculty, funding representatives, and university colleagues;
- provides information about the University of Minnesota and its commitment to enrolling a diverse student population;
- supports a diverse student body in recruiting, funding, retention, and graduation with strategies for clarifying goals; selecting an appropriate graduate program; preparing the best possible graduate school application; and funding graduate work through assistantships and fellowships;
- serves as the administrative unit for funding programs that support a diverse graduate student body;
- promotes professional development and scholarship across disciplines and works toward creating the institutional environment necessary for facilitating the academic achievements of graduate and professional students; and
- encourages undergraduate students to consider graduate study by participating in research and other academic projects outside of their regular coursework.
Student Grievance Procedures

Academic Complaints — Student academic complaints are those brought by students regarding the University’s provision of education and academic services affecting their role as students. Information about the policy and procedures related to student academic complaints is available at www.policy.umn.edu/Policies/Education/Student/STUDENTCOMPLAINTS.html. For more information and additional resources, contact the Student Conflict Resolution Center, 254 Appleby Hall (612-624-7272; sos@umn.edu; www.sos.umn.edu).

Employment Grievances — Grievances by student employees or other employees of the University are handled through the Office for Conflict Resolution, 662 Heller Hall (612-624-1030; ocr@umn.edu; www1.umn.edu/ocr/index.html).

Discrimination Complaints — Complaints alleging discrimination in the University/student relationship by University staff or faculty are handled by the Office of Equal Opportunity and Affirmative Action, 274 McNamara Alumni Center, 200 Oak Street S.E. (612-624-9547; eoaa@umn.edu; www.eoaffact.umn.edu).

Sexual Harassment — Complaints alleging sexual harassment by University staff or faculty are handled by the Office of Equal Opportunity and Affirmative Action, 274 McNamara Alumni Center, 200 Oak Street S.E. (612-624-9547; eoaa@umn.edu; www.eoaffact.umn.edu).

Allegations of Student Misconduct — Students are responsible for complying with the University’s Student Conduct Code (http://www1.umn.edu/regents/policies/academic/Student_Conduct_Code.pdf), which addresses University standards of academic and non-academic integrity. Matters arising from student misconduct or actions taken under the Student Conduct Code are the responsibility of the Office for Student Conduct and Academic Integrity, 211 Appleby Hall (612-624-6073; www.oscai.umn.edu).

Housing

At the current time, the University guarantees a limited number of places in University Village and Centennial Hall for new and current graduate students who apply before May 1 for fall term. More graduate and professional students can be housed in residence halls/apartments during the spring term and will have an option of renewing for the following year. Students interested in living in a residence hall on campus or in off-campus housing in Minneapolis or St. Paul should contact Housing and Residential Life, Comstock Hall-East, 210 Delaware Street S.E., Minneapolis, MN 55455 (612-624-2994; fax 612-624-6987; housing@umn.edu; www.housing.umn.edu).

Listings of apartments, duplexes, houses, sleeping rooms, shared units, and sublets are maintained in the office as well as on the web. Information on temporary housing, living costs, transportation, and day-care centers in the Twin Cities area is also available. For more information, visit the Housing and Residential Life website at www.housing.umn.edu.

For information on University family housing, contact Commonwealth Terrace Cooperative, 1250 Fifield Avenue, St. Paul, MN 55108 (651-646-7526; housing@umnctc.org; www.umncctc.org), or Como Student Community, 1024 27th Avenue S.E., Minneapolis, MN 55414 (612-378-2434; csc@umn.edu; cscc.umn.edu).

Council of Graduate Students

The Council of Graduate Students (COGS) is the official student governance body representing University graduate students. COGS provides opportunities for graduate students to participate actively in University governance and policy decision-making, as well as social, cultural, and professional development programming. COGS provides travel grants to students to offset education-related travel expenses. Graduate students in each degree-granting program are entitled to elect one representative to the COGS General Assembly. COGS also recruits student representatives to serve on University-wide committees, the Graduate Education Council, and in the University Senate. Students may contact COGS at 303 Johnston Hall, 101 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-1612; cogs@umn.edu; www.cogs.umn.edu).

Graduate and Professional Student Assembly

The Graduate and Professional Student Assembly (GAPSA) represents all currently registered, full-time graduate and professional students at the University of Minnesota Twin Cities campus, and full-time pharmacy and medical students on the University of Minnesota Duluth campus. GAPSA provides additional opportunities for students to become involved in University governance and to work on issues important to graduate and professional students. For more information, contact gapsa@umn.edu or visit www.gapsa.umn.edu.

Preparing Future Faculty

Preparing Future Faculty (PFF) welcomes graduate and postdoctoral participants from all disciplines. PFF helps participants acquire information and competencies in both teaching and learning strategies and the overall teaching and learning process; understand the faculty role at a variety of institutions of higher education; gain a realistic perspective on the skills required for success as a faculty member; examine their fit with a teaching career in higher education; work with a faculty mentor in a teaching opportunity at a local college or university; demonstrate, document, and reflect on their teaching skills; and create classroom and job search materials/strategies to market themselves for faculty or other professional positions.

PFF is a program sponsored by the Graduate School and the Office of Human Resources, and is administered through the Center for Teaching and Learning (CTL). For more information, drop by the CTL in 400 University Office Plaza (612-625-3811; pff@umn.edu; www.umn.edu/ohr/teachlearn/graduate/pff).
Registration

Students register via the One Stop website at http://onestop.umn.edu/registration/index.html.

Registration Deadlines—All graduate students must register before the term-specific, University-wide registration deadline. For University calendar and registration deadline information and the University-wide policy governing cancel/adds, refer to http://onestop.umn.edu/onestop/calendar.html.

Exceptions to University-wide registration deadlines are subject to review and approval by the student’s college; such requests are not routinely granted. For more information, and to initiate a registration exception, refer to “Request a registration exception” at  http://onestop.umn.edu/special_for/graduate_students.html.

All graduate students must register before the first day of the term to avoid a late registration fee. For more information regarding the late registration fee schedule, refer to http://onestop.umn.edu/finances/costs_and_tuition/fees/serviceusefees/latest_registration_fees.html.

Registration Requirements for All Graduate Students—To maintain their active status, graduate students must register every fall and spring term. Those who do not do so are considered to have withdrawn and their student status is deactivated. Deactivated students may not register for courses, take examinations, file for degree clearance, or otherwise participate in the University community as graduate students. Those who wish to resume their graduate work must request readmission following the procedures outlined at http://www.grad.umn.edu/admissions/readmission/index.html, and if readmitted, must register for the term of readmission to regain active status. For more information about the fall and spring term registration requirement, refer to http://www.grad.umn.edu/students/registration/activestatus/index.html.

Registration Requirements for Graduate Assistants—For information regarding eligibility, including minimum registration requirements, see http://policy.umn.edu/Policies/hr/Hiring/GRADSTUDENTEMPLOYMENT_APPA.html.

Other Registration Requirements—Students receiving other types of financial aid from the University or other agencies, international students with certain types of visas, and students who wish to use various University services and facilities may have more specific registration requirements; these students are responsible for obtaining information about such requirements from the appropriate offices.

Special Registration Categories

GRAD 999—GRAD 999 is a zero-credit, zero-tuition, non-graded registration option for graduate students who must register solely to meet the fall/spring registration requirement. GRAD 999 does not meet any other internal/external departmental or agency requirements. For more information about GRAD 999, see http://www.grad.umn.edu/students/registration/specialcategories/index.html.

Registration Categories for Advanced Graduate Students—Advanced master’s students and advanced doctoral candidates (i.e., students who have completed all their program coursework and required thesis credits, but are still working full-time on the research or writing of their thesis, papers, capstone project, or dissertation) may be eligible for special registration categories that enable them to be certified as full-time students when registered for one credit. For information about eligibility requirements, refer to http://www.grad.umn.edu/students/registration/specialcategories/index.html.

Leave of Absence

Graduate students are expected to maintain active status through continuous registration from the time they matriculate until they graduate. Students who are not able to maintain active status are strongly encouraged to consult with their director of graduate studies, adviser, and relevant offices to determine whether requesting a leave of absence is the most appropriate course of action. Students who do not have an approved leave of absence and are not continuously enrolled may experience negative consequences related to academic, visa, financial aid, and other student issues. For more information and links to related forms regarding the University’s Leave of Absence policy, please refer to www.policy.umn.edu/Policies/Education/Education/GRADSTUDENTLEAVE.html.

Readmission and Changes to Master’s or Doctoral Degree Objectives

Graduate programs make all decisions about readmission, change of degree objective, or addition of degree objective. Readmission and changes of degree objectives are not guaranteed; programs have the discretion to require a full admissions application from a student. For specific information about readmission or changes of degree objectives, contact your graduate program. For information on University-wide policies governing readmission and changes to degree objectives, refer to the Graduate Students section of the University’s Policy Library at www.policy.umn.edu/Policies/Education/index.htm.

Grading System

Graduate level courses at the University are offered under two distinct grading systems, A-B-C-D-F (with pluses and minuses permitted) and S-N. For detailed information about the University’s grading and grade point system, refer to the All Students section of the University’s Policy Library at www.policy.umn.edu/Policies/Education/index.htm.

Satisfactory Progress Toward the Degree

Graduate programs are required to provide master’s and doctoral students with an annual review of their degree progress. Students should consult their major program’s graduate studies handbook for specific criteria for satisfactory progress toward their degree. For information on University-wide policies governing performance standards and progress, refer to the Graduate Students section of the University’s Policy Library at www.policy.umn.edu/Policies/Education/index.htm.
Degree Clearance

Termination of Graduate Student Status

When performance is unsatisfactory in terms of grades or normal progress toward the student’s degree objective, graduate student status may be terminated. Each program sets specific standards by which progress is measured for purposes of continuation. Students are encouraged to check with the director of graduate studies in their major field for complete information about academic performance and degree progress standards and the procedures used to monitor these standards.

Students who do not register every fall and spring term are considered to have withdrawn.

Definitions

Postbaccalaureate Certificates

Postbaccalaureate certificates are formal awards that recognize completion of an organized program of study of at least 12 semester credit hours beyond the bachelor’s degree. Postbaccalaureate certificates provide professional training beyond the bachelor’s degree and require at least a bachelor’s degree for admission, but they do not meet the minimum requirements of a master’s degree. For more information regarding postbaccalaureate certificate requirements and standards, refer to the Graduate Students section of the University’s Policy Library at www.policy.umn.edu/Policies/Education/index.htm.

Master’s Degree

The master’s degree is awarded in recognition of academic accomplishment as demonstrated by completing a coherent program of coursework, and, depending on the particular graduate program, passing of the required examinations, and preparation of a thesis or project(s). For information regarding master’s degree requirements, including application of graduate credits toward the degree, minimum credit requirements, performance/progress standards, and degree-completion requirements, refer to the Graduate Students section of the University’s Policy Library at www.policy.umn.edu/Policies/Education/index.htm.

Doctoral Degree

The doctoral degree is awarded in recognition of high attainment and ability in a special subject field as demonstrated by passing the required examinations and milestones, and in the case of the Ph.D., by preparing and successfully defending a dissertation based on original research that makes a significant contribution to knowledge in the student’s field. For information regarding doctoral degree requirements, including application of graduate credits toward the degree, minimum credit requirements, performance/progress standards, and degree-completion requirements, refer to the Graduate Students section of the University’s Policy Library at www.policy.umn.edu/Policies/Education/index.htm.

Degree Clearance

Degrees are awarded on the last business day of each month. To qualify for graduation in a particular month, a student must submit the Application for Degree form on or before the first business day of that month, and complete all other requirements by the last business day of that month. For more detailed degree-clearance eligibility requirements, master’s students should refer to the Degree Completion Steps section of the Information for Master’s Students at www.grad.umn.edu/students/masters/index.html; doctoral students should refer to the Degree Completion Steps section of the Information for Doctoral Students at www.grad.umn.edu/students/doctoral/index.html. Transcripts showing the award of the degree are available by request two to three weeks following the official date of conferral. Diplomas should be received in the mail four to six weeks following the official date of conferral.
### All-University Degrees

**Twin Cities and Duluth Campuses**

<table>
<thead>
<tr>
<th>Majors</th>
<th>Degrees Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majors</td>
<td>Degrees Offered</td>
</tr>
<tr>
<td>Integrated Biosciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Toxicology</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Water Resources Science</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Ecology, Evolution and Behavior</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>American Studies</td>
<td></td>
</tr>
<tr>
<td>Animal Sciences</td>
<td></td>
</tr>
<tr>
<td>Anthropology</td>
<td></td>
</tr>
<tr>
<td>Applied Economics</td>
<td></td>
</tr>
<tr>
<td>Applied Kinesiology</td>
<td></td>
</tr>
<tr>
<td>Applied Plant Sciences</td>
<td></td>
</tr>
<tr>
<td>Architecture</td>
<td>Design</td>
</tr>
<tr>
<td>Art</td>
<td></td>
</tr>
<tr>
<td>Art History</td>
<td></td>
</tr>
<tr>
<td>Arts and Cultural Leadership</td>
<td></td>
</tr>
<tr>
<td>Asian Literatures, Cultures, and Media</td>
<td></td>
</tr>
<tr>
<td>Astrophysics</td>
<td></td>
</tr>
<tr>
<td>Audiology</td>
<td></td>
</tr>
<tr>
<td>Biochemistry, Molecular Biology and Biophysics</td>
<td></td>
</tr>
<tr>
<td>Bioethics</td>
<td></td>
</tr>
<tr>
<td>Biological Science</td>
<td></td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td></td>
</tr>
<tr>
<td>Biophysical Sciences and Medical Physics</td>
<td></td>
</tr>
<tr>
<td>Bioproduction and Biosystems Science</td>
<td></td>
</tr>
<tr>
<td>Engineering, and Management</td>
<td></td>
</tr>
<tr>
<td>Business Administration</td>
<td></td>
</tr>
<tr>
<td>Business and Industry Education</td>
<td></td>
</tr>
<tr>
<td>Business Taxation</td>
<td></td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td></td>
</tr>
<tr>
<td>Chemical Physics</td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td></td>
</tr>
<tr>
<td>Child Psychology</td>
<td></td>
</tr>
<tr>
<td>Civil Engineering</td>
<td></td>
</tr>
<tr>
<td>Classical and Near Eastern Studies</td>
<td></td>
</tr>
<tr>
<td>Clinical Research</td>
<td></td>
</tr>
<tr>
<td>Cognitive Science</td>
<td></td>
</tr>
<tr>
<td>Communication Studies</td>
<td></td>
</tr>
<tr>
<td>Community Health Promotion</td>
<td></td>
</tr>
<tr>
<td>Comparative and Molecular Biosciences</td>
<td></td>
</tr>
<tr>
<td>Comparative Literature</td>
<td></td>
</tr>
<tr>
<td>Comparative Studies in Discourse and Society</td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td></td>
</tr>
<tr>
<td>Conservation Biology</td>
<td></td>
</tr>
<tr>
<td>Creative Writing</td>
<td></td>
</tr>
<tr>
<td>Curriculum and Instruction</td>
<td></td>
</tr>
<tr>
<td>Dental Hygiene</td>
<td></td>
</tr>
<tr>
<td>Dental Therapy</td>
<td></td>
</tr>
<tr>
<td>Dentistry</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td></td>
</tr>
<tr>
<td>Development Practice</td>
<td></td>
</tr>
<tr>
<td>Early Childhood Education</td>
<td></td>
</tr>
<tr>
<td>Earth Sciences</td>
<td></td>
</tr>
<tr>
<td>Ecology, Evolution and Behavior</td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td></td>
</tr>
<tr>
<td>Education, Curriculum, and Instruction</td>
<td></td>
</tr>
</tbody>
</table>

**Twin Cities and Rochester Campuses**

<table>
<thead>
<tr>
<th>Major</th>
<th>Degrees Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Informatics and Computational Biology</td>
<td>M.S., Ph.D.</td>
</tr>
</tbody>
</table>

### Twin Cities Campus Degrees

<table>
<thead>
<tr>
<th>Majors</th>
<th>College/School</th>
<th>Degrees Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountancy</td>
<td>Carlson School of Management</td>
<td>M.Acc.</td>
</tr>
<tr>
<td>Adult Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Aerospace Engineering and Mechanics</td>
<td>Science and Engineering</td>
<td>M.Aero.E., M.S., Ph.D.</td>
</tr>
<tr>
<td>Agricultural Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>American Studies</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Animal Sciences</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Anthropology</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Applied Economics</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Applied Kinesiology</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Applied Plant Sciences</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Architecture</td>
<td>Design</td>
<td>M.Arch., M.S.</td>
</tr>
<tr>
<td>Art</td>
<td>Liberal Arts</td>
<td>M.F.A.</td>
</tr>
<tr>
<td>Art History</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Arts and Cultural Leadership</td>
<td>Continuing Education</td>
<td>M.P.S.</td>
</tr>
<tr>
<td>Asian Literatures, Cultures, and Media</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Astrophysics</td>
<td>Science and Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Audiology</td>
<td>Liberal Arts</td>
<td>Au.D.</td>
</tr>
<tr>
<td>Biochemistry, Molecular Biology and Biophysics</td>
<td>Graduate School</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Bioethics</td>
<td>Graduate School</td>
<td>M.A.</td>
</tr>
<tr>
<td>Biological Science</td>
<td>Continuing Education</td>
<td>M.B.S.</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>Science and Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Biophysical Sciences and Medical Physics</td>
<td>Graduate School</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Bioproduction and Biosystems Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering, and Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Administration</td>
<td>Carlson School of Management</td>
<td>M.B.A., Ph.D.</td>
</tr>
<tr>
<td>Business and Industry Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Business Taxation</td>
<td>Carlson School of Management</td>
<td>M.B.T.</td>
</tr>
<tr>
<td>Chemical Engineering</td>
<td>Science and Engineering</td>
<td>M.Ch.E., M.S.Ch.E., Ph.D.</td>
</tr>
<tr>
<td>Chemical Physics</td>
<td>Science and Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Science and Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Child Psychology</td>
<td>Education and Human Development</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Science and Engineering</td>
<td>M.C.E., M.S., Ph.D.</td>
</tr>
<tr>
<td>Classical and Near Eastern Studies</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Clinical Research</td>
<td>School of Public Health</td>
<td>M.S.</td>
</tr>
<tr>
<td>Cognitive Science</td>
<td>Liberal Arts</td>
<td>Ph.D.</td>
</tr>
<tr>
<td>Communication Studies</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Community Health Promotion</td>
<td>School of Public Health</td>
<td>M.P.H.</td>
</tr>
<tr>
<td>Comparative and Molecular Biosciences</td>
<td>Veterinary Medicine</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Comparative Literature</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Comparative Studies in Discourse and Society</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Science and Engineering</td>
<td>M.C.S., M.S., Ph.D.</td>
</tr>
<tr>
<td>Conservation Biology</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S.</td>
</tr>
<tr>
<td>Creative Writing</td>
<td>Liberal Arts</td>
<td>M.F.A.</td>
</tr>
<tr>
<td>Curriculum and Instruction</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Dental Hygiene</td>
<td>School of Dentistry</td>
<td>M.D.H.</td>
</tr>
<tr>
<td>Dental Therapy</td>
<td>School of Dentistry</td>
<td>M.D.T.</td>
</tr>
<tr>
<td>Dentistry</td>
<td>School of Dentistry</td>
<td>M.S.</td>
</tr>
<tr>
<td>Design</td>
<td>Design</td>
<td>M.A., M.F.A., M.S., Ph.D.</td>
</tr>
<tr>
<td>Development Practice</td>
<td>Humphrey School of Public Policy</td>
<td>M.D.P.</td>
</tr>
<tr>
<td>Early Childhood Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>Science and Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Ecology, Evolution and Behavior</td>
<td>Biological Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Economics</td>
<td>Carlson School of Management</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Education, Curriculum, and Instruction</td>
<td>Education and Human Development</td>
<td>M.A., Ph.D.</td>
</tr>
</tbody>
</table>

12 University of Minnesota Fall 2012 Graduate Education Catalog
<table>
<thead>
<tr>
<th>Field of Study</th>
<th>College/Program</th>
<th>Degree(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Policy and Administration</td>
<td>Education and Human Development</td>
<td>M.A., Ed.D, Ph.D.</td>
</tr>
<tr>
<td>Educational Psychology</td>
<td>Education and Human Development</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>Science and Engineering</td>
<td>M.S.E.E, Ph.D.</td>
</tr>
<tr>
<td>English</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>English as a Second Language</td>
<td>Liberal Arts</td>
<td>M.A.</td>
</tr>
<tr>
<td>Entomology</td>
<td>Biological Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Environmental Health</td>
<td>School of Public Health</td>
<td>M.P.H., M.S., Ph.D.</td>
</tr>
<tr>
<td>Environmental Restoration Engineering and Science</td>
<td>Science and Engineering</td>
<td>M.S.</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>School of Public Health</td>
<td>M.P.H., M.S., Ph.D.</td>
</tr>
<tr>
<td>Experimental and Clinical Pharmacology</td>
<td>Pharmacy</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Experimental Surgery</td>
<td>Medical School</td>
<td>M.S. Exp.Surg.</td>
</tr>
<tr>
<td>Family Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Family Social Science</td>
<td>Education and Human Development</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Feminist Studies</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Financial Mathematics</td>
<td>Carlson School of Management</td>
<td>M.F.M.</td>
</tr>
<tr>
<td>Food Science</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>French</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Geotechnical Engineering</td>
<td>Science and Engineering</td>
<td>M.G.I.S.</td>
</tr>
<tr>
<td>Geographic Information Science</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Geography</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Germanic Studies</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Health Care Administration</td>
<td>School of Public Health</td>
<td>M.H.A.</td>
</tr>
<tr>
<td>Health Informatics</td>
<td>Graduate School</td>
<td>M.H.I., M.S., Ph.D.</td>
</tr>
<tr>
<td>Health Journalism and Communication</td>
<td>Graduate School</td>
<td>M.A.</td>
</tr>
<tr>
<td>Health Services Research, Policy, and Administration</td>
<td>School of Public Health</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Hispanic and Lusophone Literatures, Cultures, and Linguistics</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>History</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>History of Science, Technology, and Medicine</td>
<td>Graduate School</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Horticulture</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.P.S.</td>
</tr>
<tr>
<td>Human Factors and Ergonomics</td>
<td>Design</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Human Resource Development</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Human Resources and Industrial Relations</td>
<td>Carlson School of Management</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Industrial and Systems Engineering</td>
<td>Science and Engineering</td>
<td>M.S.I.Sy.E, Ph.D.</td>
</tr>
<tr>
<td>Infrastructure Systems Engineering</td>
<td>Science and Engineering</td>
<td>M.S.I.S.E</td>
</tr>
<tr>
<td>Integrated Behavioral Health</td>
<td>Continuing Education</td>
<td>M.P.S.</td>
</tr>
<tr>
<td>Integrative Biology and Physiology</td>
<td>Medical School</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Kinesiology</td>
<td>Education and Human Development</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Land and Atmospheric Science</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Landscape Architecture</td>
<td>Design</td>
<td>M.L.A., M.S.</td>
</tr>
<tr>
<td>Leadership in Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>Continuing Education</td>
<td>M.L.S.</td>
</tr>
<tr>
<td>Linguistics</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Literacy Education</td>
<td>Education and Human Development</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Management of Technology</td>
<td>Science and Engineering</td>
<td>M.S.M.O.T.</td>
</tr>
<tr>
<td>Mass Communication</td>
<td>Liberal Arts</td>
<td>M.A., Ph.D.</td>
</tr>
<tr>
<td>Materials Science and Engineering</td>
<td>Science and Engineering</td>
<td>M.Mat.S.E, M.S.Mat.S.E, Ph.D.</td>
</tr>
<tr>
<td>Maternal and Child Health</td>
<td>School of Public Health</td>
<td>M.P.H.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Science and Engineering</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>Science and Engineering</td>
<td>M.S.M.E, Ph.D.</td>
</tr>
<tr>
<td>Medicinal Chemistry</td>
<td>Pharmaceutical Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Microbial Engineering</td>
<td>Biological Sciences</td>
<td>M.S.</td>
</tr>
<tr>
<td>Microbiology, Immunology, and Cancer Biology</td>
<td>Medical School</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Molecular, Cellular, Developmental Biology and Genetics</td>
<td>Graduate School</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Multicultural College Teaching and Learning</td>
<td>Education and Human Development</td>
<td>M.A.</td>
</tr>
<tr>
<td>Music</td>
<td>Liberal Arts</td>
<td>D.M.A., M.A., M.M., Ph.D.</td>
</tr>
<tr>
<td>Natural Resources Science and Management</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Neuroscience</td>
<td>Medical School</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Nursing</td>
<td>School of Nursing</td>
<td>M.N., M.S., Ph.D.</td>
</tr>
<tr>
<td>Nursing Practice</td>
<td>School of Nursing</td>
<td>D.N.P.</td>
</tr>
<tr>
<td>Nutrition</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Occupational Therapy</td>
<td>Academic Health Center</td>
<td>M.O.T.</td>
</tr>
<tr>
<td>Oral Biology</td>
<td>School of Dentistry</td>
<td>M.S., Ph.D.</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>Medical School</td>
<td>M.S., M.S.Otol., Ph.D.Otol.</td>
</tr>
<tr>
<td>Paper Science and Engineering (Discontinued Fall 2012)</td>
<td>Food, Agricultural and Natural Resource Sciences</td>
<td>M.P.S.E.</td>
</tr>
</tbody>
</table>

Information in this PDF is current as of Oct. 1, 2012. For up-to-date information, see [www.catalogs.umn.edu/grad/index.html](http://www.catalogs.umn.edu/grad/index.html).
### Majors and Degrees

<table>
<thead>
<tr>
<th>Minor Only</th>
<th>College/School</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minors</strong></td>
<td><strong>Education and Human Development</strong></td>
</tr>
<tr>
<td>Clinical Physiology and Movement Science</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Developmental Studies and Social Change</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Early Modern Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Education Sciences</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Gerontology</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Human Genetics</td>
<td>Medical School</td>
</tr>
<tr>
<td>Human Rights</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Integrative Therapies and Healing Practices</td>
<td>Graduate School</td>
</tr>
<tr>
<td>International Education</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Interpersonal Relationships Research</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Italian Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Law</td>
<td>Law School</td>
</tr>
<tr>
<td>Literacy and Rhetorical Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Medieval Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Microbial Ecology</td>
<td>Biological Sciences</td>
</tr>
<tr>
<td>Moving Image Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Museum Studies</td>
<td>Design</td>
</tr>
<tr>
<td>Nanoparticle Science and Engineering</td>
<td>Science and Engineering</td>
</tr>
<tr>
<td>Political Psychology</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Population Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Prevention Science</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Product Design</td>
<td>Design</td>
</tr>
<tr>
<td>Program Evaluation</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Public Art</td>
<td>Liberal Arts</td>
</tr>
</tbody>
</table>

---

**Majors and Degrees**

- **Pharmacology** ........................................... Medical School ........................................... M.S., Ph.D.
- **Pharmacy** .................................................. M.S., Ph.D.
- **Philosophy** ............................................. Liberal Arts ........................................... M.A., Ph.D.
- **Physical Therapy** ..................................... Medical School ........................................... D.P.T.
- **Physics** .................................................. Science and Engineering .................................. M.S., Ph.D.
- **Plant Biological Sciences** .......................... Biological Sciences ...................................... M.S., Ph.D.
- **Plant Pathology** ....................................... Food, Agricultural and Natural Resource Sciences .................................... M.S., Ph.D.
- **Political Science** .................................... Liberal Arts ........................................... M.A., Ph.D.
- **Psychology** ............................................. Liberal Arts ........................................... M.A., Ph.D.
- **Public Affairs** ........................................ Humphrey School of Public Affairs ............... M.P.A.
- **Public Health Administration and Policy** ..................... School of Public Health ...................... M.P.H.
- **Public Health Nutrition** ................................ School of Public Health ...................... M.P.H.
- **Public Health Practice** ................................ School of Public Health ...................... M.P.H.
- **Public Policy** ........................................... Humphrey School of Public Affairs ..................... M.P.P.
- **Recreation, Park, and Leisure Studies** (Discontinued Fall 2012) ...................... Education and Human Development ............... M.Ed.
- **Rehabilitation Science** ................................ Medical School ........................................... M.S., Ph.D.
- **Rhetoric, Scientific and Technical Communication** .................. Liberal Arts ........................................... M.A., Ph.D.
- **Science, Technology, and Environmental Policy** .................... Humphrey School of Public Affairs .......... M.S.
- **Scientific and Technical Communication** .......................... Liberal Arts ........................................... M.S.
- **Scientific Computation** ................................ Science and Engineering ........................................... M.S., Ph.D.
- **Security Technologies** .................................. Science and Engineering ........................................... M.S.S.T.
- **Social and Administrative Pharmacy** .................. Pharmacy ........................................... M.S., Ph.D.
- **Social Work** ............................................. Education and Human Development ..................... M.S.W., Ph.D.
- **Sociology** .................................................. Liberal Arts ........................................... M.A., Ph.D.
- **Software Engineering** ................................ Science and Engineering ........................................... M.S.S.E.
- **Special Education** ..................................... Education and Human Development ..................... M.Ed.
- **Speech-Language-Hearing Sciences** ................................ Education and Human Development ..................... M.A., Ph.D.
- **Sport Management** ...................................... Education and Human Development ..................... M.A.
- **Statistics** .................................................. Liberal Arts ........................................... M.S., Ph.D.
- **Stem Cell Biology** ..................................... Medical School ........................................... M.S.
- **Strategic Communication** ................................ Liberal Arts ........................................... M.A.
- **Surgery** .................................................. Medical School ........................................... M.S.Surg., Ph.D.Surg.
- **Teaching** .................................................. Education and Human Development ..................... M.Ed.
- **Theatre Arts** ............................................ Liberal Arts ........................................... M.A., M.F.A., Ph.D.
- **Urban and Regional Planning** ................................ Humphrey School of Public Affairs ............. M.U.R.P.
- **Veterinary Medicine** .................................... Veterinary Medicine ........................................... M.S., Ph.D.
- **Youth Development Leadership** ................................ Education and Human Development ..................... M.Ed.
<table>
<thead>
<tr>
<th>Postbaccalaureate Certificate/Endorsement</th>
<th>College/School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addiction Studies</td>
<td>Continuing Education</td>
</tr>
<tr>
<td>Adult Education</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Adult Literacy</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Advanced Practices in Second Language Teaching</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Aging Studies</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Applied Behavior Analysis</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Applied Developmental Psychology</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Autism Spectrum Disorders</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Career and Technical Education</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Clinical Physiology and Movement Science</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Clinical Research</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Community and Learning</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Disability Policy and Services</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Dual Language and Immersion Education</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Early Childhood Policy</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>French Studies</td>
<td>Liberal Arts</td>
</tr>
<tr>
<td>Fundamentals of Quantitative Finance</td>
<td>Science and Engineering</td>
</tr>
<tr>
<td>Health Care Design and Innovation</td>
<td>Graduate School</td>
</tr>
<tr>
<td>Housing Studies</td>
<td>Design</td>
</tr>
<tr>
<td>Human Resource Development</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Infant and Early Childhood Mental Health</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Innovation Studies</td>
<td>Continuing Education</td>
</tr>
<tr>
<td>Innovations in Undergraduate Multicultural</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Integrative Therapies and Healing Practices</td>
<td>Graduate School</td>
</tr>
<tr>
<td>Leadership in Health Information Technology for Health Professionals</td>
<td>School of Nursing</td>
</tr>
<tr>
<td>Management Fundamentals</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Management Studies in Health Services Administration ISP-I (Discontinued Fall 2012)</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Management Studies in Health Services Administration ISP-II (Discontinued Fall 2012)</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Management Studies in Health Services Administration ISP-III (Discontinued Fall 2012)</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Metropolitan Design</td>
<td>Design</td>
</tr>
<tr>
<td>Nonprofit Management</td>
<td>Humphrey School of Public Affairs</td>
</tr>
<tr>
<td>Online Distance Learning</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Parent Education</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Performance Improvement (See Public Health Postbaccalaureate Certificate in Performance Improvement, below)</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>PK-12 Administration</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Policy Issues on Work and Pay</td>
<td>Humphrey School of Public Affairs</td>
</tr>
<tr>
<td>Professional Development</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Program Evaluation</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Public Affairs Leadership</td>
<td>Humphrey School of Public Affairs</td>
</tr>
<tr>
<td>Public Health Core Concepts</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Public Health Food Protection</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Public Health Occupational Health (Discontinued Fall 2012)</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Public Health Postbaccalaureate Certificate in Performance Improvement</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Public Health Preparedness, Response, and Recovery</td>
<td>School of Public Health</td>
</tr>
<tr>
<td>Stream Restoration Science and Engineering</td>
<td>Science and Engineering</td>
</tr>
<tr>
<td>Surface Design</td>
<td>Design</td>
</tr>
<tr>
<td>Talent Development and Gifted Education</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>Teaching Writing and Critical Literacy</td>
<td>Education and Human Development</td>
</tr>
</tbody>
</table>

Information in this PDF is current as of Oct. 1, 2012. For up-to-date information, see www.catalogs.umn.edu/grad/index.html.
General Information

Technical Communication ......................................................... Liberal Arts
Technology Enhanced Learning:
  K-12 Technology Integration ................................................... Education and Human Development
Technology Enhanced Learning:
  Multimedia Design and Development .................................. Education and Human Development
Transportation Studies ......................................................... Continuing Education

Additional Licensure

Postgraduate Certificates  
College/School
Adult Health/Gerontological Clinical Nurse Specialist .......... School of Nursing
Adult Health/Gerontological Nurse Practitioner ................. School of Nursing
Family Nurse Practitioner .................................................. School of Nursing
Nurse Midwifery ................................................................. School of Nursing
Pediatric Clinical Nurse Specialist ...................................... School of Nursing
Pediatric Nurse Practitioner ............................................... School of Nursing
Psychiatric Mental Health Nurse Practitioner .................... School of Nursing
Women's Health Care Nurse Practitioner ......................... School of Nursing

Specialist Certificates in Education  
College/School
Educational Psychology Specialist Certificate in Education and Counseling ................................................ Education and Human Development
Educational Psychology Specialist Certificate in Education and School Psychological Services ......................... Education and Human Development
Educational Psychology Specialist Certificate in Education and Special Education ........................................ Education and Human Development
Specialist Certificate in Education and General Education Administration ............................................. Education and Human Development
Specialist Certificate in Education and Special Education Administration ................................................ Education and Human Development
### Duluth Campus Degrees

<table>
<thead>
<tr>
<th>Majors</th>
<th>College/School</th>
<th>Degrees Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advocacy and Political Leadership</td>
<td>College of Liberal Arts</td>
<td>M.A.P.L.</td>
</tr>
<tr>
<td>Applied and Computational Mathematics</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.</td>
</tr>
<tr>
<td>Art</td>
<td>School of Fine Arts</td>
<td>M.F.A.</td>
</tr>
<tr>
<td>Business Administration</td>
<td>Labovitz School of Business and Economics</td>
<td>M.B.A.</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.</td>
</tr>
<tr>
<td>Communication Sciences and Disorders</td>
<td>College of Education and Human Service Professions</td>
<td>M.A.</td>
</tr>
<tr>
<td>Computer Science</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.</td>
</tr>
<tr>
<td>Criminology</td>
<td>College of Liberal Arts</td>
<td>M.A.</td>
</tr>
<tr>
<td>Education</td>
<td>College of Education and Human Service Professions</td>
<td>M.Ed.</td>
</tr>
<tr>
<td>Electrical and Computer Engineering (To be discontinued)</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.E.C.E.</td>
</tr>
<tr>
<td>Engineering</td>
<td>Swenson College of Science and Engineering</td>
<td>M.Eng.</td>
</tr>
<tr>
<td>Engineering Management</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.E.M.</td>
</tr>
<tr>
<td>English</td>
<td>College of Liberal Arts</td>
<td>M.A.</td>
</tr>
<tr>
<td>Environmental Health and Safety</td>
<td>College of Education and Human Service Professions</td>
<td>M.Ed</td>
</tr>
<tr>
<td>Geological Sciences</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.E.C.E.</td>
</tr>
<tr>
<td>Integrated Biosciences</td>
<td>All-University</td>
<td>M.S.</td>
</tr>
<tr>
<td>Liberal Studies</td>
<td>College of Liberal Arts</td>
<td>M.L.S.</td>
</tr>
<tr>
<td>Music</td>
<td>School of Fine Arts</td>
<td>M.M.</td>
</tr>
<tr>
<td>Physics</td>
<td>Swenson College of Science and Engineering</td>
<td>M.S.</td>
</tr>
<tr>
<td>Social Work</td>
<td>College of Education and Human Service Professions</td>
<td>M.S.W.</td>
</tr>
<tr>
<td>Special Education</td>
<td>College of Education and Human Service Professions</td>
<td>M.Spec.Ed.</td>
</tr>
<tr>
<td>Teaching and Learning</td>
<td>College of Education and Human Service Professions</td>
<td>Ed.D.</td>
</tr>
<tr>
<td>Toxicology</td>
<td>Medical School–Duluth Campus</td>
<td>M.S.</td>
</tr>
<tr>
<td>Tribal Administration and Governance</td>
<td>College of Liberal Arts</td>
<td>M.T.A.G.</td>
</tr>
<tr>
<td>Water Resources Science</td>
<td>All-University</td>
<td>M.S.</td>
</tr>
</tbody>
</table>

### Minor Only

- **Linguistics**
  College of Liberal Arts

### Postbaccalaureate Credit Certificates

<table>
<thead>
<tr>
<th>Certificates</th>
<th>College/School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autism Spectrum Disorders</td>
<td>College of Education and Human Service Professions</td>
</tr>
<tr>
<td>Educational Computing and Technology</td>
<td>College of Education and Human Service Professions</td>
</tr>
<tr>
<td>Environmental Education</td>
<td>College of Education and Human Service Professions</td>
</tr>
<tr>
<td>Fetal Alcohol Spectrum Disorders</td>
<td>College of Education and Human Service Professions</td>
</tr>
</tbody>
</table>
Twin Cities Campus
Occupational Therapy M.O.T.
Allied-Occupational Therapy
Academic Health Center Shared

Contact Information:
Program in Occupational Therapy, MMC 368, 420 Delaware Street S.E., Minneapolis, MN 55455 (877-334-2659; fax: 612-626-8127)
Email: cahpinfo@umn.edu
Website: http://www.cahp.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 78
- This program requires summer semesters for timely completion.
- Rochester campus.
- Degree: Master of Occupational Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Program in Occupational Therapy (OT) is a 22-25 month, 78-credit, graduate-level professional program completed over the course of five semesters.

Graduates of the program are eligible to sit for the national certification examination for the occupational therapist administered by the National Board for Certification in Occupational Therapy (NBCOT). In addition, most states require licensure in order to practice; however, state licenses are usually based on the results of the NBCOT Certification Examination.

The program has been continuously accredited since its inception in 1946. In 2007, a new performance site was accredited making the OT program available in both Minneapolis and Rochester, Minn. Both performance sites are permitted by ACOTE to enroll and graduate students.

Accreditation
This program is accredited by Accreditation Council for Occupational Therapy Education (ACOTE)

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree in order to apply to the Program in Occupational Therapy.

Core Prerequisite Courses
There are seven core prerequisite courses required for admission to the Program in Occupational Therapy. Five of the seven must be completed at the time of application. All prerequisite courses must be completed no later than the end of summer session of the year of admission. There is one non-core prerequisite, Medical Terminology, which may be taken for college credit or online. Prerequisite courses must be fulfilled with a minimum number of semester credits, listed next to each course.

- Human Anatomy (3 cr)
- Human Physiology (3 cr)
- Statistics (3 cr)
  This course must include descriptive and inferential statistics.
- General Psychology (3 cr)
- Abnormal Psychology (3 cr)
- Human Development Across Life Span (3 cr)

Students will be required to verify that the course(s) taken covered content from conception to death. Students may need to take a series of courses to complete this prerequisite.

Sociology/Anthropology
This course should include content related to human societies and behaviors, social theory and theories of social change, methods of study in sociology, characteristics of social units (for example, race/ethnicity, economics/social organizations, gender, politics, religious systems) and the impact of cultural diversity.

Intro to Sociology (3 cr)
or Cultural Anthropology (3 cr)

Non-Core Prerequisite
Medical Terminology (1 cr)
An online course equivalent to 1 college credit may be substituted.

Computer Competency: Applicants admitted to the Program in Occupational Therapy will be expected to be competent in using a computer to type, edit, format, and print documents.

Practical Experience: Although this type of experience is suggested, but not required for application, the Admissions Committee does consider an applicant's optional observation, volunteer and/or work experience in occupational therapy and other health-related areas and believes these experiences strengthen the application.

Special Application Requirements:
Applicants should complete a prerequisite planning sheet found under the tab Prerequisite Planning and Pre-program Advising in order to determine which prerequisites have been fulfilled.

If the OT program does not list the student's school(s), or if the Prerequisite Planning Sheet for the student's school(s) does not list the courses taken, the student should send course description(s) for each course taken that the student believes fulfills a prerequisite requirement. The student should include an email outlining the course(s) for which descriptions are being submitted and which prerequisite they complete. Send this information to cahpinfo@umn.edu.

Criminal Background Studies
The State of Minnesota Department of Health requires criminal background studies on all students admitted to the Program in Occupational Therapy. Failure to pass the background study may preclude successful completion of the program. A felony conviction may affect a graduate's ability to sit for the National Board for Certification in Occupational Therapy certification examination or attain state licensure. Information on national certification is available from:

National Board for Certification in Occupational Therapy
800 S. Frederick Avenue, Suite 200
Gaithersburg, MD 20877-4150
(301) 990-7979
www.nbcot.org

Admitted students are provided detailed instructions for how to request a criminal background study soon after beginning the program.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 78 major credits and null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Students will engage in a group or individual study of a research question related to occupational therapy. Students will demonstrate a high level of critical thinking as they plan, conduct, and evaluate their mentored scholarly project. Students will submit a written description of their project in APA format and defend their scholarly project through a oral or poster presentation.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

In addition to their coursework, students will complete two 12-week, full-time fieldwork experiences.

Year One
The first year of study focuses on building a firm foundation in the study of activity and occupation; society, community, family, and environmental influences on human occupation; and foundations of occupational therapy practice when human occupation is reduced. Students participate in their communities and with their interprofessional colleagues as they practice professional level skills. Two Level I fieldwork experiences provide guided practice in the role of occupational therapy.

**Fall Semester**
3-4 sessions face-to-face
- CAHP 5110 - Foundations of Interprofessional Communication and Collaboration (1.0 cr)
- OT 6100 - Public and Professional Engagement I (0.5 cr)
- OT 6101 - Foundations of Occupational Science and Occupational Therapy (4.0 cr)
- OT 6102 - Professional Identity: Behaviors and Attitudes (2.0 cr)
- OT 6103 - Occupational Therapy Process for Society (3.0 cr)
- OT 6111 - Foundations: Occupations as Therapy (3.0 cr)
- OT 6113 - Occupational Therapy Process for Community (3.0 cr)

**Spring Semester**
6-8 sessions face-to-face
- OT 6200 - Public and Professional Engagement II (0.5 cr)
- OT 6201 - Functional Anatomy and Kinesiology (3.0 cr)
- OT 6202 - Occupational Therapy Process for Individuals: Occupation Through Compensation (5.0 cr)
- OT 6203 - Occupational Therapy Process for Family (2.0 cr)
- OT 6213 - Occupational Therapy Process for Individuals: Medical Contexts (2.0 cr)
- OT 7201 - Scholarly Inquiry in Health Sciences (4.0 cr)

**Summer Semester**
8-15 sessions face-to-face
- OT 6200 - Public and Professional Engagement II (0.5 cr)
- OT 6301 - Neuroscience (5.0 cr)
- OT 6302 - Occupational Therapy Process for Individuals: Occupation Through Remediation (4.0 cr)
- OT 6312 - Occupational Therapy Process for Individuals: Psychosocial Approaches (3.0 cr)
- OT 6322 - Occupational Therapy Process for Individuals: Work Contexts (2.0 cr)
- OT 7394 - Scholarly Project in OT I (2.0 cr)

**Year Two**
Year two shifts focus from conceptual coursework to an emphasis on practice. Students apply concepts of occupational therapy in a broad range of contexts including work, school, and group settings. Students practice during Level I fieldwork and community engagement. Six months is devoted to Level II fieldwork where students practice under the direct supervision of an occupational therapist in a medical and/or community setting. Students should expect to travel to at least one field site.

**Fall Semester**
15 sessions face-to-face
- OT 6200 - Public and Professional Engagement II (0.5 cr)
- OT 6402 - Occupational Therapy Process for Individuals: Occupation Through Neurorehabilitative Approaches (4.0 cr)
- OT 6403 - Management of Occupational Therapy Services (1.0 cr)
- OT 6412 - Occupational Therapy Process for Individuals: Orthotics and Prosthetics (3.0 cr)
- OT 6422 - Occupational Therapy Process: Group Context (2.0 cr)
- OT 6432 - Occupational Therapy Process for Individuals: Educational Context (2.0 cr)
- OT 7494 - Scholarly Project in OT II (4.0 cr)

**Spring Semester**
- OT 7596 - Occupational Therapy Level II Fieldwork I (6.0 cr)
- OT 7696 - Occupational Therapy Level II Fieldwork II (6.0 cr)

**Program Sub-plans**
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Integrated Biosciences M.S.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218- 726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the master of science (M.S.) degree under Plan A (coursework and original thesis). The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college/university in the biological or physical sciences or a related field. Background in a variety of subdisciplines is appropriate preparation.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Recommended undergraduate courses for applicants pursuing the M.S. degree include one year each of chemistry, biology, and physics. One semester of calculus is also recommended. Applicants are strongly encouraged to have taken other advanced courses in chemistry, biology, additional calculus, and introductory statistics.

Required Coursework
Twin Cities Campus
Integrated Biosciences Ph.D.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Integrated Biosciences Graduate Program, University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- The Integrated Biosciences Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Integrated Biosciences Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the doctor of philosophy (Ph.D.) degree. The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
  • via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college or university in the biological or physical sciences or a related field.

Recommended undergraduate courses for applicants pursuing the Ph.D. degree include one year each of chemistry, biology, physics, calculus, and advanced chemistry. One semester (minimum) of statistics is also recommended.

Additional recommended courses for students in the ecology, organismal, and population (EOP) emphasis include one year of calculus, one semester each of ecology and evolutionary biology along with one course in two of the following subjects: genetics, cell biology, biochemistry.

Additional recommended courses for students in the cell, molecular, and physiological (CMP) emphasis include one year of organic chemistry plus one course in each of the following: genetics, cell biology, and biochemistry.

Applicants must submit their test score(s) from the following:
  • GRE

International applicants must submit score(s) from one of the following tests:
  • TOEFL
    - Internet Based - Total Score: 79
    - Internet Based - Writing Score: 21
    - Internet Based - Reading Score: 19
    - Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80
The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

20 credits are required in the major.

12 credits are required outside the major.

24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Ph.D. Written Preliminary Examination: In addition to completing the curriculum for the major and internal related fields, students will be required to pass both a written and oral preliminary examination prior to completing the Ph.D. program. The preliminary written examination will be administered once the student has completed the majority of the required coursework. This will typically occur in the summer of the second year. The written examination will consist of a completed NIH or NSF grant application for the student's proposed research project. The project will be evaluated by the Thesis Examining Committee, which will also serve as the student's Final Oral Examining Committee to provide continuity of advice during the length of the student's research program.

Ph.D. Oral Preliminary Examination: The oral preliminary examination will be administered within two months of the successful completion of the preliminary written examination. The examination will be administered by the graduate faculty according to Graduate School regulations and all students will be required to pass the oral examination to continue in the Ph.D. program. Within one semester of passing the preliminary oral examination, each Ph.D. student must file a Thesis Proposal Form with the Graduate School.

Ph.D. Final Oral Defense: Most students will complete the requirements for the Ph.D. degree within five years. The final oral defense will be conducted by the graduate faculty according to Graduate School regulations. It will consist of a public seminar presented by the student.
Twin Cities Campus
Toxicology M.S.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Toxicology Graduate Program, Medical School Duluth, 162 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-6354; fax: 218-726-8014)
Email: toxgrad@d.umn.edu
Website: http://www.ahc.umn.edu/toxicology

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36 to 38
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This University-wide program provides comprehensive training in the broad scope of toxicology. Toxicology, the science of poisons, is devoted to identifying and quantifying potential noxious agents in our environment. Although most chemical agents at sufficiently large doses may be toxic, not all present a significant risk to human health or to environmental organisms or ecosystems. Accordingly, the essence of the science of toxicology is defining the fine line that distinguishes a risk from a residue. To accomplish this requires scientific expertise in such areas as analytical and environmental chemistry, biology, and mathematics. Advanced courses and research are also available in such subdisciplines as human health risk assessment, epidemiology, environmental chemistry and engineering ecotoxicology, food additives and nutritional toxicology, biochemical and physiological mechanisms, histopathology, diagnostic and analytical toxicology, drug metabolism, chemical carcinogenesis, behavioral toxicology, and the toxicity of noxious agents to various organ systems (e.g., nervous, heart, liver, kidneys).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree or its foreign equivalent from a recognized college or university with a full year each of biology, organic chemistry, and physics, as well as mathematics.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 22 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The master of science degree is offered under Plan A and Plan B. Plan A requires 22 course credits and 10 thesis credits; Plan B requires 30 course credits. A core curriculum of 8 credits in toxicology (TXCL 8012, 8013, and 8100) is required for both plans. Additional courses are arranged on an individual basis.
Twin Cities Campus
Toxicology Minor
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Toxicology Graduate Program, Medical School Duluth, 162 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-6354; fax: 218-726-8014)
Email: toxgrad@d.umn.edu
Website: http://www.ahc.umn.edu/toxicology

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 12
• Length of program in credits (Doctorate): 12
• This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This University-wide program provides comprehensive training in the broad scope of toxicology. Toxicology, the science of poisons, is devoted to identifying and quantifying potential noxious agents in our environment. Although most chemical agents at sufficiently large doses may be toxic, not all present a significant risk to human health or to environmental organisms or ecosystems. Accordingly, the essence of the science of toxicology is defining the fine line that distinguishes a risk from a residue. To accomplish this requires scientific expertise in such areas as analytical and environmental chemistry, biology, and mathematics. Advanced courses and research are also available in such subdisciplines as human health risk assessment, epidemiology, environmental chemistry and engineering, ecotoxicology, food additives and nutritional toxicology, biochemical and physiological mechanisms, histopathology, diagnostic and analytical toxicology, drug metabolism, chemical carcinogenesis, behavioral toxicology, and the toxicity of noxious agents to various organ systems (e.g., nervous, heart, liver, kidneys).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minor is available at the doctoral level and requires 12 credits: 8 credits of core courses and 4 credits of advanced toxicology courses.
Twin Cities Campus
Toxicology Ph.D.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Toxicology Graduate Program, Medical School Duluth, 162 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-6354; fax: 218-726-8014)
Email: toxgrad@d.umn.edu
Website: http://www.ahc.umn.edu/toxicology

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program requires summer semesters for timely completion.
- The Toxicology Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Toxicology Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This University-wide program provides comprehensive training in the broad scope of toxicology. Toxicology, the science of poisons, is devoted to identifying and quantifying potential noxious agents in our environment. Although most chemical agents at sufficiently large doses may be toxic, not all present a significant risk to human health or to environmental organisms or ecosystems. Accordingly, the essence of the science of toxicology is defining the fine line that distinguishes a risk from a residue. To accomplish this requires scientific expertise in such areas as analytical and environmental chemistry, biology, and mathematics. Advanced courses and research are also available in such subdisciplines as human health risk assessment, epidemiology, environmental chemistry and engineering, ecotoxicology, food additives and nutritional toxicology, biochemical and physiological mechanisms, histopathology, diagnostic and analytical toxicology, drug metabolism, chemical carcinogenesis, behavioral toxicology, and the toxicity of noxious agents to various organ systems (e.g., nervous, heart, liver, kidneys).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree or its foreign equivalent from a recognized college/university. At least a full year each of biology, organic chemistry, and physics, as well as mathematics.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
22 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The doctor of philosophy degree requires core courses in physiology (4 credits), biochemistry (6 credits), statistics (2 credits), and toxicology (10 credits). Students must also complete 12 credits in a minor or supporting program and 24 thesis credits. Because the program spans the Duluth and Twin Cities campuses, the required courses differ on each campus.

Additional advanced courses in toxicology or related fields may be specified by the adviser. Students must complete and defend an original research project.
Twin Cities Campus
Water Resources Science M.S.
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, University of Minnesota, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- University of Minnesota, Duluth
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the M.S. level: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Microbiology; Plant Biology; Soil, Water, and Climate; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; Physics; and Political Science; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a bachelor's degree in physical or biological science or engineering.

Recommended academic preparation includes one year (or two semesters) each of calculus, physics, and chemistry, and one biology course.

Availability of funding and willingness of a member of the graduate faculty to serve as an adviser are important criteria for admission to the program.
Special Application Requirements:
Applicants must submit three letters of recommendation via the Graduate School ApplyYourself website. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE General Test. Students may be admitted any semester but are strongly encouraged to submit their application by December 15 for fall semester admission. More specific application instruction can be found on the program website: wrs.umn.edu/prospectivestudents/apply/index.htm.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is defined by the faculty adviser. The Plan B option is well suited to students who have little undergraduate course work in water resources science and thus need more coursework to gain the combination of depth and breadth needed in this field. Plan B projects involve field, laboratory or computer work and the analysis, synthesis, or interpretation of data.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students may choose Plan A, which requires a thesis, or Plan B, which requires additional coursework and a major project. Both plans incorporate courses offered on the Twin Cities and Duluth campuses.

Students must complete courses in four core areas: 1) hydrology (surface and/or hydrogeology); 2) environmental/water chemistry; 3) limnology; and 4) water resources policy, economics, and management, and two electives in such areas of emphasis as aquatic biology, hydrologic science, watershed science and management, and water management technology. One elective must be from an approved list of technical courses dealing with water quality science/management. A minimum of two related field courses (at least 6 credits) outside of aquatic science are required. Registration for the WRS Seminar during the first semester in residence and training in responsible conduct of research and ethics are also required.

Approved core and area of emphasis courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/index.htm.

A minimum of 20 course credits (plus 10 thesis credits) are required for Plan A and a minimum of 30 credits are required for Plan B (up to 3 credits may be used for the Plan B project). Students who had classes equivalent to those in the WRS core as undergraduates may substitute other classes to meet minimum credit requirements.
**Program Sub-plans**

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

**Limnology and Oceanography**

The science of inland waters, or “limnology,” includes the study of streams, lakes, ponds, and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology. A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical and chemical sciences. Such interdisciplinary fields in the modern research university require mechanisms to insure cross-fertilization of ideas, approaches, methods, techniques, and knowledge. The limnology and oceanography track in WRS provides just such a much-needed mechanism.

The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography.

Students may choose Plan A, which requires a thesis, or Plan B, which requires additional coursework and a major project. Specific curriculum for the limnology and oceanography track follows WRS course requirements. Both plans incorporate courses offered on the Twin Cities and Duluth campuses.

Students must complete courses in four limnology and oceanography track core areas: 1) hydrology (surface and/or hydrogeology); 2) environmental/water chemistry; 3) limnology; and 4) water resources policy, economics, and management; and one elective must be from an approved list of technical courses dealing with water quality science/management. An additional one or two electives in limnology and oceanography are also required. A minimum of two related field courses (at least 6 credits) outside of aquatic science are required. Registration for the WRS Seminar during the first semester in residence and training in responsible conduct of research and ethics are also required.

A minimum of 20 course credits (plus 10 thesis credits) are required for Plan A and a minimum of 30 credits are required for Plan B (up to 3 credits may be used for the Plan B project). Students who had classes equivalent to those in the WRS core as undergraduates may substitute other classes to meet minimum credit requirements.

The faculty adviser must be a member of the limnology and oceanography track faculty.

Approved limnology and oceanography track core and elective courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/landotrack/index.htm.
Twin Cities Campus
Water Resources Science Minor
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- University of Minnesota Duluth

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the M.S. and Ph.D. levels: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Microbiology; Plant Biology; Soil, Water, and Climate; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; Physics; and Political Science; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires 9 credits, including WRS 5101 (3 credits) and two of the other core courses described under M.S. degree requirements. Doctoral students must complete 12 credits, including WRS 5101 (3 credits), a core courses described under the M.S. degree requirements, and two electives from one of the areas of emphasis.
**Twin Cities Campus**

**Water Resources Science Ph.D.**

*Water Resources Center*

*Graduate School*

Link to a list of faculty for this program.

**Contact Information:**

Water Resources Science, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)

Email: wrs@umn.edu

Website: [http://wrs.umn.edu](http://wrs.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- The Water Resources Science Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Water Resources Science Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the Ph.D. level: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Microbiology; Plant Biology; Soil, Water, and Climate; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering Geography; Geological Sciences; Physics; Political Science; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a bachelor's or master's degree in physical or biological science or engineering.

Recommended academic preparation includes one year (or two semesters) each of calculus, physics, and chemistry, and one biology course at the undergraduate level.

Availability of funding and willingness of a member of the graduate faculty to serve as an adviser are important criteria for admission to the Ph.D. program.
Special Application Requirements:
Applicants must submit three letters of recommendation via the Graduate School ApplyYourself website. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE. Students may be admitted any semester but are strongly encouraged to submit their application by December 15 for fall semester admission. More specific application instruction can be found on the program website: wrs.umn.edu/prospectivestudents/apply/index.htm.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Coursework is tailored to student interests, and many areas of emphasis are possible. Core courses are offered on both the Twin Cities and Duluth campuses.

Students complete coursework equivalent to that of an M.S. in water resources science, with additional coursework in an area of emphasis. There are no specific credit requirements in the major, but Ph.D. programs normally include at least 40 course credits beyond the B.S. level, including relevant coursework taken for a master's degree and a required minimum of 12 credits in a supporting or minor program.

Approved core and area of emphasis courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/index.htm.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Limnology and Oceanography
The science of inland waters, or "limnology," includes the study of streams, lakes, ponds and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology. A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical, and chemical sciences.

This track within the cross-campus interdisciplinary WRS program provides comprehensive training in limnology and oceanography. As is the case for the WRS graduate program as a whole, the L&O program includes a set of core courses plus electives in the subfield of limnology and oceanography.

The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography. Faculty on both Twin Cities and Duluth campuses participate in the limnology and oceanography track. WRS limnology and oceanography faculty list: http://wrs.umn.edu/faculty/landotracklist/index.htm.

Specific curriculum for the limnology and oceanography track follows WRS course requirements. Core courses are offered on both the Twin Cities and Duluth campuses.

Students must complete coursework equivalent to that of an M.S. in the water resources science limnology and oceanography track, with additional coursework in an area of limnology and oceanography. There are no specific credit requirements in the major, but Ph.D. programs normally include at least 40 course credits beyond the B.S. level, including relevant coursework taken for a master's degree and a required minimum of 12 credits in a supporting or minor program.

Ph.D. students pursuing this track must have at least two members of the limnology and oceanography track faculty on their committee including the adviser.

Approved limnology and oceanography track core and elective courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/landotrack/index.htm.
Twin Cities Campus
Biomedical Informatics and Computational Biology M.S.
R Bioscience/Biotechnology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Those interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

The M.S. is offered under two plans: Plan A (with thesis), and Plan B (with project). Plan A is considered suitable for students planning to pursue careers that require a limited research experience or those planning to continue their education in a Ph.D. program. It is also suitable for students with full-time employment whose thesis can be related to their work assignments. Plan B is suitable for students planning to work in settings where technical knowledge is more germane than research experience.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences. The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

In addition to completing the online application form, applicants must submit a personal statement, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in biomedical informatics and computational biology. Applicants should also indicate the names of the BICB graduate faculty whose interests overlap their own. Although there is no page limit for the personal statement, 2-3 pages are recommended.

Special Application Requirements:
Applications for the M.S. program are accepted throughout the year for either fall or spring.

GRE scores may be waived for students with significant work or academic experience.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under two plans: Plan A (with thesis), and Plan B (with project).

Plan A is considered suitable for students planning to pursue careers that require a limited research experience or those planning to continue their education in a Ph.D. program. Plan A students defend their thesis in public and must pass an oral examination. Plan A is suitable for students with full-time employment whose thesis can be related to their work assignments.

Plan B is suitable for students planning to work in settings where technical knowledge is more germane than research experience.

The requirements include 20 course credits for Plan A and 30 course credits for Plan B.

Up to 6 credits outside the major may be taken but are not required.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus

Biomedical Informatics and Computational Biology Minor

R Bioscience/Biotechnology

Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.
• The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Master's Minor: A minimum of 9 credits must be completed in Core Area 1 and one of Core Areas 2-5.

Doctoral Minor: A minimum of 12 credits must be completed in Core Area 1 and two of Core Areas 2-5.

Graduate students choose from a list of courses that satisfy requirements in core areas and electives.

There are five core areas:
1. Biochemistry, molecular and cell biology
2. Database, data mining, and computing
3. Informatics, analysis, and machine learning
4. Mathematics, biostatistics, and statistics
5. Computational and systems biology

Students choose elective courses from the following eight areas:
1. Biochemistry, molecular and cell biology
2. Informatics, database, data mining, and computing
3. Mathematics, biostatistics, and statistics
4. Chemistry, chemical engineering, and physics
5. Biophysics and structural biology
6. Imaging, information theory, and signal processing
7. Computational chemistry, medicinal chemistry, and drug design
8. Clinical and translational sciences

Core/elective courses are listed on the courses page of the BICB Student Handbook (http://r.umn.edu/academics-research/bicb/graduate-program/student-handbook/courses). The adviser(s), together with the DGS, will ensure that the student selects appropriate courses.
Twin Cities Campus

Biomedical Informatics and Computational Biology Ph.D.
R Bioscience/Biotechnology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program requires summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. The Ph.D. program includes an industrial or clinical internship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences. The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

In addition to completing the online application form, applicants must submit a personal statement, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in biomedical informatics and computational biology. Prospective students should also indicate the names of the BICB graduate faculty whose interests overlap with their own. The department strongly encourages applicants to contact these faculty members before applying. Although there is no page limit for the personal statement, 2-3 pages are recommended.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are admitted only for the fall semester.

GRE scores may be waived for students with significant work or academic experience.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Ph.D. students take preliminary written exams at the end of the second year of study, which focuses on the development of a research proposal. An oral preliminary exam focuses on the plan for thesis research and the student's coursework and is taken by the fall of the third year of full-time registration or its equivalent. At least 24 course credits are required to gain competency in both biology and quantitative areas related to biomedical informatics and computational biology. An internship is required, which may be waived for students with equivalent experience. Additionally, 24 thesis credits are required. Ph.D. students defend their thesis in public and must pass an oral examination.

An internship is required, which may be waived for students with equivalent experience.

Up to 9 credits outside the major may be taken but are not required.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus

Ecology, Evolution and Behavior M.S.

Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Email: wiggins@umn.edu
Website: http://www.cbs.umn.edu/eeb/graduateprogram

- Program Type: Master's
- Requirements for this program are current for Spring 2013
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Courses in inorganic chemistry, organic chemistry, biochemistry, general physics, one year of college calculus, animal biology, genetics, physiology, and plant biology are strongly recommended and provide an important background to pursue graduate work in EEB. Proficiency in a foreign language is not required but is strongly recommended for students who expect to pursue field work in a country where English is not the native language. Deficiencies must be made up early in the graduate program.

Special Application Requirements:
Students are admitted only in fall semester. Deadline for application is December 1. Refer to the EEB website for more details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Plan B requires 10 additional course credits and one to three research papers, which may be written in conjunction with graduate courses. Significant field or laboratory experience and competence in statistics, to include hypothesis testing, regression, and correlation are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under both Plan A (with thesis) and Plan B (without thesis). Both plans require a minimum of 14 course credits in the major and a minimum of 6 course credits in one or more related fields outside the major. Plan A also requires 10 thesis credits, and Plan B requires 10 additional course credits and one to three research papers, which may be written in conjunction with graduate courses. Significant field or laboratory experience and competence in statistics, to include hypothesis testing, regression, and correlation are required. Degree programs are planned by the student and an advisory committee of three faculty members to meet the student's interests and needs.

**Joint- or Dual-degree Coursework:** Joint Degree Program in Law, Health & the Life Sciences Student may take a total of 12 credits in common among the academic programs.
**Twin Cities Campus**

**Ecology, Evolution and Behavior Minor**

*Ecology, Evolution & Behavior*

**College of Biological Sciences**

Link to a list of faculty for this program.

**Contact Information:**
Email: wiggins@umn.edu
Website: [http://www.cbs.umn.edu/eeb/graduateprogram](http://www.cbs.umn.edu/eeb/graduateprogram)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2012
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A minimum of 7 credits selected from BIOL 5407, BIOL 5409, BIOL 5411, and EEB 4xxx, 5xxx, or 8xxx courses is required for a master's minor in EEB.

A minimum of 12 credits selected from BIOL 5407, BIOL 5409, BIOL 5411, and EEB 4xxx, 5xxx, or 8xxx courses is required for a doctoral minor in EEB.
Twin Cities Campus
Ecology, Evolution and Behavior Ph.D.
Ecology, Evolution & Behavior
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Email: wiggins@umn.edu
Website: http://www.cbs.umn.edu/eeb/graduateprogram

- Program Type: Doctorate
- Requirements for this program are current for Spring 2013
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in ecology, evolution, and behavior (EEB) links faculty and students interested in the biology of organisms from molecules to ecosystems. Studies address questions from molecular mechanisms of evolution, the interactions of organisms in social groups and populations, the distributions and abundances of species in communities and ecosystems, to global biogeochemical processes. The program provides broad training in the general areas of ecology, evolution, and animal behavior, and specialized courses and research in vertebrate and invertebrate zoology; behavior and ethology; evolution; population genetics; molecular evolution; systematics; population, community, and ecosystem ecology; global ecology; limnology; ecology of vegetation; and theoretical ecology. Opportunities for field research are available in Africa, Central America, and other parts of the world, as well as in local ecosystems, including the Cedar Creek Ecosystem Science Reserve and Itasca Biological Station. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Courses in inorganic chemistry, organic chemistry, biochemistry, general physics, one year of college calculus, animal biology, genetics, physiology, and plant biology are strongly recommended and provide an important background to pursue graduate work in EEB. Proficiency in a foreign language is not required but is strongly recommended for students who expect to pursue field work in a country where English is not the native language. Deficiencies must be made up early in the graduate program.

Special Application Requirements:
Students are admitted only in fall semester. Deadline for application is December 1. Refer to the EEB website for more details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

24 credits are required in the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

A minimum of 24 graduate level course credits and 24 thesis credits are required in the major. At least 12 course credits are required for a minor. Significant field or laboratory experience, proficiency in using computers in research, and competence in advanced statistics are required. Students are expected to gain some appreciation of history or philosophy of science and are required to teach a minimum of two semesters at 50 percent time. Degree programs are planned by the student and an advisory committee of three to five faculty members.

Joint- or Dual-degree Coursework:
Joint Degree Program in Law, Health & the Life Sciences
Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus

Microbial Ecology Minor
College of Biological Sciences - Adm
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Email: micecol@umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This minor is available to master's (M.S.) and doctoral (Ph.D.) students. Microbial ecology is an interdisciplinary research area concerned with the relationships between microorganisms and their natural environment. The microbial ecology minor offers core coursework in microbiology, microbial physiology, microbial genetics, microbial genomics, microbial ecology, ecology, and theoretical ecology. Additional courses and opportunities to interact with others interested in microbial ecology are also part of the minor. The microbial ecology/biotechnology seminar series allows students and faculty to interact with microbial ecologists from other universities. The curriculum encourages interdisciplinary interaction, communication, and synthesis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 graduate credits, all of which must be outside the student's major department and must include at least one laboratory course in microbiology (e.g., MICB 4215) and one ecology (EEB) course chosen from the list below. The remaining courses also are chosen from this list with the guidance and approval of the director of graduate studies.

The doctoral minor requires 12 graduate credits, 9 credits of which must come from the core courses listed below (contact the director of graduate studies for potential alternatives to these courses). The remaining credits must come from at least two courses chosen from this list, but may not be in the student's major.

Core courses:
EEB 5053 (4 cr)
MICB 4111 (3 cr)
MICB 4121 (3 cr)
MICA 8002 (4 cr)

Additional courses
CE 8541
CE 8542
CE 8551
EEB 4601
EEB 4609
PLPA 8102
PLPA 8103
SOIL 5515
SOIL 5611
Twin Cities Campus
Microbial Engineering M.S.
Biological Process Technology Institute
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, Saint Paul, MN 55108 (612-624-6774; fax 612-625-5780)
Email: mice@umn.edu
Website: http://www.bti.umn.edu/MicE

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Microbial engineering is an interdisciplinary program that combines an understanding of basic principles in microbiology, biochemistry, molecular biology, chemical engineering, and related sciences. Students are trained in the industrial application of microorganisms, cultured cells, and immunologic agents. Students learn both modern basic microbiology and biological engineering and can either proceed to a Ph.D. program in a related discipline or work directly with research and development staff in biotechnology industries. Supporting courses may be chosen from specific fields including biochemistry, microbiology, food science, genetics and cell biology, or pharmacognosy. The program is coordinated by the BioTechnology Institute (BTI) and involves faculty from 10 departments and 5 institutes of the University.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Typically, applicants with a bachelor's degree in biological sciences, biochemistry, chemistry, or chemical engineering apply. Recommended academic preparation includes one year each of calculus, organic chemistry, physics, microbiology, and a background in a field such as basic chemical engineering, biology, physical chemistry, or genetics. Background deficiencies can be made up during the first year of graduate work. Most students enter the program with a GPA of 3.40 or higher.

Special Application Requirements:
Three letters of recommendation, scores from the General Test of the GRE, the TOEFL score for international applicants, transcripts, Curriculum Vitae, and an autobiographical statement including occupational goals must be submitted to the director of graduate studies. Applications are accepted for fall semester only. To receive full consideration for financial aid, students must apply for fall semester admission by March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Reading Score: 19
  - Internet Based - Writing Score: 21
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
  - Speaking test score: 0

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The M.S. requires 32 credits. Plan A students carry out a research project (10 cr) resulting in a M.S. thesis presented to the graduate faculty. Plan B students complete a summer (about 2½ months) preceptorship (4 cr) in a private company research laboratory or at a research institute in the University and prepare a Plan B project paper based on this research.

The two-year program comprises coursework in a specialized program of microbiology, molecular biology, immunology, and chemical engineering. The major program courses are the chemical engineering and microbiology courses. All students must take MICE 5355 - Advanced Ferment/Biocatalysis Laboratory. In addition, students must attend research seminars during the first-year spring semester and the following year present a research seminar in a biotechnology seminar series.

Students may choose supporting coursework (at least 6 cr) from specified fields, including biochemistry, food science, pharmacology, plant biology, genetics, cell biology, bioinformatics, and engineering.

Plan B students complete a preceptorship in a private company research laboratory or at a research institute in the University, and prepare a Plan B paper based on the research project. Presentation of the original laboratory research thesis/project to the graduate faculty is required at the end of the second year.
Twin Cities Campus

Microbial Engineering Minor

Biological Process Technology Institute

College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, Saint Paul, MN 55108 (612-624-6774; fax 612-625-5780)
Email: mice@umn.edu
Website: http://www.bti.umn.edu/MicE

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Microbial engineering is an interdisciplinary program that combines an understanding of basic principles in microbiology, biochemistry, molecular biology, chemical engineering, and related sciences. Students are trained in the industrial application of microorganisms, cultured cells, and immunologic agents. Students learn both modern basic microbiology and biological engineering. Courses may be chosen from specific fields including biochemistry, microbiology, food science, genetics and cell biology, or pharmacognosy. The program is coordinated by the BioTechnology Institute (BTI) and involves faculty from 10 departments and 5 institutes of the University.

Note: The minor in microbial engineering is offered at the doctoral level only.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students must complete at least 12 credits, selected in consultation with the director of graduate studies for microbial engineering.
Twin Cities Campus
Plant Biological Sciences M.S.
Plant Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant Biological Sciences Graduate Program, 1445 Gortner Avenue, Room 256, St. Paul, MN 55108 (612-625-4222; fax: 612-625-1738)
Email: pbiogp@umn.edu
Website: http://www.cbs.umn.edu/plantbio/gradprog

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all application materials by December 15 is required in order to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

- PBIO 5960 - Itasca PBS Graduate Student Experience (1 cr)
- PBS 8081 - Integrative Plant Biology: Connecting Molecules to Ecosystems (3 cr)
- PBS 8900 (SEC 001) - PBS Colloquium (1 cr)
- PBS 8900 (SEC 003) - Graduate Student Seminar (1 cr)
- PBS 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- PBS 8994 - Directed Research (1-5 cr)
- GRAD 8101 - Teaching in Higher Education (3 cr; A-F grade option)
Twin Cities Campus
Plant Biological Sciences Minor

Plant Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant Biological Sciences Graduate Program; 1445 Gortner Avenue, Room 256, St. Paul, MN 55108 (612-625-4222; fax: 612-625-1738)
Email: pbiogp@umn.edu
Website: http://www.cbs.umn.edu/plantbio/gradprog

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For students majoring in other fields, a master's minor in plant biological sciences may be obtained by completing 6 credits selected from the four disciplinary areas by the DGS.

To obtain the doctoral minor, Ph.D. students must complete 12 credits selected from the four disciplinary areas by the DGS.
Twin Cities Campus
Plant Biological Sciences Ph.D.
Plant Biology
College of Biological Sciences

Link to a list of faculty for this program.

Contact Information:
Plant Biological Sciences Graduate Program, 1445 Gortner Avenue, Room 256, St. Paul, MN 55108 (612-625-4222; fax: 612-625-1738)
Email: pbiogp@umn.edu
Website: http://www.cbs.umn.edu/plantbio/gradprog

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant biological sciences encompasses all aspects of the basic biology of both higher and lower plants. Major emphases include molecular and physiological approaches to development; physiological, structural, and functional studies at the cellular and organismal levels; systematic and evolutionary biology; and molecular genetics and applied biotechnology. Students study plants from the subcellular and molecular to the whole plant and community levels of biological organization. They also have opportunities for laboratory and field research at state, national, and international levels. Each student's program is planned to meet individual requirements within the framework of a multidisciplinary core of coursework. Seminars are an integral part of the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Prospective students are expected to have completed a year of coursework in at least three of the following four areas: differential and integral calculus; organic and inorganic chemistry; biology; and physics. For students with demonstrated ability, background deficiencies as determined by the admissions committee can be made up during the first year of graduate studies. All admitted students are assigned to an adviser in the graduate program before they begin their studies.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all application materials by December 15 is required in order to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year.

Applicants must submit their test score(s) from the following:
- GRE
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
18 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

PBIO 5960 - Itasca PBS Graduate Student Experience (1 cr)
PBS 8081 - Integrative Plant Biology: Connecting Molecules to Ecosystems (3 cr)
PBS 8900 (SEC 001) - PBS Colloquium (1 cr)
PBS 8900 (SEC 003) - Graduate Student Seminar (2 cr)
PBS 8901 - Preparation of Research Proposal (1 cr)
PBS 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
PBS 8888 Doctoral Thesis Credits (24 cr)
PBS 8994 - Directed Research (1-5 cr)
GRAD 8101 - Teaching in Higher Education (3 cr; A-F grade option)
Twin Cities Campus

Addiction Studies Postbaccalaureate Certificate

CCE Addiction Studies
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
Addiction Studies, Degree and Certificate Programs, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000; fax: 612-625-1511)
Email: cceinfo@umn.edu
Website: http://www.cce.umn.edu/Addiction-Studies-Graduate-Certificate/index.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 19
- This program does not require summer semesters for timely completion.
- Degree: Addiction Studies P Bacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The addiction studies graduate certificate provides students with a strong theoretical and practical foundation in substance abuse treatment modalities, counseling skills, professional and ethical responsibilities, and client advocacy. The program offers two track options: public health and service provider.

The curriculum is designed to meet the ongoing training and education needs of addiction counselors, social workers, psychologists, mental health practitioners, and prevention specialists. Students have the opportunity to develop and refine clinical skills and knowledge in addictive disorders in a multidisciplinary environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor’s degree from an accredited post-secondary institution or its foreign equivalent.

Special Application Requirements:
Although students may take one or two program courses before applying for official admission into the certificate program, the program recommends that students apply for admission as soon as possible. Once accepted into the program, students will receive timely program updates and course registration information along with admitted student benefits.

Applying for the program is easy. Simply complete the Post-Baccalaureate Application for Certificate Admission form. The application form includes instructions, deadlines, and materials needed to apply. Students who have questions or who miss the deadline may call 612-624-4000 or send an email to cceinfo@umn.edu for advising.

Application Deadlines
Fall semester: July 15
Spring semester: November 15
Summer term: April 15

Note: Students who have graduated from a B.A. or B.S. program must apply for the graduate-level certificate.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

To be awarded the Addiction Studies Certificate, students must:
- complete a minimum of 19 credits within four years of their admission date;
- take core courses for a letter grade, earning a B- or better;
- obtain a cumulative GPA of 2.8 or better for all certificate coursework.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Public Health
The public health track allows students to specialize in the epidemiology of various addictive behaviors and disorders, particularly substance use behaviors, and to gain an understanding of the various models and promising prevention approaches.

Public Health Core Courses (11 credits)
ADDS 5009 - Multicultural Aspects of Addiction (2 cr)
or
FSOS 5426 - Alcohol and Drugs: Families and Culture (3 cr)
ADDS 5003 - Applied Psychopharmacology for Human Service Professionals (2 cr)
(Note: Students are recommended to take ADDS 5001 and FSOS 5426 before ADDS 5003.)
ADDS 5004 - Co-occurring Addictive and Mental Health Disorders (2 cr)
(Note: Students are recommended to take ADDS 5004 after ADDS 5001 and ADDS 5003.)
PUBH 6724 - The Health Care System and Public Health (3 cr)
PUBH 6003 - Fundamentals of Alcohol and Drug Abuse (1 cr)
(Note: Students must inform the teaching assistant for the course that they are addiction studies certificate students in order to get the assignments that are related to the certificate program.)

Elective Courses (8 credits)
Students should check with their advisers to determine the appropriate electives for their program of choice.

Service Provider
This clinical track offers training and education for two distinct audiences: currently licensed professionals, and those seeking licensure.

Currently Licensed Professionals
This option is for currently licensed professionals who wish to develop advanced counseling and therapy skills in order to work with individuals who have addictive disorders, to learn advanced intervention techniques, or to improve clinical skills for specialized populations.

Individuals currently licensed as addiction counselors can select a special area of interest for intensive study that best fits with their career plans. Some emphasis areas are:
- Aging and addiction
- Adolescents and addiction
- Integrative approaches to behavioral health
- Multicultural issues and addiction
- Prevention

Students may also work with an adviser to design an individual plan of study that best meets their personal interests and career development goals.

Licensure-Seeking Service Provider
This option is for individuals with a bachelor's degree and for professionals with a related license (LMSW, MSW, LMFT, LP, LPCC, LPC, MD) who are interested in becoming licensed alcohol and drug counselors. The core curriculum prepares students for the Minnesota Licensed Alcohol and Drug (MLADC) comprehensive exam and to become credentialed as a Board Certified Counselor (BCC).

Licensure-Seeking Service Provider Requirements
Core Courses (9 credits)
ADDS 5001 - Foundations in Addiction Studies (2 cr; to be taken first semester)
ADDS 5003 - Applied Psychopharmacology for Human Service Professionals (2 cr)
ADDS 5004 - Co-Occurring Addictive and Mental Health Disorders (2 cr)
ADDS 5009 - Multicultural Aspects of Addiction Studies (3 cr)
or
FSOS 5426 - Alcohol and Drugs: Families and Culture (3 cr)

Elective Courses (10 credits)
EPSY 5401 - Counseling Procedures (3 cr)
FSOS 5429 - Advanced Counseling Skills (3 cr)
(Students are recommended to take EPSY 5401 before FSOS 5429 and ADDS 5008.)
ADDS 5002 - Methods, Models, and Intervention Skills for Substance Abuse Counselors (2 cr)
ADDS 5006 - Introduction to Resilience and Health Realization (2 cr)
ADDS 5007 - Adolescents and Addiction (2 cr)

Minnesota Licensed Alcohol and Drug Counselor Requirements

To fulfill the educational requirements and be eligible for licensure, students must complete the following courses:
ADDS 4001 - Professional Practice of Addictions Counseling (4 cr)
ADDS 4002 - Internship I (2-8 cr)

Students must have the content in the courses listed below in order to meet the 12 core functions specified by the Minnesota statute's licensing requirements. Some of these courses are core courses. Others may be taken as electives if students haven't taken them previously.
ADDS 5001 - Foundations in Addiction Studies (2 cr)
or
PUBH 6003 - Fundamentals of Alcohol and Drug Abuse (1 cr)
ADDS 5002 - Methods, Models, and Intervention Skills for Substance Abuse Counselors (2 cr)
or
FSOS 5429 - Counseling Skills Practicum (3 cr)
ADDS 5003 - Applied Psychopharmacology for Human Service Professionals (2 cr)
ADDS 5004 - Co-occurring Addictive and Mental Health Disorders (2 cr)
ADDS 5009 - Multicultural Aspects of Addiction (2 cr)
or
FSOS 5426 - Alcohol and Drugs: Families and Culture (3 cr)

Internship Experience
The internship experience will provide students with the opportunity to transfer the knowledge and skills gained in the academic portion of the service provider certificate to clinical practice. Students should keep the following key points in mind:
- Students may enroll for the internship sequence after the academic portion is completed.
- The Professional Practice of Addictions Counseling course is a required prerequisite for the internship sequence and should be taken during the semester prior to registering for internship.
- Internships are planned as part of the Professional Practice course and must be approved by addiction studies faculty.
- According to the Minnesota Certificate Board (MCB), the written exam for the MLADC licensure can be taken while the student is completing the internship. However, students may not take the oral exam until all studies, including the internship, have been completed.
- Students should review the Internship Manual before or during their first class in the certificate program.
Twin Cities Campus
Arts and Cultural Leadership M.P.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, M.P.S. in Arts and Cultural Leadership, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108
(612-624-4000; fax: 612-626-2800)
Email: cceacl@umn.edu
Website: http://www.cce.umn.edu/acl

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students for both administrative and leadership roles in professional leadership of arts-related nonprofit organizations. It is aimed at career arts administrators in nonprofit arts and cultural organizations looking for a graduate degree to boost their advancement in the field and/or to interact with other students/faculty in discussing artistic leadership, planning, and policy. It is available to career administrators working in fields not directly related to the arts, but who want new careers in arts-related nonprofit organizations.

The program of study leads to a master's degree that is: individualized, allowing students to tailor electives and a capstone project to their unique interests; interdisciplinary, including required interdisciplinary seminars and elective coursework drawn from two or more academic departments at the University; and career focused, with a capstone project centered on an issue or topic expressly related to the student's career interest.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

At least 3 years of relevant work experience is required. Factors of academic preparation, relevant experience, evidence of readiness and maturity, writing ability, and reasons for seeking the degree will be taken into account as part of the admissions review. GRE scores may be submitted, but are not required.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, a current resume, two letters of reference, a two- to three-page written statement of purpose in which the student elaborates on his or her interest in the program, and an additional writing sample of approximately 10 pages. Application deadlines are in spring for summer term and fall semester admission, and fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 32 major credits and null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Final Project Seminar (APS 8002) is designed to help students bring their respective projects/papers to closure. There are two paths to completing final project/paper:
1. A field-based project undertaken within a specific organization. The student will be supervised by both their faculty adviser and a field site supervisor who will serve as co-adviser. (Preferred.)
2. Thesis-length papers (50-80 pages) will be written under supervision of the student's adviser, and should integrate skills and knowledge acquired in the program. The papers should investigate or illuminate an area of knowledge within the study of leadership, as it pertains to the arts and cultural sector. (Students who are considering this option should meet with the faculty director.)

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of 32 credits are required for completion of the MPS degree.

Take core courses for a letter grade, earning a B- or better.

Obtain a cumulative GPA for all degree course work of 2.8 or better.

Required courses (14 credits)

- APS 8001 - Introduction to Interdisciplinary Inquiry (3.0 cr)
- ACL 5200 - Trends and Impacts in Arts and Cultural Leadership (3.0 cr)
- ACL 5220 - Philanthropy, Development, and Strategic Leadership (3.0 cr)
- ACL 5230 - Ethical and Legal Issues in Arts Policy and Law (3.0 cr)
- ACL 8201 - Mentorship/Project Leadership Practicum (1.0 cr)
- ACL 8202 - Arts and Cultural Nonprofit Board Practicum (1.0 cr)
- APS 8002 Final Project Seminar

Selected applications courses (6 credits)

Required: At least two of the following courses with selection based on prior experiences. PA 5003 - Introduction to Financial Analysis and Management is required for students without significant experience in this area. Take 2 or more course(s) totaling 6 or more credits(s) from the following:
- PA 5011 - Management of Organizations (3.0 cr)
- PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
- PA 5104 - Strategic Human Resource Management (3.0 cr)
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5111 - Financial Management in Public and Nonprofit Organizations (3.0 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5103 - Leadership and Change in an Innovation Society (3.0 cr)

Electives (9 credits)

Elective courses must be selected from two or more academic departments. Studio or applied courses, such as a course in painting or piano, may not be included as electives. Electives should relate to the professional tasks required of arts leaders or enhance student's understanding of the arts within a broader cultural context. Examples include, but are not limited to the courses listed below. Take 9 or more credits(s) from the following:
- ACL 5950 - Special Topics (1.0 - 4.0 cr)
- TH 5780 - Advanced Topics in Arts Management (2.0 - 4.0 cr)
- LS 5100 - Liberal Studies Seminar (1.0 - 4.0 cr)
- JOUR 4263 - Strategic Communication Campaigns (4.0 cr)
- JOUR 5251 - Psychology of Advertising (3.0 cr)
- MST 5011 - Museum History and Philosophy (3.0 cr)
- MST 5012 - Museum Practices (3.0 cr)
- Other electives chosen in consultation with student's adviser.
Twin Cities Campus
Biological Science M.B.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, Master of Biological Science Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000; fax: 612-626-2800)
Email: ccembs@umn.edu
Website: http://www.cce.umn.edu/mbs

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Biological Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The professional master of biological science (M.B.S.) degree is offered with concentrations in areas such as biochemistry, basic biology (animal, plant, cell, applied, and general), biotechnology, biophysics, ecology, environment, evolution, food science and nutrition, genetics, microbiology, molecular biology, and neuroscience. This is an interdisciplinary program administered by the College of Continuing Education. The M.B.S. is a highly flexible, graduate-level, practitioner-based program offered to meet the needs of a substantial portion of the working community who wish or need to increase their knowledge in areas related to modern biology. The program provides educational opportunities beyond those that aim at maintaining and improving productivity within the professions. It fills a gap in the present educational system for those who have neither the time nor the flexibility to earn a graduate degree through more traditional channels. It also provides this population with the most current information and advanced skills in their areas of professional interest, and gives them acknowledgment for their achievement. The degree enables recipients to learn new job skills, change professional emphasis, or provide added value to their present job.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

Evidence of knowledge of current, introductory, college-level concepts of basic chemistry, organic chemistry, and some biology coursework is required. Transcripts showing equivalent coursework combined with professional experience will be considered for application toward fulfillment of the prerequisites for admission. Two years of relevant experience in the workforce is required for admission. GRE scores may also be submitted, but are not required.

Special Application Requirements:
A statement of career goals, letters of reference, transcripts for all undergraduate and post-baccalaureate degrees or coursework, and an updated resume must accompany the application. Application deadlines are in the spring for summer term and fall semester admission, and in the fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The capstone project is worth 2 semester credits toward the degree. The capstone project may be, but is not limited to, a research paper, a laboratory project, or a practicum.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The program includes coursework, seminars, independent study, workshops, and a capstone project. With guidance from faculty advisers, students complete 30 credits. M.B.S. candidates may transfer up to 10 credits into the program. Core credits may be waived or substituted if the student can show proficiency in the subject area, pending advisory committee approval. If a core credit is waived, the credits must still be earned in an elective course. Coursework is taken from the regular graduate-level coursework as well as from other approved credit-bearing courses (e.g., intensive short courses and Internet courses). An overall GPA of 3.00 is preferred for the degree to be awarded. A student with 8 or more credits of incomplete (I) coursework will not be allowed to register for additional courses until the coursework marked with (I) is completed.
Twin Cities Campus

Biological Science Minor

CCE Graduate Programs Instruction

College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, Master of Biological Science Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000, fax: 612-626-2800)
Email: ccembs@umn.edu
Website: http://www.cce.umn.edu/mbs

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting students. Please contact the College of Continuing Education for more information about the status of this program.

A minor in biological science offers concentrations in areas such as biochemistry, basic biology (animal, plant, cell, applied, and general), biotechnology, biophysics, ecology, environment, evolution, food science and nutrition, genetics, microbiology, molecular biology, and neuroscience. This is an interdisciplinary program administered by the College of Continuing Education. The program is a highly flexible graduate-level, practitioner-based program offered to meet the needs of a substantial portion of the working community who wish or need to increase their knowledge in areas related to modern biology. The program provides educational opportunities beyond those that aim at maintaining and improving productivity within the professions. Together with the College of Continuing Education's master of biological sciences program, this minor fills a gap in the present educational system for those who have neither the time nor the flexibility to pursue graduate coursework through more traditional channels. It also provides this population with the most current information and advanced skills in their areas of professional interest, and gives them acknowledgment for their achievement. The degree enables recipients to learn new job skills, change professional emphasis, or provide added value to their present job.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus
Horticulture M.P.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
Email: www.cce.umn.edu/hort
Website: http://www.cce.umn.edu/Master-of-Professional-Studies-in-Horticulture

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of professional studies in horticulture degree is designed to enhance the capacity of those currently working in the horticulture industry; and to provide the knowledge base needed by others interested in beginning new careers, starting their own business, or pursuing personal interests in horticulture. The degree provides a solid foundation of contemporary horticultural knowledge, yet is flexible enough to allow individuals to focus on the specific skills they wish to hone.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

Evidence of knowledge of current, introductory, college-level concepts of algebra, chemistry, biology, botany, or plant propagation is required for admission to the program. Prerequisite coursework may be completed at the University of Minnesota or at other educational institutions subject to transfer review. In all cases, documentation of completed, equivalent coursework combined with professional experience will be considered for application toward fulfillment of the prerequisites for admission to the M.P.S. in horticulture. A minimum grade of C will be the standard for admission for all prerequisite coursework. Undergraduate prerequisite coursework must come from the following areas: algebra, chemistry, biology, botany, or plant propagation. Please refer to the program website for further details.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, a current resume, two letters of reference, a written statement of purpose (max two pages) which addresses pertinent aspects of the student's background and academic qualifications as related to admission to the program and demonstrates a strong interest in horticultural science including documentation of any relevant experiences in the field of horticulture. Application deadlines are in spring for summer term and fall semester admission, and in fall for spring semester admission. Refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone course, HORT 6002 - Problem Solving in Horticulture, accounts for 4 of the minimum 30 credits required for the degree and is not considered part of the horticulture core course requirements.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The course program must include a minimum of 30 semester credits in courses 4xxx or above, with a minimum of 15 credits in 5xxx or higher courses. Courses must include 15 credits of horticulture courses, 11 credits in a related field, and 4 credits of HORT 6002 - Capstone.

Students who have not completed relevant introductory coursework in soils, plant pathology, and entomology, either during or subsequent to completion of their bachelor's degree, will be required to complete courses in these areas as part of their MPS degree requirements. These courses are not prerequisites for admission. Depending on the specific courses included in the student's program, some additional coursework may also be required over and above the 30 graduate credits required for the degree.

All prerequisites associated with courses included in the student's course program must be completed as part of the student's degree requirements unless exempted in writing by the instructor for the course and approved by the student's adviser and the program DGS prior to taking the course.

Excluding the capstone course, a maximum of 3 credits taken S/N may be applied toward the minimum requirements for the degree.

A maximum of 3 credits of HORT 5090 - Directed Studies may be applied toward the minimum horticulture core course requirements.

The student's course program must be approved by the DGS and MPS Steering Committee.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 30 semester credits required for the degree.
Twin Cities Campus

Innovation Studies Postbaccalaureate Certificate

CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
(612-624-4000; fax: 612-626-2800)
Email: cceisi@umn.edu
Website: http://www.cce.umn.edu/is

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Innovation Studies Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This certificate is built on two premises: (1) that the economic order of the 21st century will be determined more by intellectual capital and knowledge worker productivity than by the traditional resources of labor, capital, and raw materials; and (2) that an individual's success in the new economic order will be determined more by such personal characteristics as knowledge, inventiveness, adaptability, and self-reliance, than by the institutional structures and protections traditionally provided to workers by employers. Workers can no longer rely, in other words, on any established company or organization to provide secure, long-term employment. Today they are much more on their own, requiring them to develop new skills in self-leadership, self-marketing, and team formation.

These shifts are nothing less than revolutionary, propelled by ever-advancing information and communications technologies. Likewise, they will be sustained by educational systems geared to preparing human capital for continuous innovation. Associated implications for international and global cooperation, collaboration, and competitiveness will be addressed throughout the innovation studies certificate seminars.

The focus of the certificate in innovation studies will be the individual, with emphasis on developing the requisite insights and skills needed to support a shift from an institutional model to a self-reliance model that rewards innovative leadership and problem solving. The curriculum will draw on a broad, growing body of interdisciplinary literature that deals with such topics as the impact of accelerating change on the nature of work and social institutions, the expansion and globalization of business and industry, geo-political change, socio-cultural change, ecological/environmental issues, population issues, the evolution of technology, and adaptive human behavior.

Potential students for the certificate are adults with bachelor degrees or better who develop or innovate significant portions of their work, or who wish to learn the principles and general skills of doing so. These are knowledge workers whose professional life pivots on thought, collaboration, and decision making to help envision or produce new goods and services. Familiar job titles for this target audience include:

-Organizational planners and strategists
-Engineers and scientists seeking to develop commercially successful new products
-Teachers and consultants in both the public and private sectors
-Financial planners and analysts
-Entrepreneurs and "intrepreneurs," in both profit and non-profit organizations

The program is beneficial to anyone wanting to be better aligned with the future in her or his current position or wishing to make a strategic, innovation-focused career change.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.
To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

**Special Application Requirements:**
To be admitted, prospective students must show evidence that they are prepared to successfully undertake graduate-level work, and that they understand the nature of the program. Applicants must:
- hold a baccalaureate degree from an accredited college or university;
- submit transcripts from their undergraduate institution(s) and any subsequent credit coursework;
- submit a two-page statement of purpose that explains why this program is a good fit for them; and
- submit a current résumé, describing professional and lifework experiences.
Letters of reference from past or current employers and/or professors are optional.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

The certificate consists of at least 16 credits: 7 credits in two required core seminars and 9 credits in innovation studies electives. The core seminars include a 3-credit introductory course, IS 5001 - Introduction to Innovation Studies, which begins the certificate sequence; and a 4-credit capstone final project or internship, IS 5002, which concludes the program. Between the core seminars, students choose 9 credits of innovation studies seminars from a group of existing or prospective IS 5100 or IS 5950 topics seminars. These electives allow a student to focus on areas of innovation studies that offer the highest potential level of integration into his or her own educational and professional goals.
**Twin Cities Campus**

Integrated Behavioral Health M.P.S.

*CCE Addiction Studies*

*College of Continuing Education*

Link to a list of faculty for this program.

**Contact Information:**

College of Continuing Education Information Center, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN, 55108 (612-624-4000)

Email: cceinfo@umn.edu


- Program Type: Master's
- Requirements for this program are current for Spring 2013
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Professional Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The high prevalence of co-occurring mental health and substance use disorders virtually guarantees that counselors, no matter the treatment setting, will encounter clients struggling with not one, but two or more disorders.

The master of professional studies in integrated behavioral health (IBH) prepares counselors for this clinical reality. The IBH degree merges mental health and substance abuse education and training into a single, comprehensive and cohesive program. This synthesis represents an important and pioneering shift in the preparation of clinicians.

The IBH is designed to fulfill education and training requirements for two licenses: Licensed Professional Clinical Counselor (LPCC) and Licensed Alcohol and Drug Counselor (LADC).

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

- Bachelor's degree from an accredited institution
- Transcripts
- Personal statement
- Two letters of reference
- Updated resume or CV

**Special Application Requirements:**

International students interested in the master of professional studies in integrated behavioral health should contact the International Student and Scholar Service ([http://www.isss.umn.edu](http://www.isss.umn.edu)) for information on visa status and academic requirements.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 60 major credits and 0 credits outside the major. There is no final exam. A capstone project is required.  

**Capstone Project:** Satisfactory completion of a portfolio demonstrates the student’s clinical conceptualization and practice skills through the following:
- A client case study that includes an assessment and treatment plan
- A videotaped treatment session with a mock client
- A philosophy of counseling statement outlining the student’s theoretical orientation to counseling and specific applications of his/her counseling philosophy to the population she/he intends to serve
- Evaluations outlining areas of competence and skill as assessed by internship site supervisor
- Self-selected papers and projects from program coursework that demonstrate the student's mastery of knowledge and skills

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

In addition to coursework, an 880-hour field placement is required to complete the degree. The credit and field placement requirements are designed to fulfill licensing requirements as defined in the Minnesota Statutes, section 148B.54, subdivision 2; and Minnesota Rules, part 2150.2500 to 2150.2660. As noted in the statute, “The national trend for master's programs in counseling is towards 60 semester credits.” In order for a practitioner to be eligible for third party reimbursement for services, the practitioner must demonstrate a minimum of 60 semester graduate level credits in counseling coursework.

Students may take one or more courses per term and have up to seven years to complete a master's degree. Students who wish to transfer graduate-level coursework from other institutions should contact the Graduate Programs office at cceinfo@umn.edu for information and assistance.

Only coursework for which the student has earned a grade of B- or better will be counted toward the minimum of 60 semester credits required for the degree.

**Core Courses**

ADD 5011 - Foundations in Addiction Studies (2.0 cr)
ADD 5021 - Introduction to Evidence Based Practices and the Helping Relationship (2.0 cr)
ADD 5031 - Applied Psychopharmacology (2.0 cr)
ADD 5041 - Methods and Models I: Motivational Counseling (2.0 cr)
ADD 5051 - Methods and Models II: Cognitive Behavioral Therapy (2.0 cr)
ADD 5061 - Foundations of Group Work (3.0 cr)
ADD 5071 - Foundations of Co-occurring Disorders (2.0 cr)
ADD 5081 - Multicultural Foundations of Behavioral Health (3.0 cr)
ADD 5091 - Assessment and Treatment Planning I (3.0 cr)
IBH 6011 - Foundations in Neuropsychology (2.0 cr)
IBH 6021 - Methods and Models III: Relapse Prevention, Risk Reduction & Recovery Maintenance (2.0 cr)
IBH 6031 - Methods and Models IV: Trauma and Anxiety, Assessment and Treatment Intervention (2.0 cr)
IBH 6041 - Advanced Cognitive Therapies for Trauma (2.0 cr)
IBH 6051 - Advanced Group Practice (2.0 cr)
IBH 6061 - Advanced Diagnostic Assessment (3.0 cr)
IBH 6071 - Advanced Professional Issues (3.0 cr)
IBH 6081 - Human Lifespan Development and Behavioral Health (2.0 cr)
IBH 6091 - Career Development and Counseling (2.0 cr)
IBH 6101 - Family Dynamics and Therapy (3.0 cr)
IBH 6111 - Research and Evaluation Methods (3.0 cr)
IBH 6996 - Internship for Integrated Behavioral Health (1.0 - 8.0 cr)
Twin Cities Campus
Liberal Studies M.L.S.
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, Master of Liberal Studies Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108, (612-624-4000; fax: 612-626-2800)
Email: ccemls@umn.edu
Website: http://www.cce.umn.edu/mls

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Liberal Studies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate major in liberal studies (LS) offers an interdisciplinary curriculum that includes an introductory seminar, a choice of liberal studies seminars, a choice of electives from disciplines throughout the University, and a final project seminar. Although LS seminars for the M.L.S. are scheduled for early evenings and some Saturday mornings, most graduate-level courses offered during the day are also open to M.L.S. students.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

To be admitted, students must have a bachelor's degree from an accredited post-secondary U.S. institution or its foreign equivalent.

The faculty committee reviewing each application looks for indications that the student can succeed in graduate study, that there is a good "fit" between the M.L.S. program and the student's stated educational objectives, and that the student can express him/herself well in writing. The faculty also looks for positive qualities and other experiences the student will bring to the program.

Special Application Requirements:
The application package must include official transcripts of all baccalaureate and post-baccalaureate work, two letters of reference, an updated resume, a three- to four-page written statement of purpose, and an additional writing sample of 10 to 20 pages. Application deadlines are in spring for summer term and fall semester admission, and in fall for spring semester admission. Please refer to the program website for further details.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements

**Plan B**: Plan B requires 30 major credits and null credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project**: The Plan B project is a specific variation of the master's Plan B option. The final project must be prepared as part of LS 8002 - Final Project for Graduate Liberal Studies and must be approved by at least two faculty members and the director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The program requires at least 30 credits. Introduction to Interdisciplinary Inquiry (LS 8001, 3 cr) and the Final Project (LS 8002, 3 cr) seminars are required. Students must take at least 9 credits of liberal studies seminars. The remaining 15 credits are composed of graduate-level electives from disciplines throughout the University of Minnesota, or directed study, directed research, advanced interdisciplinary inquiry, online coursework, or additional liberal studies seminars. Courses are selected with the help of the student's graduate faculty adviser.
Twin Cities Campus
Liberal Studies Minor
CCE Graduate Programs Instruction
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
College of Continuing Education, Master of Liberal Studies Program, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108, (612-624-4000; fax: 612-626-2800)
Email: ccemls@umn.edu
Website: http://www.cce.umn.edu/mls

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate major in liberal studies offers an interdisciplinary curriculum that includes an introductory seminar, a choice of liberal studies seminars, a choice of electives from disciplines throughout the University, and a final project seminar. Although seminars for the M.L.S. are scheduled for early evenings and some Saturday mornings, most graduate-level courses offered during the day are also open to M.L.S. students.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus  
Transportation Studies Postbaccalaureate Certificate  
CCE Certificate Programs  
College of Continuing Education

Link to a list of faculty for this program.

Contact Information:
Transportation Studies Certificate, Information Center, College of Continuing Education, University of Minnesota, 20 Ruttan Hall, 1994 Buford Avenue, St. Paul, MN 55108 (612-624-4000; fax: 612-625-6381)
Email: cts@umn.edu
Website: http://www.cts.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Transportation Studies PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently admitting students. Please contact the program for more information.

The transportation studies program allows students to gain advanced interdisciplinary knowledge of transportation by taking a set of core courses along with a series of focused electives. The certificate program is structured into two program tracks—civil engineering and planning/public policy—to meet the core course requirement. Students select one course from each of the two program tracks. Students are also required to complete one of two 1-credit seminars focusing on intelligent transportation systems or various civil engineering topics as a part of their core coursework. In addition to the foundation, students acquire further expertise in a specific area related to transportation by taking at least 9 graduate credits in a field chosen by the student and approved by the director of graduate studies. These credits may consist of any combination of courses that will further the student's knowledge of a specific transportation-related subject area or areas. A broad array of topical areas and course offerings are available, including advanced traffic engineering and related mathematical disciplines; transportation pavements or structures; management, logistics, regional planning, or human factors; historical, political, or economic analysis.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admission requires a B.S. or B.A. from an accredited U.S. institution or foreign counterpoint.

The applicant's undergraduate degree should be in a field related to transportation issues through work experience, community involvement, political leadership, or other activity. Applicants must document study in one or more of the following technical course topics, demonstrating proficiency in physical science and/or quantitative analysis: intermediate economics, theory, statistics, calculus, physics.

Special Application Requirements:
Prospective students must submit a statement explaining how their work experience, community involvement, political leadership, or other activity has prepared them for the program. Prospective students may supplement this statement with letters of recommendation from employers, community leaders, etc., if appropriate.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The core courses are structured into two program tracks: the civil engineering track includes CE 5211 and CE 5214; the planning/public policy track includes PA 8202 and CE 5212/PA 5232. Students select one course from each of the two program tracks.

Students are also required to complete ME 8772/CE 8213 or CE 8200, a 1-credit seminar, as part of their core coursework. Elective courses consist of any combination of courses in a transportation-related subject area. The courses must be approved by the director of graduate studies. For more information on courses, visit www.cts.umn.edu/Education/Certificate.
Twin Cities Campus

Architecture M.Arch.
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
School of Architecture, College of Design, University of Minnesota, 145 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455
(612-624-7866; fax: 624-5743)
Website: http://arch.design.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 90
• This program does not require summer semesters for timely completion.
• Degree: Master of Architecture

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Architecture encompasses the making and study of the buildings and environments 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 sustainable environmental systems, urban form, and business economics.

The School of Architecture offers one accredited professional degree, the master of architecture (M.Arch.), and three non-professional research degrees, the master of science (M.S.) in architecture, including a sustainable design track or concentrations in heritage conservation and preservation or metropolitan design.

The master of architecture degree is the accredited three-year professional program that prepares students for licensure and practice in the discipline of architecture as a speculative, analytic, and investigative endeavor. Through rigorous methods of inquiry—developed in the design studio, lectures, and seminars—students acquire the breadth of knowledge required of the professional architect, including: the techniques and processes of representation, communication, and analysis; the history and theory of making architecture and urban form for human use; and the technology, systems, processes, and economics of construction and practice. The 90-credit M.Arch. professional degree program is accredited by the National Architectural Accrediting Board (NAAB). A portfolio for admission is required.

The master of science in architecture is a nonprofessional degree offering advanced studies and research methods in sustainable design, heritage conservation and preservation, or metropolitan design. The nonprofessional M.S. in architecture seeks advanced students from architecture, building science, art history, geography, archaeology, landscape architecture, environmental design, or related disciplines to pursue multidisciplinary graduate study and research in sustainable building practices and historic preservation. The School of Architecture also offers a concurrent degree program that combines the M.Arch. professional degree and the M.S. in architecture. Students may take a total of 24 credits in common between the two academic programs. See information on the M.S. in architecture for degree requirements.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C**: Plan C requires 90 major credits and null credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project**: The Master's Final Project is a 10-credit studio-based design exploration under the supervision of a studio faculty mentor.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The professional M.Arch. curriculum requires completion of a total of 90 credits (80 course credits and a 10-credit design studio Plan C Master's Final Project). M.Arch. students can expect to complete the program in six semesters (three years), including the Master's Final Project. The fall semesters include integrated core curriculum of studio, building and environmental technologies, history-theory, or digital methods. The spring semesters are organized as half-semester elective modules in studio-like projects and seminars in urban/suburban-rural, building technology and sustainable practices, history-theory-culture themes. May term study abroad options are available for qualified students in any summer semester.
Twin Cities Campus

Architecture M.S.
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
School of Architecture, University of Minnesota, 145 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-624-7866; fax: 612-624-5743)
Email: archinfo@umn.edu
Website: http://arch.cdes.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33 to 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Architecture offers three distinct master of science in architecture degrees: 1) M.S. in architecture, sustainable design track; 2) M.S. in architecture, heritage conservation and preservation concentration; and 3) M.S. in architecture, metropolitan design concentration. Each of these master of science degree programs has its own unique application requirements, prerequisites, and curriculum structure. Prospective applicants are encouraged to consult the Degree Programs section of the School of Architecture website for additional information: http://arch.design.umn.edu.

Students who successfully complete the a master of science in architecture degree are eligible to receive 936 hours of IDP credit—that is 17 percent of the 5,600 hours of mandatory internship for registration as an architect. To receive the IDP credit, the M.S. degree must be earned after receiving the M. Arch degree.

The M.S. metropolitan design concentration requires summer semester coursework. The M.S. sustainable design track and the M.S. heritage conservation and preservation concentration do not require summer coursework.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Each of the master of science in architecture programs has its own unique application requirements, prerequisites, and curriculum structure. Prospective applicants are encouraged to consult the Degree Programs section of the School of Architecture website for additional information: http://arch.design.umn.edu.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS
- MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 27 to 28 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The M.S. sustainable design track requires a total of 34 credits, typically completed over one-and-a-half years. Coursework includes the following: four foundation courses (12 cr); two electives in architecture (6 cr); two courses outside the department in disciplinary studies (6 cr); and either a 10-credit Plan A thesis or Plan B master's project(s).

The M.S. heritage conservation and preservation concentration requires a total of 33 credits, typically completed over one-and-a-half years. Coursework includes the following: four foundation courses (12 cr); two electives in architecture (6 cr); two electives outside of architecture (6 cr); and either a Plan A thesis (10 cr) or Plan B project(s) (9 cr).

The M.S. metropolitan design concentration requires 34 credit units out of which 12 credits are electives (6 of which are outside architecture) and 10 credits of thesis on either on Plan A or Plan B.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Sustainable Design
Twin Cities Campus
Architecture Minor
School of Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
School of Architecture, University of Minnesota, 145 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-624-7866; fax 612-624-5743)
Website: http://arch.cdes.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Architecture encompasses the making and study of the buildings and environments 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 sustainable environmental systems, urban form, and business economics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus
Design M.A.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax: 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify a track and degree objective. Formal tracks are:
- Apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies)
- Graphic design (including interactive design)
- Housing studies
- Interior design (including evidence-based design) only

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students are required to take 4 credits in the core, 24 credits in the major field, and 6 credits in the related field or minor. Master's Plan A students are required to take 10 thesis credits. The program requires a minimum number of credits in theory and methods. Students may be required to complete additional credits upon recommendation of their committee.

The Plan B project culminates in a paper and project. Students must demonstrate familiarity with the tools of research or scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively.

Students may be required to complete additional credits upon recommendation of their committee.

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Apparel Studies**

The apparel studies track advances both theoretical knowledge and applications for textile and apparel products and their relationship to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis.

**Graphic Design**

The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; and interactive design.

**Housing Studies**

The housing studies track advances both theoretical and applied knowledge in the housing field. Through research experiences, students are prepared to assist people and communities in addressing housing-related issues. Courses emphasize human needs and behavior, analysis of designed environments, policy and community development, and housing of specific subpopulations such as the elderly or low-income families with children.

**Interior Design**

Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues, aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). Students are prepared for teaching and research positions as well as design specializations within the profession. The evidence-based design emphasis provides students with the opportunity to explore theoretical, process, and applied aspects of this design practice approach.
Twin Cities Campus

Design M.F.A.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify the track and degree objective.

The M.F.A. is available in the graphic design track only.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota

The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 52 major credits and 8 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: M.F.A. coursework and research culminates in a creative thesis, which includes a paper and extensive creative project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students are required to take 4 credits in the core, 36 credits in the major field, 8 credits in the related field or minor, and 12 credits for the creative project. The program requires a minimum number of credits in theory and methods. Students may be required to complete additional credits upon recommendation of their committee.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Graphic Design

The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; and interactive design.
Twin Cities Campus
Design M.S.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax: 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify the track and degree objective.

Formal tracks are:
- Apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies)
- Graphic design (including interactive design)
- Housing studies
- Interior design (including evidence-based design)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 144
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS  
  - Total Score: 6.5  
• MELAB  
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students are required to take 4 credits in the core, 24 credits in the major field, and 6 credits in the related field or minor. Master's Plan A students are required to take 10 thesis credits. The program requires a minimum number of credits in theory and methods. Students may be required to complete additional credits upon recommendation of their committee.

The Plan B project culminates in a paper and project. Students must demonstrate familiarity with the tools of research or scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively. Students may be required to complete additional credits upon recommendation of their committee.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Apparel Studies
The apparel studies track advances both theoretical knowledge and applications for textile and apparel products and their relationship to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis.

Graphic Design
The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include multicultural communication, visual representation of information, human interaction with designed objects, social and cultural implications of design, color systems and perception, design history, and design education. Students and faculty collaboratively develop designed objects and information resources that will enhance people's lives.

Housing Studies
The housing studies track advances both theoretical and applied knowledge in the housing field. Through research experiences, students are prepared to assist people and communities in addressing housing-related issues. Courses emphasize human needs and behavior, analysis of designed environments, policy and community development, and housing of specific subpopulations such as the elderly or low-income families with children.

Interior Design
Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues,
aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). Students are prepared for teaching and research positions as well as design specializations within the profession. The evidence-based design emphasis provides students with the opportunity to explore theoretical, process, and applied aspects of this design practice approach.
Twin Cities Campus
Design Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax: 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus
Design Ph.D.
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax: 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The design graduate program focuses on the study of relationships between humans and their designed environments. This focus is based on the assumption that design and analysis of environments contributes to the improvement of the human condition. The program addresses theory, research, and application, using a shared disciplinary base from the arts and social and behavioral sciences. The goal of the program is for students to analyze, evaluate, and integrate theoretical frameworks related to humans and their designed environments.

Applications submitted to the design graduate program specify a track and degree objective.

Formal tracks are:
- Apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies)
- Graphic design (including interactive design)
- Housing studies
- Interior design (including evidence-based design)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Eligibility requirements are located on the track pages of the design graduate program website:
http://dha.design.umn.edu/programs/grad.

Special Application Requirements:

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 144
  - General Test - Quantitative Reasoning: 153
  - General Test - Analytical Writing: 4

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
IELTS
- Total Score: 6.5
• MELAB
- Final score: 80
The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students are required to take 4 credits in the core, 23 credits in the major field, 12 credits in the related field or minor, and 24 credits of dissertation credits. The program requires a minimum number of credits in theory and methods. Students may be required to complete additional credits upon recommendation of their committee.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Apparel Studies
The apparel studies track advances both theoretical knowledge and applications for textile and apparel products and their relationship to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. Within each of these areas of emphasis within the track, the student completes related coursework as well as research or creative production that culminates in a thesis.

Graphic Design
The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; design creativity; color and design; user-centered design; design authorship; and interactive design.

Interior Design
Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues, aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). Students are prepared for teaching and research positions as well as design specializations within the profession. The evidence-based design emphasis provides students with the opportunity to explore theoretical, process, and applied aspects of this design practice approach.

Housing Studies
Housing studies is a multidisciplinary track that draws from a variety of theoretical perspectives. Students are trained in a variety of research methodologies. Coursework and research experiences combine to further understanding of the innovative approaches to the development of housing and related programs. Upon completion of the graduate degree, students seek housing careers in state and federal agencies, nonprofit community organizations, housing regulation, and higher education.
Twin Cities Campus

Housing Studies Postbaccalaureate Certificate
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Design Graduate Program, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax: 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.cdes.umn.edu/programs/grad/prospective/admissions/housingstudiescertificateprogram.htm

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Housing Studies PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The housing studies certificate is designed for individuals interested, or currently working, in housing related professions to expand their knowledge in areas including housing and community development, housing policy, residential environment and energy use, rural housing issues, housing management, and housing finance.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The certificate consists of at least 15 credits; 2 credits in the required course and at least 13 credits from the elective options. Courses are drawn primarily from the Department of Design, Housing, and Apparel. Some elective courses require prerequisites that may be waived with instructor permission according to University policy.
Twin Cities Campus

Human Factors and Ergonomics M.S.
Mechanical Engineering
Graduate School

Link to a list of faculty for this program.

Contact Information:
Human Factors and Ergonomics Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Website: http://www.humanfactors.umn.edu/index.shtml

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HF/E) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HF/E has applications ranging from clothing and living spaces to business processes, computer interfaces, and spacecraft cockpits. Companies value graduates with HF/E training because it is essential to creating effective products that can compete in a global market. The minor is available to master's and doctoral students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 24 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under two plans: Plan A (with thesis) and Plan C (with minor). Plan A requires completion of 20 course credits plus 10 thesis credits. Plan C requires completion of 30 course credits, including 6 non-major credits.
Twin Cities Campus
Human Factors and Ergonomics Minor
Mechanical Engineering
Graduate School

Link to a list of faculty for this program.

Contact Information:
Human Factors and Ergonomics Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Website: http://www.humanfactors.umn.edu/index.shtml

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HF/E) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HF/E has applications ranging from clothing and living spaces to business processes, computer interfaces, and spacecraft cockpits. Companies value graduates with HF/E training because it is essential to creating effective products that can compete in a global market. The minor is available to master's and doctoral students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires 7 graduate credits, including 6 credits of courses from an approved list (which can be found on the Human Factors and Ergonomics web page) and 1 seminar credit approved by the director of graduate studies. In addition to these 7 credits, master's students must also take a course in statistical analysis methods. The statistic course may be at the graduate or undergraduate level, and must be approved by the director of graduate studies. A doctoral minor requires 13 credits, including 12 credits from the approved list of courses, and 1 seminar credit approved by the director of graduate studies. In addition to these 13 credits, doctoral students must also take courses in statistical analysis methods and design of experiments. The statistics courses may be at the undergraduate or graduate level, and must be approved by the director of graduate studies.
Twin Cities Campus

Human Factors and Ergonomics Ph.D.

Mechanical Engineering

Graduate School

Link to a list of faculty for this program.

Contact Information:
Human Factors and Ergonomics Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Website: http://www.humanfactors.umn.edu/index.shtml

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human factors and ergonomics (HF/E) is the study of how to make technological systems safe, effective, and easy and enjoyable to use. The program offers interdisciplinary coursework that addresses human performance and how it can be enhanced through design of tools, systems, working environments, processes, and organizations. HF/E has applications ranging from clothing and living spaces to business processes, computer interfaces, and spacecraft cockpits. Companies value graduates with HF/E training because it is essential to creating effective products that can compete in a global market.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
42 credits are required in the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Major Course Requirements: 14 credits total from the core, including
- 3 credits in statistics or experimental design
- 3 credits in Human Factors Foundations
- 3 credits in Physical Human Factors
- 3 credits in Cognitive Human Factors

The balance of core credits may come from any category on the core list. Furthermore, in order to ensure that students receive interdisciplinary exposure to multiple perspectives, they must choose core courses (excluding statistics and experimental design courses) from at least three different departments.
Twin Cities Campus
Landscaping Architecture M.L.A.
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, 144 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Website: http://landarch.design.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 88
- This program does not require summer semesters for timely completion.
- Degree: Master of Landscape Architecture

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of landscape architecture (M.L.A.) is a first professional degree required for students who wish to become licensed landscape architects. The program introduces students to the practice and discipline of landscape architecture, providing them with the artistic, technical, cognitive and communication skills, and the scientific and aesthetic knowledge necessary to practice in the profession and in other environmental fields.

The M.L.A. program is a three-year degree for students already possessing a baccalaureate degree. The program requires 88 graduate credits. Students with baccalaureate degrees in landscape architecture or architecture may apply to the three-year M.L.A. and be accepted with advanced standing.

Coursework for the M.L.A. exposes students to the broad field of landscape architecture as both a discipline and a profession. Classes are collaborative in nature and challenge students to delve into landscape issues that cut across multiple systems and scales. At the core of the M.L.A. curriculum are six design studios, one in each of the six semesters of the degree program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

M.L.A. program applicants must have completed a baccalaureate degree. M.S. program applicants must have completed an accredited baccalaureate or graduate degree in landscape architecture or a baccalaureate degree in a related discipline.

Special Application Requirements:
M.L.A. program applicants must apply by January 15 for entry the following fall in order to receive first consideration for admission, fellowships, and assistantships. In addition to completing the Graduate School application requirements, applicants must submit all of the following: three recommendations, responses in English to the two questions pertaining to landscape architecture, all essays required by the Graduate School, and a resume. All of these additional items should be submitted by uploading them to the Graduate School's electronic application system. International students must submit scores from the TOEFL, IELTS, or the MELAB. The department may give advanced standing for specific required professional degree courses when an applicant has taken a course elsewhere and provides evidence that enables it to be judged equivalent to those offered by the department. An 8.5” x 11” portfolio containing examples of creative work is preferred for all M.L.A. applications, and is required to obtain advanced standing in design. Portfolios should be sent directly to the department. Applicants with degrees in related design professions such as architecture, environmental design, or planning should clearly indicate their interest in being evaluated for admission with advanced standing with a direct letter to the director of graduate studies. GRE scores are not required for entry to the M.L.A., however, they can be helpful to applicants seeking fellowships and assistantships. A cumulative GPA of 3.00 or higher is preferred. Because of resource limitations, students are admitted for entry into the M.L.A. program only for the fall semester. More detailed information about the above departmental application requirements and procedures, including a downloadable checklist in PDF format, may be found at the department website, http://landarch.cdes.umn.edu/prog/admissions.php.
International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 86
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to **test abbreviations** (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the **General Information** section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 82 major credits and 6 credits outside the major. The final exam is written.

**Plan C:** Plan C requires 82 major credits and 6 credits outside the major. There is no final exam. A capstone project is required.

**Capstone Project:** A capstone design project is required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The M.L.A. program, which is accredited by the national Landscape Architecture Accreditation Board (LAAB), is designed for students who wish to become registered professional landscape architects. Areas of required coursework within the program include design, technology and ecology, graphic and written communication, landscape history, and research methods. To develop a special focus or to explore areas in more depth, students are encouraged to select from among the graduate seminars offered to fulfill elective requirements. To meet LAAB standards, 88 graduate credits are required for students without previous design experience. Because coursework is organized in a sequential framework of six design studios, commitment to the program for three successive years is essential.

Students who hold an accredited professional bachelor's degree in landscape architecture may complete the M.L.A. with 30 credits, including 12 credits of landscape architecture studio courses, 3 credits of landscape architecture research issues and methods, and 15 elective credits, 6 of which must be outside of the department. Up to 9 credits earned as part of the M.L.A. may be applied to the M.S.
**Twin Cities Campus**

**Landscape Architecture M.S.**

*College of Design*

Link to a [list of faculty](http://landarch.design.umn.edu) for this program.

**Contact Information:**
Department of Landscape Architecture, 144 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Website: [http://landarch.design.umn.edu](http://landarch.design.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](http://landarch.design.umn.edu) section of the catalog website for requirements that apply to all major fields.

The M.S. is for students with a clear focus in research related to landscape architecture. M.S. students build expertise related to the practice of landscape architecture as they learn how to conduct research. Students specialize within areas of faculty expertise, which may include art and landscape architecture, landscape ecology, landscape architectural history and theory, park and recreation design, rural and suburban landscape planning, transportation, planning of world heritage sites, and urban design.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.8
- **MELAB**
  - Final score: 80

Key to [test abbreviations](http://landarch.design.umn.edu) (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](http://landarch.design.umn.edu) section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 6 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
The M.S. requires 30 credits, including at least 6 credits within landscape architecture, 10 thesis credits, and at least 6 credits in an area of focus outside of landscape architecture.
Twin Cities Campus
Landscape Architecture Minor
Landscape Architecture
College of Design

Link to a list of faculty for this program.

Contact Information:
Department of Landscape Architecture, University of Minnesota, 144 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-625-6860; fax: 612-625-0710)
Email: gsland@umn.edu
Website: http://landarch.design.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in landscape architecture develop professional design skills through courses that address the increasingly complex relationships between art, ecology, and community that influence and inform design on the land. Courses emphasize three principal areas of study: 1) landscape architecture as a means to add to the aesthetic richness of our culture and environment—helping us to better understand ourselves and our place in the world; 2) integration of biological, geophysical, and ecological processes into lasting, meaningful, and systemically rigorous landscape architecture that sustains and protects the health of people and the ecosystems on which they depend; and 3) design for urban and suburban places and people, with emphasis on gaining knowledge and experience through direct engagement with clients and the public in order to address the problems and opportunities of the metropolitan core of cities.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor requirements are determined in consultation with the director of graduate studies.
Twin Cities Campus
Metropolitan Design Postbaccalaureate Certificate
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
College of Design, Metropolitan Design Program, 1 Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (625-9000; fax: 626-0600)
Email: mdc@umn.edu
Website: http://www.designcenter.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 21
- This program does not require summer semesters for timely completion.
- Degree: Metropolitan Design PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The metropolitan design certificate at the College of Design prepares students with the essential knowledge and understanding of the City within the complexities of the 21st-century metropolis. As suburban development is losing some of its past seductions, traditional cities are being transformed to accommodate the return to city living, an American countertrend that requires the integrative approach of many fields of knowledge.

The certificate is open to graduate students in the College of Design and graduate students from other colleges with related urban planning programs are welcome to apply. The certificate is a two-semester, 21-credit course sequence within existing master's degrees at the College of Design. It is strongly recommended that the required urban design courses should be taken in sequence. There is no additional tuition charge to complete the certificate.

Interested students should enroll during the second semester (spring) of graduate studies. It is recommended that students make a decision to enroll in the certificate early so that the completion of courses can be made within the time required for completion of the professional degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An application is required including a 2-page statement of interest in the program, university transcripts, and a portfolio of design work (no more 10 pages). Other students not from the College of Design should submit comparable graphic examples and two written papers.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Courses
ARCH 5711
ARCH 5721
ARCH 5731
ARCH 8255 or ARCH 52xx or ARCH xxxx (6 cr, studio)

Electives
(Students should choose a minimum of 2 courses from the following list.)
ARCH 5313 - Visualization/Communications Techniques 3 cr (Fall)
ARCH 5441 - Minnesota Architecture and Landscape 3 cr (Sp.)
ARCH 5501 - Architecture and Ecology 3 cr (Fall)
ARCH 5539 - Daylighting and Architecture Design 3 cr (Sp.)
ARCH 5542 - Building Energy Systems (DGS prior permission) 3 cr (Fall)
ARCH 5671 - Historic Preservation 3 cr (Fall)
HSG 5467 - Housing and the Social Environment 4 cr (Fall, Sp.)
LA 5201 - Making Landscape Spaces and Types 3 cr (Fall)
LA 5400 - Re-greening Cities and Bioregions 3 cr (Fall)
LA 5571 - Landform Systems and Spatial Performance 3 cr (Fall)
LA 5755 - Infra. Nat. Systems and the Spaces of 3 cr (Fall)
PA 5204 - Urban Spatial and Social Dynamics 3 cr (Fall, Sp.)
PA 5212 - Managing Urban Growth and Change 3 cr (Fall)
PA 5231 - Transit Planning and Management 3 cr (Fall)
PA 5261 - Housing Policy 3 cr (Fall)
PA 5511 - Community Economic Development 3 cr (Fall)
PA 8202 - Networks and Places: Transportation, Land Use, Design 4 cr (Fall)
Twin Cities Campus

Museum Studies Minor
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Museum Studies Graduate Minor, Bell Museum of Natural History, 10 Church Street S.E., Minneapolis, MN 55455 (612-624-6380; fax: 612-626-7704)
Email: murdo001@umn.edu
Website: http://www.bellmuseum.org/museum_studies.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The museum studies minor offers a structured graduate curriculum for master's and doctoral students interested in museums. It provides students from a variety of disciplines with an introduction to the issues involved in museum practices (e.g., educational, curatorial, administrative, and conservation). The curriculum includes seminars and internships.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's and doctoral minors require 7 and 12 credits respectively. Each requires the introductory seminar (MST 5011, 3 cr), the museum practices course (MST 5012, 3 cr), and at least one credit of internship (MST 5020). Additional credits for the doctoral minor may be internship or directed study (MST 8993).
Twin Cities Campus
Product Design Minor
Design, Housing & Apparel
College of Design

Link to a [list of faculty] for this program.

Contact Information:
Director of Graduate Studies, Product Design Graduate Minor, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax 612-624-2750)
Email: cklarqui@umn.edu
Website: [http://product.design.umn.edu](http://product.design.umn.edu)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Product design is the planning of an item intended to be manufactured and sold. These items exist both as discrete artifacts and as actors in larger social systems, such as branded environments, services, experiences, and social interactions. A graduate minor may be earned in product design when it logically relates to the graduate major field. The minor program is designed to suit the particular needs and interests of the student. The course of study is determined in consultation with the student's major adviser and the director of graduate studies for the minor.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses taken in fulfillment of the major field may not be used to fulfill requirements of the product design minor.

The course of study is determined in consultation with the student's major adviser and the director of graduate studies for the minor.
Twin Cities Campus
Surface Design Postbaccalaureate Certificate
Design, Housing & Apparel
College of Design

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Surface Design Certificate, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax: 612-624-2750)
Email: dhagrad@umn.edu
Website: http://dha.design.umn.edu/programs/grad

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Surface Design PBac Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The surface design certificate helps designers develop and build on skills needed in contemporary design education and design professions—the importance of studio practice, the ability to work in creative teams, conceptual thinking, and the creative integration of digital and non-digital skills. Design, craft, and aesthetic theory is integrated into the studio courses. Students embrace traditional methods and are encouraged to explore innovative approaches to surface design. The purpose of promoting non-digital methods is not merely to encourage excellence in craft and hand skills, but to emphasize a seamless link between technological advances and traditional skills and materials, and also to emphasize the role of evolving design production technologies in the creative process.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
A portfolio consisting of 8-10 examples of creative work is required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.
At least 1 semesters must be completed before filing a Degree Program Form.

This is a coursework-only certificate; there is no final project or thesis. A minimum of 15 credits is required for completion of the certificate.
Twin Cities Campus

Adult Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in adult education (AdEd), is a specialized academic area of the Work and Human Resource Education (WHRE) program in the Department of Organizational Leadership, Policy, and Development. AdEd graduate programs prepare individuals to work with adults in a variety of roles, such as program developers, teachers, advisers, administrators, and managers in a variety of formal and informal settings, such as educational institutions, business and industry, community agencies, healthcare organizations, continuing and professional education, and adult basic education.

As of Fall 2011, admission to the adult education M.Ed./professional studies degree has been temporarily suspended, while the program examines its current programmatic capacity. There will be no disruption to the adult education courses scheduled, or to the opportunities for progress for students already admitted.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
Applicants should submit a résumé and personal statement (limit two pages) describing career goals and rationale for interest in the M.Ed. program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 24 major credits and 10 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Course Group 0

OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
OLPD 5204 - Designing the Adult Education Program (3.0 cr)
OLPD 5296 - Field Experience in Adult Education (3.0 - 6.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)

One additional ADED elective for at least 3 credits.

Take 1 or more course(s) totaling 3 or more credits from the following:

Program Sub-plans

A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Adult Basic and Continuing Education

The M.Ed./professional studies program in adult education prepares individuals to design, implement, and evaluate educational activities for adults.

This graduate-level, practitioner-based program of 34 semester credits includes coursework in adult and continuing education, including a field experience, and in related fields appropriate to the student's interests. In consultation with a faculty adviser, students may include coursework, independent study, and field experiences in their program plans. Up to six credits in field-based projects, problems courses, independent study, and internships may be applied to the program.

Courses at the University of Minnesota are offered at a variety of times, including late afternoons and evenings. Students can also enroll in courses offered during the summer and at off-campus sites.

Students must complete at least 34 credits, including the following courses:

ADED 5101 - Strategies for Teaching Adults (3 cr)
ADED 5102 - Perspectives of Adult Learning & Development (3 cr)
ADED 5103 - Designing the Adult Education Program (3 cr)
ADED 5196 - Field Experience in Adult Education (3 credits are required and no more than 6 credits may be applied toward the program.)
ADED elective (3 credits minimum)
HRD 5301 - Organization Development (3 cr)
WHRE 5001 - Survey: Human Resource Development and Adult Education (3 cr)
WHRE 5901 - Using Research in Work and Human Resource Education (3 cr)

M.Ed. candidates in adult education may also add coursework from the following areas to their program:

- Adult learners, including undereducated adults
- Adult education as a field of practice and a profession
- Teaching adults
- Design of educational activities for adults
- Evaluation of educational activities for adults
- Administration or management of agencies, programs, and personnel related to adult education
- Advising and counseling adult learners
- Adult literacy
- Additional teaching licensure in adult literacy from the State of Minnesota

Rochester
Twin Cities Campus

Adult Education Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Contact Information:
Department of Organization Leadership, Policy, and Development, 330 Wulling Hall 3345A, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Courses in this program are taught in Twin Cities and Rochester campuses.
- Degree: Adult Education PBacc Certificate Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in adult education (AdEd), is a specialized academic area of the Work and Human Resource Education (WHRE) program in the Department of Organization Leadership, Policy, and Development. AdEd graduate programs prepare individuals to work with adults in a variety of roles, such as program developers, teachers, advisers, administrators, and managers in a variety of formal and informal settings, such as educational institutions, business and industry, community agencies, healthcare organizations, continuing and professional education, and adult basic education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.
Required Coursework
OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
OLPD 5201 - Strategies for Teaching Adults (3.0 cr)
OLPD 5202 - Perspectives of Adult Learning and Development (3.0 cr)
OLPD 5296 - Field Experience in Adult Education (3.0 - 6.0 cr)
or OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)
OLPD 5607 - Organization Development (3.0 cr)
or Additional OLPD courses to make total credits earned equal 14 credits.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus

Adult Literacy Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
The Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Adult Literacy PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting applications for admission. Please contact the College of Education and Human Development for more information about the status of this program.

The adult literacy certificate is designed to prepare teachers, administrators, trainers, and counselors in the broad political, social, economic, and theoretical aspects of adult literacy in a global environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Note: The department is currently not accepting any applications for this program.

U.S. bachelor's degree or international equivalent.
Admittance to a University graduate program or eligibility to take courses as a non-degree-seeking graduate student.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Curriculum (14 credits total required)

Part 1: Adult Literacy (minimum of 6 credits from modules below)
- OLPD 5211 - Introduction to Adult Literacy (1 cr)
- OLPD 5212 - Introduction to Adult Literacy in the Workplace (1 cr)
- OLPD 5213 - Introduction to Adult Literacy in the Community (1 cr)
- or OLPD 5251 - Introduction to Adult Literacy (in lieu of the above three courses) (3 cr)

- OLPD 5224 - Formal Assessment of Adult Literacy (1 cr)
- OLPD 5225 - Informal Assessment of Adult Literacy (1 cr)
- OLPD 5226 - Advanced Assessment of Adult Literacy (1 cr)
- or OLPD 5252 - Assessment of Adult Literacy (in lieu of the above three courses) (3 cr)

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
OLPD 5233 - Methods of Teaching Beginning Adult Literacy (1 cr)
OLPD 5234 - Methods of Teaching Intermediate Adult Literacy (1 cr)
OLPD 5235 - Methods of Teaching Advanced Adult Literacy (1 cr)
or OLPD 5203 - Methods of Teaching Adult Literacy (in lieu of the above three courses) (3 cr)

Part 2: Adult Education (minimum 3 credits)
OLPD 5201 - Strategies for Teaching Adults (3 cr)
OLPD 5202 - Perspectives of Adult Learning and Development (3 cr)

Part. 3: Field Experience (minimum 3 credits)
OLPD 5296 - Field Experience in Adult Education (3-6 cr)

Part. 4: Electives (minimum 2 credits)
The following courses can be substituted for one adult literacy class and/or be counted as electives
LING 5505 - Introduction to Second Language Acquisition (3 cr)
TESL 5721 - Methods of Teaching ESL (3 cr)
TESL 5723 - Materials for Teaching ESL (3 cr)
TESL 5724 - Introduction to Language Assessment (3 cr)
Twin Cities Campus
Advanced Practices in Second Language Teaching Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: ciinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota’s Advanced Practices in Second Language Teaching Certificate program is designed for teachers of foreign languages and English as a second/foreign language and is offered by the Department of Curriculum and Instruction in partnership with the Center for Advanced Research on Language Acquisition (CARLA) Summer Institute Program.

Courses are offered on the Twin Cities campus, typically during the last three weeks in July. The certificate may be completed independently or in conjunction with a master of education (M.Ed) degree in second languages and cultures education at the University of Minnesota.

Although the University certificate does not lead to teaching licensure or state certification, it adds value to a preservice or inservice teacher’s academic program and professional life. Completion of the advanced practices in second language teaching certificate indicates successful participation in a set of internationally recognized, high-quality summer institutes for language teaching and provides a vehicle for teachers to receive tangible recognition of preparation in advanced language teaching practices and methodologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Special Application Requirements:
This program is available to graduate-level students only. A completed bachelor's degree is required for admission. Coursework taken before completion of the bachelor's degree cannot be applied to the certificate program. Admission is open to degree-seeking or non-degree-seeking students. Academic advisers are assigned upon admission to the program.

Admission requirements include the following:
- A baccalaureate degree from an accredited U.S. institution or foreign equivalent with a minimum undergraduate GPA of 2.80
- Transcripts from all postsecondary institutions where degrees were earned (unofficial copies are acceptable)
- TOEFL or other scores, if applicable
- Certificate application form

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required courses
Non-U of M transfer credits are not accepted (other U of M courses may serve as substitutes and are decided on a case-by-case basis with adviser approval).

CI 5621 - Culture as the Core in the Second Language Classroom (2.0 cr)
CI 5622 - Second Language Acquisition Basics for Teachers (2.0 cr)
LGT 5110 - Technology in the Second Language Classroom (2.0 cr)

Students choose three of the following options:
CI 5623 - Improving Language Learning: A Practical Course in Styles- and Strategies-based Instruction (2.0 cr)
or CI 5624 - Content-based Language Instruction and Curriculum Development (2.0 cr)
or CI 5625 - Developing Assessments for the Second Language Classroom (2.0 cr)
or CI 5626 - Developing Learners' Sociocultural Competence (2.0 cr)
Twin Cities Campus

Agricultural Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The agricultural education initial licensure program at the University of Minnesota is designed to help students become accomplished professional educators who can help students succeed in the classroom. The program prepares inquiring, analytical, and reflective professional educators who can teach in the classroom and lead in the schools.

Master of education (M.Ed.)/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted in fall 1998 by the Minnesota Board of Teaching.

Students enter a 12- to 15-month program integrating educational theory with classroom practice. Working closely with experienced teachers, students observe firsthand the daily rewards and pressures of their profession.

Flexibility is an important advantage of this program. Students may enroll in any semester and are welcomed into the entire agriculture education program, building valuable professional support. A second advantage is that most program credits may be applied toward completion of the M.Ed. degree. Students have seven years to complete their degree, beginning with the first course(s) used in the program, and must maintain a 2.80 minimum overall grade point average (GPA).

This program includes two components: initial licensure and the M.Ed. degree. After successfully completing licensure requirements and appropriate work experience, students are recommended for state licensure to teach agricultural education in grades 5-8 and 7-12. This program may also provide initial preparation for Minnesota State College and Universities (MnSCU) licensure in farm business management education.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

Relevant professional experience or a relevant undergraduate major is also required.

Candidates for both plans must have at least one year of professional experience before the degree is awarded.

Special Application Requirements:
Applicants must also submit a résumé and personal statement describing career goals and rationale for interest in the M.Ed. program (limit two pages).

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
Program Requirements
Plan C: Plan C requires 15 major credits and 15 credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

License
After successfully completing licensure requirements and appropriate work experience, students are recommended for state licensure to teach agricultural education in grades 5-8 and 7-12. This program may also provide initial preparation for Minnesota State College and Universities (MnSCU) licensure in farm business management education.

1) AFEE 5290 - Seminar: Current Issues in Agricultural Education and Extension (1-3 cr), or AFEE 5280 - Current Issues for the Beginning Agricultural Education Teacher (1-3 cr), or equivalent, chosen in consultation with an adviser
2) AFEE 5995 - Integrating Paper--Master of Education: Agricultural and Extension Education (1-4 cr)
3) WHRE 5901/OLPD 5819 - Using Research in Work and Human Resource Education (3 cr)
4) Minimum of 6 credits in AFEE courses, with at least 2 credits from each of the following three areas: curriculum; methods; and program planning, organization, management
5) 16 credits in agricultural, food, and environmental sciences or related fields of study (A maximum of 12 credits of AFEE 5220 - Special Topics in Agriculture Education and Extension (1-3 cr) may be applied to this requirement.)

Although separate from the M.Ed. program, those seeking additional licensure also need to complete the Foundation of Education Courses listed below:
CI 5452 - Reading in the Content Areas for Initial Licensure Candidates (1 cr)
EDHD 5001 - Learning, Cognition, and Assessment (3 cr)
EDHD 5003 - Developmental and Individual Differences in Educational Contexts (2 cr)
EDHD 5004 - Teaching Students with Special Needs in Inclusive Settings (2 cr)
EDHD 5005 - School and Society (2 cr)
EDHD 5007 - Technology for Teaching and Learning (1.5 cr)
EDHD 5009 - Human Relations: Applied Skills for School and Society (1 cr)
PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1 cr)

Professional Studies
This sub-plan is for individuals who are interested in agri-industry training and development, sales and sales management, extension service, or other areas of agriculturally based business.

With guidance from faculty advisers, students choose at least 30 semester credits that may include coursework, independent study, internships, workshops, school-based experiences, and an integrating paper. Students can also enroll in courses offered during the summer and at off-campus school sites.
1) AFEE 5290 - Seminar: Current Issues in Agricultural Education and Extension (1-3 cr), or AFEE 5331 - History, Philosophy, and Systems of Extension (3 cr), or equivalent, chosen in consultation with an adviser
2) AFEE 5995 - Integrating Paper--Master of Education: Agricultural and Extension Education (1-4 cr)
3) WHRE 5901/OLPD 5819 - Using Research in Work and Human Resource Education (3 cr)
4) Minimum of 10 credits selected from the following two areas: methods; and program planning, organization, management
5) 12 credits in agricultural, food, and environmental sciences or related fields of study (A maximum of 8 credits of AFEE 5220 - Special Topics in Agriculture Education and Extension (1-3 cr) may be applied to this requirement.)
Twin Cities Campus

Applied Behavior Analysis Postbaccalaureate Certificate

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: sped-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/certificate/ABA.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Applied Behavior Analysis Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program in applied behavior analysis (ABA) prepares teachers and related service personnel from a variety of human services disciplines (e.g., social work, psychology) to design and deliver individualized supports to children and youth with developmental and acquired disabilities.

This 12-credit program provides specialized training in methods of behavioral assessment, intervention, treatment evaluation, and ethical issues in behavior analysis services.

The behavior-analytic model of service delivery is recognized locally and nationally as an effective and accountable system for consumers with developmental and acquired disabilities.

This program offers professional development opportunities for public and private social service agency staff, public and private school personnel, treatment facility personnel, and psychology and education professionals.

Accreditation
This program is accredited by the Behavior Analyst Certification Board (BCAB).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

By the beginning of the program, undergraduate applicants must have earned at least 60 credit hours with a minimum 2.80 GPA. Undergraduate and international students wishing to complete the certificate must be admitted to a degree program at the University of Minnesota Twin Cities campus. Graduate applicants must have a minimum 2.80 GPA in their undergraduate degree and 3.00 in graduate coursework from accredited institutions.

Special Application Requirements:
All applicants must submit the following materials:
- Two letters of recommendation from individuals who can address the applicant's ability to work with populations that could benefit from ABA techniques
- Typed goal statement (no more than one page)
- Completed certificate application
- Transcripts from all postsecondary institutions the student has attended or is currently attending, except the University of Minnesota.

International students must have foreign transcripts evaluated from an accredited reviewer (ECS http://www.ece.org or WES http://wes.org/students/index.asp).
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

A maximum of three credit hours related to the ABA field and completed at the University of Minnesota Twin Cities campus may be accepted as prior credits. Coursework must be approved by certificate faculty. No coursework from outside the University of Minnesota will be accepted as transfer credits. No course substitutions will be allowed.

All coursework must be completed for the certificate. Students will have a maximum of four years to complete coursework for the certificate. Students must maintain a minimum 3.00 GPA in certificate coursework to remain in the program. A minimum grade of B is required for successful completion of the required practicum course EPSY 5703.

All coursework must be completed prior to the practicum. Before registering for EPSY 5703, candidates must pass a criminal background check. The candidate must pay any background check fees.

**Required Coursework**

- **EPSY 5657** - Interventions for Social and Emotional Disabilities (3.0 cr)
- **EPSY 5703** - Practicum in Applied Behavior Analysis (3.0 cr)
- **PSY 4011** - Applied Behavior Analysis (3.0 cr)
- **EPSY 5616** - Behavior Analysis and Classroom Management (3.0 cr)
  or **EPSY 8707** - Principles of Behavior Analysis and Learning (3.0 cr)
  **EPSY 8708** - Functional Behavior Assessment (3.0 cr)
Twin Cities Campus

Applied Developmental Psychology Postbaccalaureate Certificate

Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373)
Email: borde021@umn.edu
Website: http://www.cehd.umn.edu/icd/DevPsych.html

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2011
• Length of program in credits: 21
• This program does not require summer semesters for timely completion.
• Degree: Appl Developmental Psychology PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in applied developmental psychology allows graduate students who major or minor in child psychology to study and experience applications of developmental science issues, policies, and problems concerning children and child development at the local, state, and national level. Through the combination of theory and field experience, students learn how to help solve pressing real-life problems and to improve the lives of children. The 21-credit program explores such topics as ethical issues in applied developmental psychology; media and children's programming; nutrition and hunger; accidents and safety issues; children in the judicial system; the design and role of children's museums; and the development of children's toys, games, and recreational activities. Professionals in this field need to develop an in-depth understanding of how public policy affects children's lives, how to make pure research comprehensible and practical without losing its complexity, and how to work in interdisciplinary teams.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admission is open to graduate students enrolled in a doctoral program at the University. Students in child psychology must consult with the training director(s) and complete a department application form before officially registering for the first seminar.

Students not in child psychology must have successfully completed a four-year undergraduate degree with a preferred 3.00 GPA and equivalent of 12 quarter or 9 semester course credits in psychology, and one statistics course.

Special Application Requirements:
Admission is based primarily on the applicant's academic record, GRE scores, and research experience.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

CPSY 8360 Section 7 (2 cr) gives an overview of applied developmental science problems and provides a framework for the second two components of the program. CPSY 8301 (4 cr) and 8302 (4 cr) are the core courses in developmental psychology covering biological, cognitive, and social aspects of development. They are fundamental to understanding the developmental perspective. CPSY 8996 (5 cr) integrates and applies information learned in coursework. The course is individually designed based on each student's prior experience and interests. Students focus on practical and/or public policy applications of developmental research in settings such as the Search Institute, the Minnesota Children's Museum, the guardian ad litem program in the local courts, the Center for 4-H Youth Development, and the National Institute on Media and the Family. This field experience may be taken in one to three semesters or a summer session, but must be at least 5 credits and total 188 hours. A major paper describing the field experience and integrating relevant basic research literature with practical availability taking place in the field setting is expected. Electives (6 cr) may include 5xxx or 8xxx courses approved by the training directors and chosen to complement the student's area of interest.

Course Group 0
CPSY 8360 - Special Topics in Developmental Psychology (1.0 - 3.0 cr)
CPSY 8301 - Developmental Psychology: Cognitive Processes (4.0 cr)
CPSY 8302 - Developmental Psychology: Social and Emotional Processes (4.0 cr)
CPSY 8996 - Directed Field Experiences in Child Psychology (1.0 - 6.0 cr)
Electives (6 cr) may include 5xxx or 8xxx courses approved by the training directors and chosen to complement the student's area of interest.
Twin Cities Campus
Applied Kinesiology M.Ed.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 220 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.) in applied kinesiology examines human movement, physical performance, and organizational structures of sport, exercise and movement science, sport and recreation management, and physical activities for persons with disabilities. The emphasis in K-12 physical education and teacher licensure prepares future educators to teach physical education and assume leadership roles in K-12 schools.

The program prepares students for advanced study or careers in teaching, coaching, health professions, or sport administration.

This graduate-level, practitioner-oriented program is offered by the School of Kinesiology in the College of Education and Human Development (CEHD).

With guidance from faculty advisers, students choose at least 30 semester credits, which may include coursework, independent study, internships, workshops, and professional, site-based experiences. Four program options are available:
1. Sport and exercise science: general preparation in a variety of areas or in-depth preparation in one area of applied kinesiology
2. Sport management: a primary focus on the management of sport and physical activity settings
3. Developmental adapted physical education (DAPE): prepares students for Minnesota teaching licensure in DAPE for grades preK-12
4. The physical education initial licensure program is designed to help the student become an inquiring, analytical, and reflective professional educator who can teach in various venues of the physical education classroom and who is prepared for leadership roles in the schools.

Note: Candidates for DAPE licensure must hold a current Minnesota teaching license in physical education.

Accreditation
This program is accredited by National Association for Colleges of Teacher Education (NCATE).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.50.

A bachelor degree, preferably in physical education or kinesiology.

Special Application Requirements:
All applicants must submit the following items:
- Official transcripts from all postsecondary institutions the student has attended or is currently attending, except the University of Minnesota. Transcripts must be received from the issuing school in a sealed and stamped envelope, and mailed to CEHD Student Services, 360 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455.
- Any student with a U.S. bachelor's degree or a comparable foreign degree from an accredited college or university may apply to
CEHD. Official transcripts of all previous post-secondary academic study must be submitted. Transcripts from coursework completed at a university outside of the United States must be evaluated by a professional credential evaluation center.

- Applied kinesiology developmental applied physical education (DAPE) focus area applicants must submit a copy of current K-12 physical education license(s).

All applicants must upload or submit the following items with their online applications:
- A résumé
- A personal statement describing the applicant's career goals and rationale for interest in the M.Ed. program (limit two pages)
- Application fee of $55 (charged when the online application is submitted)

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 20 major credits and null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Developmental and Adaptive Physical Education

The 19-credit additional licensure in DAPE is available only to teachers who are licensed to teach physical education in Minnesota. After completing the DAPE Additional Licensure program, students can easily obtain their M.Ed. in applied kinesiology with an emphasis in developmental/adaptive P.E. by taking several more courses (11 credits). A total of 30 graduate semester credits is required.

Additional Licensure in DAPE

The additional licensure in DAPE is available only to teachers who are licensed to teach physical education in Minnesota. The following is the DAPE additional licensure program of study:

**Required Kinesiology Courses (10 credits)**

- **KIN 5103** - Developmental/Adapted Physical Education (3.0 cr)
- **KIN 5104** - Physical Activities for Persons with Disabilities (3.0 cr)
- **KIN 5196** - Practicum: Developmental/Adapted Physical Education (1.0 - 4.0 cr)

**Required Educational Psychology courses (9 credits)**

- **EPSY 5613** - Foundations of Special Education I (3.0 cr)
- **EPSY 5614** - Foundations of Special Education II (3.0 cr)
- **EPSY 5616** - Behavior Analysis and Classroom Management (3.0 cr)

**Additional Licensure in DAPE (with DAPE emphasis)**

11 credits are required beyond the additional licensure requirements:

- 30 credits (minimum)
  - **KIN 4981** - Understanding Kinesiology Research (3.0 cr)
  - or **KIN 5981** - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
  - **KIN 5995** - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)
4 credits in other kinesiology courses

*As an alternative, students may take one 3-credit kinesiology course and one 2- or 3-credit elective course.

Take 4 or more credits from the following:
1 credit in an elective course outside of kinesiology.

*As an alternative, students may take one 3-credit kinesiology course and one 2- or 3-credit elective course.

Take 1 or more credits from the following:

Sports Management--Professional Studies
The M.Ed./professional studies program in applied kinesiology examines organizational structures of sport, sport and recreation management, and physical activities for persons with disabilities. The program prepares students for advanced study or careers in sport administration.

This graduate-level, practitioner-oriented program is offered by the School of Kinesiology in the College of Education and Human Development (CEHD).

With guidance from faculty advisers, students choose at least 30 semester credits, which may include coursework, independent study, internships, workshops, and professional site-based experiences.

Required Courses
- KIN 5111 - Sports Facilities (3.0 cr)
- KIN 5461 - Foundations of Sport Management (3.0 cr)
- KIN 5666 - Practicum in Kinesiology (1.0 - 6.0 cr)
- KIN 5801 - Legal Aspects of Sport and Recreation (4.0 cr)
- KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)
- KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
- KIN 4981 - Understanding Kinesiology Research (3.0 cr)

Suggested Elective Courses
- KIN 5115 - Event Management in Sport (3.0 cr)
- KIN 5136 - Psychology of Coaching (3.0 cr)
- KIN 5171 - Foundations of Kinesiology (3.0 cr)
- KIN 5365 - Health Promotion Program Design and Implementation
- KIN 5371 - Sport and Society (3.0 cr)
- KIN 5375 - Competitive Sport for Children and Youth (3.0 cr)
- KIN 5421 - Sport Finance (3.0 cr)
- KIN 5511 - Sport and Gender (3.0 cr)
- KIN 5601 - Sport Management Ethics and Policy (3.0 cr)
- KIN 5631 - Programming and Promotion in Sport (3.0 cr)
- KIN 5720 - Special Topics in Kinesiology (1.0 - 8.0 cr)
- KIN 5992 - Readings in Kinesiology (1.0 - 9.0 cr)
- ECON 4821 - Public Economics (3.0 cr)
- OLPD 5332 - Leadership Development Seminar (3.0 cr)
- OLPD 5372 - Youth in Modern Society (3.0 cr)
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
- OLPD 5701 - U.S. Higher Education (3.0 cr)
- OLPD 5615 - Training and Development of Human Resources (3.0 cr)
- MGMT 5004 - Negotiations, 2 credits
- PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
- PA 5111 - Financial Management in Public and Nonprofit Organizations (3.0 cr)
- YOST 5031 - International Youthwork (3.0 cr)
- YOST 5234 - Youth Agencies, Organizations, and Youth Service System (3.0 cr)

Physical Education Licensure
M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Minnesota Standards for Effective Practice for Teachers and the Physical Education Content Standards adopted by the Minnesota Board of Teaching.

Physical education students enter a 12-month program integrating educational theory with classroom practice. This program is offered by the School of Kinesiology at the College of Education and Human Development (CEHD). Three distinct, 10-week teaching experiences create a strong experiential base on which to apply the principles and methods learned in University classes.

An important advantage of this program is its cohort nature. Students are accepted into the program as a single cohort once each year, beginning classes in June and continuing through June, July, or August of the following year (depending on individual course loads throughout the year). Students begin classes together and continue through their course of study as a single group, building a valuable sense of community. Throughout their student teaching, pre-service teachers work closely with experienced teachers, observing
firsthand the daily rewards and challenges of the profession.

This program includes two components: initial licensure and M.Ed. degree. Students complete foundations, methods, and clinical experience coursework for licensure. After successfully completing licensure requirements, which include an "action-research" project, students are recommended for state licensure to teach physical education to grades K-12. After completing a total of 30 semester credits that can be applied to the M.Ed. degree, students are awarded the M.Ed. degree in applied kinesiology. Students have seven years to complete their degree, beginning with the first course(s) used in the program, and must maintain a 2.80 grade point average (GPA) for M.Ed. courses.

Foundations Courses
Throughout the program, students complete courses in foundations of education, including courses on psychological, sociological, philosophical, and theoretical foundations of education. These courses lay the foundation for developing a breadth and depth of knowledge and skills in the field. Inquiry, analysis, and reflection allows prospective teachers to examine educational issues from multiple perspectives. Students must complete:
- **EDHD 5001 - Learning, Cognition, and Assessment (3.0 cr)**
- **EDHD 5005 - School and Society (2.0 cr)**
- **EDHD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)**
- **EDHD 5003 - Developmental and Individual Differences in Educational Contexts (2.0 cr)**

or Take 3 or more course(s) from the following:
- **CPSY 2301 - Introductory Child Psychology (4.0 cr)**
- **CPSY 4303 - Adolescent Psychology (3.0 cr)**
- **KIN 5103 - Developmental/Adapted Physical Education (3.0 cr)**
- **KIN 5104 - Physical Activities for Persons with Disabilities (3.0 cr)**

Summer Session (10 weeks)
The curriculum and pedagogy methods courses focus on developing basic instructional techniques and instructional components and knowledge structures for K-5 and 6-12 physical education. Elements of the technology course, which include the use of heart-rate monitors and specific software programs, are integrated into the pedagogy courses.

* Counts toward M.Ed.
Note: Foundations of education courses may not be applied to the M.Ed. program, but are required for licensure.
- **EDHD 5007 - Technology for Teaching and Learning (1.5 cr)**
- **KIN 6151 - Theoretical Foundations of Curriculum and Instruction in Physical Education (2.0 cr)**
- **KIN 6521 - Pedagogy I: Elementary Physical Education (4.0 cr)**
- **KIN 6522 - Pedagogy II: Secondary Physical Education (4.0 cr)**
- **PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)**

Fall Semester
The M.Ed. involves participation in full days of pre-school workshops, nine weeks of half-day student teaching in an urban elementary setting, and Monday seminar. KIN 5512 focuses on how to determine and implement a comprehensive and cohesive K-12 physical education curriculum. Foundations, DAPE, or KIN 5981 classes generally round out the student's individual schedule.
- **EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)**
- **KIN 6596 - Clinical Experience I: Physical Education (4.0 cr)**
- **KIN 5152 - Curriculum Development in Physical Education (2.0 cr)**

Spring Semester (through May term to early June)
KIN 6597 involves another 10-week, half-day student teaching experience and Monday seminar. KIN 6598 culminates the three student teaching experience with 10 weeks of full-day student teaching and Monday seminar. The action research project (KIN 5995) is integrated into KIN 6597 and KIN 6598. One or two classes held during the first half of the semester or in the late afternoon or evening may also be taken.
- **EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)**
- **KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)**
- **KIN 6597 - Clinical Experience II: Physical Education (4.0 cr)**
- **KIN 6598 - Clinical Experience III: Physical Education (6.0 cr)**

M.Ed. Completion
The M.Ed. requirement is 30 graduate semester credits (5xxx or higher). At least 20 credits of these must be kinesiology courses, including the following:

Students complete at least 10 semester credits of graduate electives; these credits are generally in the area of DAPE and coaching and must be approved by the faculty adviser.

See course descriptions and course schedules.
- **KIN 4981 - Understanding Kinesiology Research (3.0 cr)**
- **KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)**

Sport and Exercise Science--Professional Studies
Course Group 0
Students pursuing the sport and exercise physiology emphasis must complete at least 30 credits of 5xxx courses. This 30-credit total must include at least 20 credits of KIN-designated courses, including:
KIN 5995 - Research Problems in Applied Kinesiology (1.0 - 6.0 cr)
KIN 4941 - Applied Sport Science (3.0 cr)

Recommended KIN Elective Courses
KIN 4385 - Exercise Physiology (4.0 cr)
KIN 4641 - Training and Conditioning for Sport (3.0 cr)
KIN 4741 - Strength and Power Development and Program Design (3.0 cr)
KIN 4841 - Athletic Performance and Environmental Considerations (3.0 cr)
KIN 5122 - Applied Exercise Physiology (3.0 cr)
KIN 5126 - Sport Psychology (3.0 cr)
KIN 5136 - Psychology of Coaching (3.0 cr)
KIN 5142 - Applied Sport Nutrition for Athletic Performance (3.0 cr)
KIN 5371 - Sport and Society (3.0 cr)
KIN 5375 - Competitive Sport for Children and Youth (3.0 cr)
KIN 5641 - Scientific Theory and Application of Training and Conditioning in Sport (3.0 cr)
KIN 5723 - Psychology of Sport Injury (3.0 cr)
KIN 5725 - Organization and Management of Physical Education and Sport (3.0 cr)
KIN 5992 - Readings in Kinesiology (1.0 - 9.0 cr)

Elective courses in both the major and the minor or related field will be selected by the student and the adviser, subject to the adviser's approval. These will be selected according to the student's prior academic background and future academic and career goals. Access to graduate-level courses in minor or related fields may be limited by prerequisites and demand.

Up to 10 credits of non-KIN-designated courses may be applied to the 30-credit total.

Take at most 10 credits(s) from the following:
Twin Cities Campus
Autism Spectrum Disorders Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: sped-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/certificate/Autism.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Autism Spectrum Disorder Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program in autism spectrum disorders (ASD) is designed to prepare teachers and related service personnel to design and deliver services to children and youth with ASD and their families.

ASD are developmental disorders of neurobiological origin that can affect intellectual functioning, social abilities, and language and communication skills.

This 14-credit program offers specialized training in methods of assessment, intervention, and treatment evaluation. Admission is open to graduate and undergraduate students. This program offers professional development opportunities for autism resource specialists, public and private social service agency staff, personnel at public and private schools, treatment facility personnel, and psychology and education professionals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

By the beginning of the program, undergraduate applicants must have earned at least 60 credit hours with a minimum 2.80 GPA. Undergraduate and international students wishing to complete the certificate must be admitted to a degree program at the University of Minnesota Twin Cities campus. Graduate applicants must have a minimum 2.80 GPA in an undergraduate degree and 3.00 in graduate coursework from accredited institutions.

Special Application Requirements:
All applicants must submit the following materials:
- Two letters of recommendation on letterhead stationery from individuals who can address the applicant's abilities to work in a professional context with this population
- Typed goal statement (no more than one page)
- Completed application
- Transcripts from all postsecondary institutions attended or currently attending, except the University of Minnesota. For students not currently in a University of Minnesota program, transcripts must be received from the issuing school in a sealed and stamped envelope.
- Foreign transcript evaluation (if applicable) from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

All coursework must be completed for the certificate. Students will have a maximum of four years to do so. Students must maintain a minimum 3.00 GPA in certificate coursework to remain in the program. A minimum grade of B is required for successful completion of the required practicum course EPSY 5703. All coursework must be completed prior to the practicum. Before registering for EPSY 5703, candidates must pass a criminal background check. The candidate must pay any background check fees.

Required Coursework

Students must complete 11 credits of the following coursework.
EPSY 5609 - Family-centered Services (2.0 cr)
EPSY 5616 - Behavior Analysis and Classroom Management (3.0 cr)
EPSY 5661 - Introduction to Autism Spectrum Disorder (3.0 cr)
EPSY 5702 - Practicum in Autism Spectrum Disorder (3.0 cr)

Elective Courses

Students must complete an additional 3 credits by completing one of these listed courses. Other courses may fulfill this requirement with prior approval from the program coordinator.
EPSY 5604 - Transition From School to Work and Community Living for Persons With Special Needs (3.0 cr)
EPSY 5622 - Programs and Curricula for Learners with Severe Disabilities (3.0 cr)
EPSY 5636 - Sensory Impairments of Learners With Intellectual Disabilities (2.0 cr)
EPSY 5656 - Social and Interpersonal Characteristics of Students with Disabilities (3.0 cr)
SLHS 5606 - Introduction to Augmentative and Alternative Communication (3.0 cr)
Twin Cities Campus

Business and Industry Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

Program Type: Master's
Requirements for this program are current for Fall 2011
Length of program in credits: 30
This program does not require summer semesters for timely completion.
Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is no longer accepting new students. Contact the department for more information.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 14 to 16 major credits and 14 to 16 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Coursework
OLPD 5405 - Critical Issues in Business and Industry (3.0 cr)
OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
OLPD 5476 - Field Based Projects in Business and Industry (1.0 - 4.0 cr)
NOTE: 6 credits of other BIE courses must be taken if these requirements have already been completed.
OLPD 5425 [inactive](3.0 cr)
or OLPD 5475 - Curriculum Development for Business and Marketing Education (3.0 cr)
OLPD 5496 - Occupational Experience in Business and Industry (1.0 - 10.0 cr)
10 credits of 5xxx courses consistent with the student's focus area to be chosen in consultation with an adviser.
Take 10 or more credits from the following:
5-7 credits of electives
Take 5 - 7 credits from the following:

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.
Business and Marketing Education

Industrial Education

Postbaccalaureate B.M.E.

Postbaccalaureate Ind
Twin Cities Campus

Career and Technical Education Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organization Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1700; fax: 612-624-2231)
Email: opdo@umn.edu
Website: http://www.cehd.umn.edu/olpd

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2011
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• Degree: Technical Education PBacc Certificate Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This certificate is designed for current instructors and those preparing to instruct in technical and community college settings, or individuals seeking a credential for workplace advancement.

Completion of Teacher Education Series (TES) requirements for this certificate program prepares students for state teaching licensure in secondary and postsecondary career and technical education. Licensure is granted by the Minnesota State Colleges and Universities (MnSCU) system and the Minnesota Department of Education (MDE).

Seventy-five percent of the certificate coursework must be completed at the University of Minnesota. Most courses will be offered on the University's Twin Cities campus, but additional courses may be offered elsewhere.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.65 is required for students to remain in good standing.

A 12-credit Regents-approved career and technical education certificate is available to non-degree-seeking and degree-seeking students who wish to obtain a credential after completing the Teacher Education Series (TES) and approved electives.

Required courses
Minimum 10 credits

Students must complete four of the five required TES courses, listed below. WHRE 1301 will be required of those participants with no previous pedagogy courses, but can be waived for those with previous pedagogy training or experience.

OLPD 1801 - Introduction to Career and Technical Education Teaching (2.0 cr)
OLPD 5806 - Philosophy and Practice of Career and Technical Education (2.0 cr)
OLPD 5808 - Student and Trainee Assessment (2.0 cr)
OLPD 5829 - Course Development for Business and Industry (2.0 cr)
OLPD 5861 - Instructional Methods for Business and Industry (2.0 cr)

Students are encouraged to consult faculty adviser about appropriate elective course(s) to complete the program's 12-credit requirement. Elective courses must be approved by a faculty adviser.
Twin Cities Campus
Child Psychology M.A.
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 154 Child Development Building, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373)
Website: http://www.cehd.umn.edu/icd

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Institute of Child Development does not offer admission for a master's degree. Students may choose to complete a master's degree (typically Plan B) during their progress toward the Ph.D. See the Child Psychology Ph.D. for more information.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.
Capstone Project: The Plan B project is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Plan A requires a minimum of 20 course credits (a minimum of 14 in the major and 6 in the minor/related field) and 10 thesis credits.
Plan B requires 30 course credits, of which 14 credits must be in child psychology and 6 credits in one or more related fields. A project
equivalent to 120 hours of work is also required.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

School Psychology
**Twin Cities Campus**

**Child Psychology Minor**

*Institute of Child Development*

**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**
Child Psychology Program, Institute of Child Development, 154 Child Development Building, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373)
Website: [http://www.cehd.umn.edu/icd](http://www.cehd.umn.edu/icd)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Students majoring in other fields may complete a doctoral minor in child psychology. Contact the Institute of Child Development for more information.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

The doctoral minor requires 12 credits in child psychology, to include CPSY 8301 (4 cr), 8302 (4 cr), and 8996 (1-6 cr). Remaining credits can be taken from 4xxx (subject to their own program's approval) or 8xxx courses.
Twin Cities Campus
Child Psychology Ph.D.
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 154 Child Development Building, 51 East River Parkway, Minneapolis, MN 55455 (612-624-0526; fax: 612-624-6373)
Email: borde021@umn.edu
Website: http://www.cehd.umn.edu/icd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 82
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. in child psychology focuses primarily on training for research in normal human development, and most students take positions in academic or research settings. The goal of the program is to train all students for careers in research and college teaching in child psychology, and to prepare students in the collaborative program options for careers in applied areas of child psychology as well. General program students may choose to specialize in an area such as cognitive neuroscience, language, learning, personality, memory, perception, psychobiology, or social development. Students interested in applied areas may specialize in developmental psychopathology and clinical science or school psychology.

The developmental psychopathology and clinical science (DPCS) program is a cooperative effort between the Institute of Child Development and the Department of Psychology to train leaders in research and teaching. Training draws on the unique strengths of each program. Students are admitted to the Ph.D. program in child psychology through the Institute of Child Development and to this training program by the agreement of program faculty in both departments.

The school psychology program is a cooperative program of the Institute of Child Development, the Department of Psychology, and the Department of Educational Psychology. Students are admitted jointly to one of the cooperating departments and to the school psychology program. Students must meet the standards and requirements of both the admitting department and the school psychology program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
The equivalent of three semester (or four quarter) courses in psychology and one course in statistics are required.

New students are normally admitted in fall semester. Application deadline is in December of the preceding year. Applicants must submit the departmental applications for graduate work, scores from the General Test of the GRE that are less than five years old, three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. The three letters of recommendation also must be received by the deadline. The TOEFL should be submitted when applicable. For full application instructions see: http://www.cehd.umn.edu/icd/GradInfo/apply.html.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
- Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
44 credits are required in the major.
14 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. degree usually requires five years of graduate work. Major program components include coursework, research activities, and teaching experience. Coursework requirements are specialization specific, but all students are required to take 44 credits in the major, 14 credits in a supporting program, and 24 thesis credits.

Each student specializes in an area such as social and personality development, learning, cognitive development, cognitive neuroscience, language development, psychobiology, or perceptual development. Required courses include CPSY 8301, 8302, 8304, 8311, 8321, 8360, 8888, 8994, and statistics through EPSY 8263 or equivalent.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

School Psychology
Twin Cities Campus
Clinical Physiology and Movement Science Minor
College of Education & Human Development - Adm
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
400 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-624-4370; fax: 612-624-1314)
Email: jkonczak@umn.edu
Website: http://ccms.umn.edu/Programs.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's or doctoral minor in clinical physiology and movement science is an innovative free-standing graduate minor that is available to University of Minnesota graduate students. Offering a uniquely interdisciplinary program in a new, emerging field of study, the minor is designed for graduate students in clinical, engineering, nursing, public health, and medical fields who are interested in the clinical aspects of physiology and movement science. The interdisciplinary coursework combines physiology and movement science with clinical skills for research and the diagnosis and assessment of disease conditions. Developed by faculty with rich collective expertise from across the University, the minor offers students a choice of two tracks: clinical physiology or clinical movement science.

The minor is attractive to graduate students seeking a Ph.D. or master's degree in kinesiology, rehabilitation sciences, and the speech and hearing sciences; in biomedical or mechanical engineering; in the School of Nursing; in the School of Public Health; or seeking a combined M.D./Ph.D. who have an interest in a variety of medical fields such as neurology, neurosurgery, otolaryngology, orthopedics, and pediatrics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The program has four dedicated core courses and the students are required to take two of the four. KIN 5987 - Professional Skills and Grant Writing for Health Sciences, will be required for a Ph.D. minor for a total of 2 credits, unless an equivalent course already has been taken or the student can document previous grant writing experience. CPMS 5101 - Introduction to Clinical Physiology and Movement Science, serves as a required core course for all students seeking a minor.

Additional elective courses are selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the minor. The specific courses chosen will depend on the background and goals of each individual student. The courses cover two focus areas, allowing the students to select a track in clinical physiology or a track in clinical movement science.

A complete course listing is available at http://ccms.umn.edu/CourseListings.html.

Sample Program for Ph.D. Minor (12 credits minimum)

CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
KIN 5987 - Professional Skills and Grant Writing for Health Sciences (2.0 cr)
Take 3 or more course(s) totaling 9 or more credits(s) from the following:
- RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
- KIN 8135 - Seminar: Motor Control and Learning (3.0 cr)
- OT 5393 - Functional Anatomy and Kinesiology (4.0 cr)
or Take 3 or more course(s) from the following:
- KIN 5141 - Nutrition for Health and Physical Performance (3.0 cr)
• KIN 5485 - Advanced Electrocardiogram Interpretation (3.0 cr)
• NURS 8175 - Quantitative Research Design and Methods (3.0 cr)

Sample Program for Master's Minor (9 credits minimum)
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
Take 6 or more credits(s) from the following:
• RSC 5135 - Advanced Biomechanics I: Kinematics (3.0 cr)
• KIN 5235 - Advanced Biomechanics II: Kinetics (3.0 cr)
Take 6 or more credits(s) from the following:
• RSC 5814 - Age, Exercise, and Rehabilitation (2.0 cr)
• KIN 5141 - Nutrition for Health and Physical Performance (3.0 cr)
• NURS 5995 - Research Dissemination (2.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Clinical Movement Science

Clinical Physiology
Twin Cities Campus

Clinical Physiology and Movement Science Postbaccalaureate Certificate

College of Education & Human Development - Adm
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
400 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-624-4370; fax: 612-624-1314)
Email: jkonczak@umn.edu
Website: http://ccms.umn.edu/Programs.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Clinical Physiology & Movement Science PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The clinical physiology and movement science postbaccalaureate certificate program is aimed at D.N.P. and M.D. fellows in nursing and medicine as well as professionals in clinical fields such as physical, occupational, and speech therapy. In addition, engineers working in the area of medical technology or medical device development are potential candidates. The interdisciplinary coursework combines physiology and movement science with clinical skills for research and the diagnosis and assessment of disease conditions. Students have the option to tailor the program to their individual needs and interest. They may select from a list of more than 30 courses. Developed by faculty with a rich collective expertise from across the University, the programs offer students a choice of two tracks: clinical physiology and clinical movement science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Students wishing to pursue the certificate program must have completed a bachelor’s degree, preferably in an allied health sciences or natural science field.

Special Application Requirements:
If the individual is applying for a certificate and is not currently enrolled in a graduate program at the University of Minnesota, two letters of support will be requested and a GPA of 3.0 or greater (or equivalent if there were a different student evaluation system) from a previous graduate program will be required. Submission package includes: clinical physiology and movement science application form, resume or curriculum vitae, transcripts, two letters of support, and documented language proficiency.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 3.0 is required for students to remain in good standing.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Clinical Movement Science
Clinical movement science is a new, interdisciplinary field of study focusing on human movement dysfunctions due to neurological or orthopedic diseases or diminished physical activity. This new field bridges the gap between basic and clinical sciences by crossing the boundaries of traditional disciplines of neurology, neurophysiology, kinesiology, and physical and occupational therapy. The postbaccalaureate certificate requires a minimum of 12 semester credits. The curriculum includes a required core course that covers the theory and application of clinical physiology and movement science. Elective courses are chosen from a broad list of offerings in departments such as kinesiology, public health, rehabilitation science, and otolaryngology.

The course, Introduction to Clinical Physiology and Movement Science, serves as a required core course for all students seeking a certificate. Additional elective courses will be selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the certificate. The specific courses chosen will depend on the background and goals of the individual student.

See complete course listings at: http://ccms.umn.edu/CourseListings.html.

Sample Program for Clinical Movement Science Track
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
RSC 5841 - Rehabilitation Science Instrumentation and Methodology (4.0 cr)
OTOL 8239 - Otoneurology (1.0 - 2.0 cr)
KIN 5941 - Clinical Movement Neuroscience (3.0 cr)

Clinical Physiology
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Clinical physiology is a branch of physiology that bridges basic physiology and clinical medicine. It joins the gap between basic and clinical sciences by crossing the boundaries of traditional disciplines of neurology, neurophysiology, kinesiology, and physical and occupational therapy. The postbaccalaureate certificate requires a minimum of 12 semester credits. The curriculum includes a required core course that covers the theory and application of clinical physiology and movement science. Elective courses are chosen from a broad list of offerings in departments such as kinesiology, public health, rehabilitation science, and otolaryngology.

The course, Introduction to Clinical Physiology and Movement Science, serves as a required core course for all students seeking a certificate. Additional elective courses will be selected in consultation with the faculty adviser and approved by the director of graduate studies (DGS), in order to satisfy the requirements for the certificate. The specific courses chosen will depend on the background and goals of the individual student.

See complete course listings at: http://ccms.umn.edu/CourseListings.html.

Sample Program for Clinical Physiology Track
CPMS 5101 - Introduction to Clinical Physiology and Movement Science (3.0 cr)
KIN 5385 - Exercise for Disease Prevention and Management (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
RSC 8130 - Current Literature Seminar (1.0 cr)
KIN 8122 - Seminar: Exercise Physiology (2.0 - 6.0 cr)
Community and Learning Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Community and Learning Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The community and learning certificate is designed to prepare individuals who work in community-based organizations and programs for the informal educational responsibilities that often accompany their roles.

This 15-credit certificate program prepares students to foster learning outside of the classroom and in their communities. Students will develop informal teaching and learning skills based on engagement and collaboration, and building trust and respect among participants.

The program is designed for individuals involved in community life. Examples include public health worker, youth worker, youth program leader, youth program evaluator, community program developer, community activist, community organizer, community educator, community program evaluator, environmental educator, civic engagement educator, political organizer, and teacher.

Certificate goals include providing students with:
- broad understanding of the history of democratic educational traditions and practices in community settings;
- greater knowledge of and experience with the pedagogy of teaching and learning in informal learning and everyday life situations; and
- leadership abilities that support individual and group learning, civic engagement, and empowerment.

The program is offered by the Department of Curriculum and Instruction (C&I). The certificate can also provide a portal to additional study, since courses may be applied toward a graduate-level program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Applicants must hold a bachelor's degree from an accredited college or university.

Special Application Requirements:
This program is not recommended for international students because required courses and electives may not be offered frequently enough to meet visa requirements for courses taken each semester, unless the student is also enrolled in another degree-granting program and is completing this certificate in conjunction with it.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Note: Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Required Courses
The certificate requires students to complete 15 credits from the following courses.

Students must complete required courses totaling 6 credits:
YOST 5972 - Education in the Community (3.0 cr)
YOST 5974 - The Democratic Learning Community (3.0 cr)

Elective Credits
In addition, students must complete at least 9 credits from the following courses (and may not include more than one 4xxx course).
Note: Students seeking graduate credit for PHIL 4324, PHIL 4325, or PHIL 4326 must also register concurrently for PHIL 8300.
To enroll in SW 8505 - Advanced Community Organization and Advocacy, students must be doctoral students in social work, or receive the approval of their adviser and the course instructor.
YOST 5952 - Everyday Lives of Youth (3.0 cr)
YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
YOST 5958 - Community: Context for Youth Development Leadership (3.0 cr)
PHIL 4324 (Inactive)(3.0 cr)
PHIL 4325 - Education and Social Change [AH, CIV] (4.0 cr)
PHIL 4326 - Lives Worth Living: Questions of Self, Vocation, and Community [CIV, AH] (6.0 cr)
PHIL 8300 - Workshop in Moral and Political Philosophy (1.0 cr)
PA 5012 - The Politics of Public Affairs (3.0 cr)
SW 8505 - Advanced Community Organization and Advocacy (3.0 cr)
Twin Cities Campus
Curriculum and Instruction M.Ed.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies degree programs are designed to meet the needs of practicing professionals in education and human development fields. Students admitted typically have interests in improving their current professional practice and applying their education to their present work responsibilities.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree from an accredited college or university.

Special Application Requirements:
All applicants must submit the following items:
- Official transcripts of all previous post-secondary academic study. Transcripts from coursework completed at universities outside of the United States must be evaluated by a professional credential evaluation center. Applicants should request a "course-by-course" evaluation. This process can take four to six weeks, so students should plan in advance. A suggested provider of this service is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400; fax: 414-289-3411).

All applicants must upload or submit the following items with their online applications:
- Résumé
- Personal statement describing career goals and rationale for interest in the M.Ed. program (limit two pages)
- Application fee of $55, which is charged when the online application is submitted. Fee must be paid with a credit card.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Art Education

The M.Ed./professional studies program in art education is designed for experienced art teachers and others who want to acquire advanced knowledge and leadership skills in the field of art education.

The program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete at least 30 semester credits of work in three areas: a core academic program in education, courses specific to the area of art education, and elective courses.

Core Requirements (6 credits)

- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5177 - Practical Research (3.0 cr)

Art Education Requirements

- CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
- CI 5075 - The Social and Historical Foundations of Art Education (1.0 - 3.0 cr)
- CI 5065 - Improving Art Programs in the Schools (3.0 cr)
- CI 5069 - Curriculum Innovations in Art Education (3.0 cr)
- CI 5008 - Theory and Practice of Teaching Art in Elementary Schools (1.0 - 2.0 cr)
- CI 5049 - Art Media Techniques (1.0 - 4.0 cr)
- CI 5050 - Issues in Art Education (1.0 - 4.0 cr)

Electives (6 credits)

Electives are selected in consultation with an adviser. Strongly recommended are courses in literacy, learning technologies, music, dance, art, and/or teaching English language learners (ELL), and children with exceptional needs.

Elementary Education

ALERT: Admission to this program sub-plan has been suspended. Please contact Student Services with any questions at 612-625-3339 or cehdinfo@umn.edu.

The M.Ed./professional studies program in elementary education is designed for elementary teachers who want to improve their instructional, decision-making, evaluation, and leadership skills.

The program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete at least 30 semester credits of work in the following areas: a core academic program in elementary education, and additional selected education courses.

Elementary Education (18 credits)

- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5187 - Practicum: Improvement of Teaching in Elementary or PreKindergarten Schools (2.0 - 3.0 cr)
- CI 5504 - Elementary School Science: Materials and Resources (3.0 cr)
- CI 5731 - Social Studies for the In-Service Elementary and Middle School Teacher (3.0 cr)
- CI 5415 - Literacy Development in the Primary Grades (3.0 cr)
  or CI 5411 - Teaching Reading in the Elementary School (3.0 cr)
- MTHE 5101 - Teaching Elementary School Mathematics (3.0 cr)
  or MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)

Electives (12 credits)

Electives are selected in consultation with an adviser. Strongly recommended are courses in literacy, classroom management, teaching children with diverse ethnic backgrounds, educational technologies, music, art, English as a Second Language (ESL), and...
teaching children with learning difficulties.

**English Education**
The M.Ed./professional studies program in English education addresses the needs and interests of middle school, high school, and community-college English teachers. This graduate-level, practitioner-based program of at least 30 semester credits is designed for experienced English teachers who want to acquire advanced knowledge and skills in the field of English education.

The English education program provides instruction on current developments in English/language arts curriculum theory and research, as well as methods for teaching literature, reading, composition, media, drama, and journalism.

The program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete 30 semester credits of work in three areas: a core academic program in education, coursework specific to the area of English education, and elective coursework that allows students to choose additional courses within or outside the College of Education and Human Development. Requirements also include a school-based project examining a problem, issue, or topic identified by the student.

**Core Requirements (6 credits)**
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

**English Education Requirements (18 credits)**
Take 18 or more credits from the following:
- CI 5404 - Culturally Diverse Books for Children and Adolescents (3.0 cr)
- CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5442 - Literature for Adolescents (3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5462 - Evaluating and Assessing Writing (3.0 cr)
- CI 5472 - Teaching Film, Television, and Media Studies (3.0 cr)
- CI 5475 - Teaching Digital Writing: Blogs, Wikis, Online Talk, Podcasting, and E-Portfolios to Teach Writing (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)

**Electives**
Electives may be selected from graduate-level courses (5xxx and above) at the University of Minnesota, as approved by faculty advisers. Course lists are available from advisers. Students are advised to choose courses that reflect learning issues faced in the classroom, including special education, secondary language, or cultural diversity issues.

**Environmental Education**
The M.Ed./professional studies degree program in environmental education is designed to develop leaders in environmental education through integrated research, outreach, and teaching.

This program of at least 30 semester credits offers an interdisciplinary, integrated approach to environmental learning and leadership for school teachers, extension service educators, and environmental educators in formal and informal settings. Learning experiences allow students to integrate their work experience and academic study. Field work, evaluation methods, internships, and other practical applications of theory and method are integral parts of the program.

The M.Ed. degree is based on the following principles:
- Interdisciplinary study of the earth as a set of interacting natural and social systems
- Interdisciplinary approach to environmental education
- Substantial subject-matter expertise
- Understanding of the human social and cultural dimensions of environmental issues
- Understanding of leadership principles

The program is offered by the University's Center for Environmental Education and Leadership, a collaboration of the College of Education and Human Development (CEHD), College of Food, Agricultural and Natural Resource Sciences (CFANS), and the University of Minnesota Extension Service.

**M.Ed. Degree Requirements**
All courses, except core courses, must be preapproved by the faculty adviser within the first term of enrollment. Students must complete at least 30 semester credits in the following areas.

**Core Courses (9 credits)**
- CI 5537 - Principles of Environmental Education (3.0 cr)
- CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)
- ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)

**Elective Courses**
12-14 credits.
Graduate-level coursework (5xxx and above) is selected from the following fields: natural sciences, social sciences, humanities.
education, natural resources, and agriculture.

Internship
The internship experience allows students to apply learning to a real-life context, such as an environmental learning center, a government agency, public or private schools, business, industry, or a nongovernmental agency. International internships or learning experiences are encouraged.

Research Methods, Evaluation, or Statistics (3-6 credits)
At least one course, chosen in consultation with the faculty adviser, intended to provide skills or knowledge essential to the required research project.

Research Project and Paper (2-4 credits)
Students are expected to conduct a research evaluation project, and prepare a professional paper from their project.

Interdisciplinary Focus
The M.Ed./professional studies program with interdisciplinary focus is designed for experienced teachers of different subjects.

This graduate-level, practitioner-based program allows teachers to select education and subject matter courses for two or more areas. Coursework required for additional licensure can often be applied toward this M.Ed. degree.

The program is flexible and can be tailored to accommodate individual needs. Students complete at least 30 semester credits of work in three areas: a core academic program in education, subject are specific courses, and elective courses. Requirements also include a school-based project examining a problem, issue, or topic identified by the student.

Core Requirements (12 credits)
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5177 - Practical Research (3.0 cr)
CI 5186 - School-Related Projects (1.0 - 4.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)

Take 12 or more credits(s) from the following:

Electives (6 credits)
Electives may be selected from graduate-level courses (5xxx and above) at the University of Minnesota, as approved by student and advisers. Courses from outside CEHD are recommended.

Learning Technologies
The M.Ed./professional studies program in learning technologies is designed for professionals interested in using technology in their organizations (especially K-12 and college educators, new media designers, and corporate trainers).

This program also serves students interested in using technology to develop instructional materials for a wide range of settings.

Because TEL certificate requirements are incorporated into the M.Ed. program, students may earn a certificate while earning the M.Ed. degree.

M.Ed. Degree
The program focuses on three distinct areas of study: K-12 technology integration, multimedia design and development, and online distance learning.

Core Requirements (9-11 credits)
Students in all three focus areas must complete the following core requirements totaling 9 credits.
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 5177 - Practical Research (3.0 cr)
CI 5190 - Directed Individual Study in Curriculum and Instruction (1.0 - 6.0 cr)
K-12 Technology Integration Focus
In addition, students in the K-12 technology integration focus area must complete the following coursework totaling 2 credits:
OLPD 5310 - Data-Driven Decision Making I (1.0 cr)

College Requirement (3 credits)
Students pursuing the multimedia design and development focus area must complete three credits of EPSY-designated coursework at the 5xxx-level or higher (these must be learning and cognition or adult education courses). Students in the K-12 technology integration and online distance learning focus areas must complete CI 5155.
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)

Electives (4-6 credits)
Students in the multimedia design and development and online distance learning focus areas must complete six credits of coursework related to technology use or education (course selection must be approved by adviser). Students in the K-12 technology integration focus area must complete four credits of coursework.

Focus Area Coursework
Students must complete at least 12 credits of coursework corresponding to one of the three focus areas in the following list:

Multimedia design and development focus area (12 credits)
CI 5362 - Foundations of Interactive Design for Web-based Learning (3.0 cr)
CI 5363 - New Media and Interaction Design for Web-based Learning (3.0 cr)
CI 5336 - Planning for Multimedia Design and Development (3.0 cr)
CI 5367 - Interactive Multimedia Instruction (3.0 cr)

K-12 technology integration focus area (12 credits)
CI 5337 - Planning for K-12 Technology Design and Integration (3.0 cr)
CI 5344 - Facilitating Technology Integration in Classrooms I (1.0 cr)
CI 5351 - Technology Tools for Educators (3.0 cr)
CI 5361 - Teaching and Learning with the Internet (3.0 cr)

Online distance learning focus area (12 credits)
CI 5321 - Foundations of Distance Education (3.0 cr)
CI 5323 - Online Learning Communities (3.0 cr)
CI 5325 - Designing and Developing Online Distance Learning (3.0 cr)
CI 5327 - Designing Online Adventure Learning (3.0 cr)

Mathematics Education
The M.Ed./professional studies program in mathematics education is designed for experienced mathematics teachers who want to acquire advanced knowledge and leadership skills in the field of mathematics education.

The program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete at least 30 semester credits of work in three areas: a core academic program in education, coursework specific to the area of mathematics education, and elective coursework that allows students to choose additional courses within or outside the College of Education and Human Development. Requirements also include a school-based project examining a problem, issue, or topic identified by the student.

Core Requirements
Minimum of 6 credits.
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5177 - Practical Research (3.0 cr)

Mathematics Education Requirements
Minimum of 14 credits.
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
MTHE 5993 - Directed Studies in Mathematics Education (2.0 cr)
Take 2 or more course(s) from the following:
• MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
• MTHE 5170 - Historical Topics in the Mathematics Classroom (1.0 - 3.0 cr)
• MTHE 5171 - Teaching Problem Solving (3.0 cr)
• MTHE 5172 - Teaching Probability and Statistics (3.0 cr)

Electives
Minimum of 10 credits. Students choose electives from math-designated coursework; a MTHE-designated course may be included.

After completing CI 5177 and a majority of the required and elective coursework, students independently complete MTHE 5993 under guidance of the faculty adviser.

Science Education
The M.Ed./professional studies program in science education is designed for experienced science teachers who want to acquire advanced knowledge and leadership skills in the field of science education.

The program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete
at least 30 semester credits of work in three areas: a core academic program in education, courses specific to the area of science education, and elective courses. Requirements also include a school-based project examining a problem, issue, or topic identified by the student.

**Core Requirements (9 credits)**
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)

**Science Education Requirements (12 credits)**
- CI 5533 - Current Developments in Science Teaching (3.0 cr)
- CI 5534 - Studies in Science Education (3.0 cr)
- CI 5535 - Foundations of Science Education (3.0 cr)
- CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)

**Science Electives**
Minimum of 9 credits.
With few exceptions, electives are selected from the following areas: science; the history, philosophy, or sociology of science; or courses relating to science and society.

After completing a majority of the required and elective courses, students independently complete CI 5186 under the faculty adviser's guidance. It is recommended that CI 5186 be the last course in the program.

**Social Studies**
ALERT: Admission to this sub-plan has been suspended. Please contact Student Services with all questions. 612-625-3339 or cehdinfo@umn.edu.

The M.Ed./professional studies program in social studies education is designed for experienced social studies teachers who want to acquire advanced knowledge and leadership skills in the field of social studies education.

This graduate-level, practitioner-based program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete at least 30 semester credits of work in three areas: a core academic program in education, coursework specific to the area of social studies education, and elective coursework that allows students to choose additional courses within or outside the College of Education and Human Development. Requirements also include a school-based project examining a problem, issue, or topic identified by the student.

**Core Requirements**
Take 10 - 12 credits from the following:
- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5177 - Practical Research (3.0 cr)
- CI 5186 - School-Related Projects (1.0 - 4.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

or Alternate courses approved by faculty adviser.

**Social Studies Education Requirements (6 credits)**
- CI 5761 - Social Studies Education for the Inservice Middle/Secondary Teacher (3.0 cr)
- CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)

**Social Studies Electives**
Minimum of 12 credits.
Adviser approved electives are selected from graduate-level courses (5xxx and above) at the University of Minnesota. Students must complete at least one course in one of the following disciplines: anthropology, economics, geography, history, political science, psychology, sociology, or a social science-related discipline.

After completing CI 5177 and a majority of the required and elective coursework, students independently complete CI 5186.

**Second Languages and Cultures**
The M.Ed./professional studies program in second languages and cultures education (SLC) is designed for experienced second language teachers who want to acquire advanced knowledge of research, best practices, and effective policies in the field of second languages and cultures education.

The SLC program addresses the needs and interests of second language educators in a variety of teaching contexts, including world languages, English as a second/foreign language (ESL/EFL), bilingual, and immersion settings. While the program emphasizes instructional issues related to K-12 education, it is also relevant to teachers working with university-level or adult learners.

The program is flexible and can be tailored to accommodate individual needs. With guidance from faculty advisers, students complete at least 30 semester credits of work in three areas: 1) core academic coursework in education, 2) coursework specific to the area of second languages and cultures education, and 3) elective coursework that allows students to choose additional courses within or outside CEHD related to their interests.
Three M.Ed. options are offered. Option 1 requires a final project. Option 2 combines the M.Ed. with the certificate program in dual language and immersion education and requires a final project. Option 3 combines the M.Ed. with the certificate program in advanced practices in second language teaching and does not require a final project.
Twin Cities Campus
Developmental Studies and Social Change Minor
College of Education & Human Development - Adm
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Interdisciplinary Center for the Study of Global Change, University of Minnesota, 537 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-0832; fax: 612-625-1879)
Email: icgc@umn.edu
Website: http://www.icgc.umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2011
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This structured interdisciplinary doctoral minor is offered in conjunction with the Interdisciplinary Center for the Study of Global Change (ICGC). By focusing on the social bases of change in the global south, the program engages a wide range of academic disciplines, including the social sciences, humanities, and biological sciences. The minor focuses on three areas: 1) the relationships between macroscopic processes of political, economic, and social change, and the microscopic conditions of lived experience in the global south; 2) specifically interdisciplinary perspectives (encompassing the social sciences, the biological sciences, and the humanities) on this general thematic concern; and 3) preparation of doctoral students for research on the global south.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The doctoral minor requires a sequence of four core seminars (DSSC 8111, 8112, 8211, 8310) for 9 credits total (8310 is taken twice). Students also take one or two courses (minimum 3 credits total) chosen from an approved list of courses from across the graduate education curriculum that are relevant to the field of development studies and social change.
Twin Cities Campus
Disability Policy and Services Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

Program Type: Post-baccalaureate credit certificate/licensure/endorsement
Requirements for this program are current for Fall 2011
Length of program in credits: 12
This program does not require summer semesters for timely completion.
Degree: Disability Policy and Services PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in disability policy and services is designed to allow graduate and undergraduate students, as well as community professionals, to study policies and services that affect the lives of children, youth, and adults with disabilities. The 12-credit program surveys the spectrum of education, health, and social services available to individuals with disabilities and their families, and examines the public and private networks of disability services from an interdisciplinary perspective. While the program addresses the needs of people with all types of disabilities, it emphasizes developmental disabilities across the lifespan. The program’s individualized learning experience (ILE) requires students to integrate theory with practice by completing a disability-related research project or working directly with people with disabilities in settings such as schools, recreation centers, or human-service agencies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

1) Specialized coursework (6 cr): A list of 50 approved courses fulfilling this requirement can obtained by contacting the Institute on Community Integration coordinator (Beth Fondel, fond0030@umn.edu)
This component broadens the student's level of knowledge in disability policies and services. Students must choose from courses offered across the University focusing on disability policy, disability services, and/or interdisciplinary teaming, such as communication disorders, family social science, kinesiology, nursing, public affairs, or social work.

2) Individualized learning experience (ILE) and interdisciplinary reflection groups (3 cr/200 hours): This component allows students to integrate and apply the information they have learned in coursework. Students work with the ICI certificate coordinator to design an individualized learning experience (ILE) in which they work with persons who have disabilities in settings like schools, recreation centers, health clinics, or human-service agencies. Students with considerable direct experience may alternatively design a project focusing on disability-related research, policy advocacy, governmental services, or other agency activities. The ILE can be completed in one or two semesters, but must total at least three credits and at least 200 hours.

Students also participate in at least six, one-hour interdisciplinary reflection groups to discuss relevant topics and ways to integrate field experiences with coursework. Reflection groups are offered throughout the year, including the summer session.
Required Course
OLPD 5356 - Disability Policy and Services (3.0 cr)
Twin Cities Campus
Dual Language and Immersion Education Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-4006; fax: 612-624-8277)
Email: ciinfo@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Language Immersion Education PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This graduate-level certificate program gives students an opportunity to complete a coordinated series of courses in the area of dual language and immersion education. The program does not lead to a state teaching certificate or licensure. (Note that a university certificate program or certificate is distinct from a state certificate or certification.)

In Minnesota and other states in the U.S., dual language/immersion teachers at the elementary level are required to hold a teaching license in elementary education and at the secondary level a license in the subject matter they teach (e.g., science, social studies, math). The University of Minnesota offers initial teacher licensure programs for individuals not yet licensed and additional teacher licensure programs for those individuals who already hold a MN teaching license and wish to add another.

The dual language and immersion education certificate program is designed for preK-12 teachers and other professionals to work effectively in the following school-based program models:
- "One-way" foreign language immersion programs designed for native English-speaking students
- "Two-way" bilingual immersion programs designed for native English-speaking students and native speakers of the program's partner language, such as Spanish
- Developmental bilingual programs designed for minority language learners, such as native Spanish speakers
- Indigenous language immersion programs designed for Native American children in indigenous communities with the goal of revitalizing an endangered language and culture.

In dual language and immersion programs, second/foreign/minority language that students are acquiring is a vehicle to teach school subjects. In order to be considered a dual language or immersion program, the immersion language must be used for at least 50 percent of subject matter instruction during the elementary school years. In a middle/secondary continuation program, at least two year-long content courses must be taught in the immersion language.

These programs aim for "additive bilingualism and biliteracy," or the acquisition of another language at no expense to the first, native language. Research shows that well-implemented programs allow students to develop higher levels of language proficiency in the immersion language than in any other type of language program model.

This unique University certificate program is the first in the United States to incorporate a coherent set of courses designed specifically for dual language and immersion teachers and other professionals. Offered by the college's Department of Curriculum and Instruction (C&I), the program was designed jointly by the college's second languages and cultures (SLC) education faculty and representatives of dual language and immersion programs in the Twin Cities metropolitan area.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.
A completed bachelor's degree is required for admission.

Students currently enrolled in a University of Minnesota graduate-level degree program may also apply.

Applicants should either be currently practicing as dual language or immersion educators, or provide evidence of the necessary background and interest (based on a goal statement).

**Special Application Requirements:**
This University certificate program is available to graduate-level students only. Coursework taken before completion of the bachelor's degree cannot be applied to the certificate program.

Admission is open to degree-seeking or non-degree-seeking students. To meet admission requirements, applicants must:
- Provide evidence of sufficient English proficiency needed to succeed in graduate coursework. Note: For non-native speakers of English, a passing score on the Test of English as a Foreign Language (TOEFL) is required. If TOEFL scores are not available, other evidence must be submitted.

Applicants must submit the following items:
- Certificate application form
- Transcripts from all postsecondary institutions where degrees were earned (unofficial copies are acceptable)
- TOEFL or other scores, if applicable; see preferred scores below
- A résumé
- A goal statement (if applicant is not a practicing dual language or immersion educator)

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 575
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Courses (9 credits)**
- CI 5670 - Foundations of Dual Language and Immersion Education (3.0 cr)
- CI 5671 - Curriculum Development and Assessment in Dual Language/Immersion Classrooms (3.0 cr)
- CI 5672 - Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms (3.0 cr)

**Elective Courses**
Six elective credits selected with adviser approval.

With faculty adviser approval, up to 3 transfer credits from another institution may be applied to this certificate program.
Early Childhood Education M.Ed.

Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Road, Minneapolis, MN 55455 (612-624-9035; fax: 612-624-6373)
Email: murph028@umn.edu
Website: http://www.cehd.umn.edu/icd/ECE/graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 70 to 72
- This program requires summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The early childhood education initial licensure/master of education (M.Ed.) program is offered through the Institute of Child Development in collaboration with the department of Curriculum and Instruction. The program is designed to prepare outstanding teachers of young children who will have a strong foundation in child development theory and research and developmentally appropriate methodology for teaching the different ages within the early childhood years (birth to age 8). Clinical experiences in the Shirley G. Moore Laboratory School and in local urban/suburban public schools create a strong experiential base in which to apply the principles and methods learned in University courses. Emphasis is placed on understanding individual learners, working with diverse learners, using a variety of instructional strategies, providing inclusive programming for children with and without special needs, working closely with families, creating positive classroom communities, all forms of professional writing and lesson planning, authentic assessment, documentation of student learning, reflective practice, professional development, and ethics.

Master of education/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted in fall 2010 by the Minnesota Board of Teaching.

This program includes two components: initial licensure and the M.Ed. degree. After successfully completing initial licensure requirements, students are recommended for state licensure in Minnesota to teach early childhood education (birth-third grade). After completing an additional capstone course and writing a master's paper students are awarded the M.Ed. degree. Students must have completed 30 credits within the seven years prior to completing their M.Ed. degree and maintain a 2.80 GPA to be eligible for the M.Ed.

Two groups of students typically apply to this M.Ed./initial licensure program.

1. Early Childhood Education: Foundations graduates--These applicants have completed or are completing the separate CEHD undergraduate Early Childhood Education: Foundations program. This group typically completes the licensure portion of the program in two semesters plus one summer, with an additional semester to complete the master's degree.

2. All other applicants--These applicants have not completed the undergraduate Early Childhood Education: Foundations program. This group typically completes the licensure portion of the program in four to five semesters plus two summers, with an additional semester to complete the master's degree. Students who wish to take coursework part-time may do so, which will extend the time needed to complete the program. Required coursework is scheduled throughout the day as well as in the evening.

Accreditation
This program is accredited by National Association for Colleges of Teacher Education (NCATE).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree must be completed at the time of matriculation. The preferred bachelor's degree is Early Childhood Education: Foundations.

Prerequisite Coursework
Prerequisite coursework is required to meet the Standards of Effective Practice for Teachers (SEPT) and content standards adopted in fall 2010 by the Minnesota Board of Teaching: "The teacher understands the central concepts, tools of inquiry, and structures of the discipline s/he teaches." Prerequisites may be completed after admission to the program.

- CPSY 2301 - Introductory Child Psychology (4.0 cr)
- CPSY 4331 - Social and Personality Development (3.0 cr)
- CPSY 4343 - Cognitive Development (3.0 cr)

Applicants are strongly encouraged to obtain paid or unpaid classroom experience with young children, ages birth to third grade, with multicultural and diverse populations.

Students with an undergraduate degree unrelated to early childhood education are eligible to apply with the understanding that they will take approximately 40 additional credits to meet state standards.

Special Application Requirements:
All applicants must submit the following:

Official transcripts from all post-secondary institutions attended or currently attending, except the University of Minnesota. Transcripts must be received from the issuing school in a sealed and stamped envelope. Transcripts from coursework completed at universities outside of the U.S. must go through a "course-by-course" evaluation by an accredited member of the National Association of Credential Evaluation Services (NACES), such as Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400, fax: 414-289-3411). This process can take four-six weeks; please plan in advance.

Résumé highlighting work with children, and classroom, diversity, and other experiences relevant to teaching young children. These experiences are not required but are considered valuable. Please include the following details:
- Dates and total hours worked
- Name and location of program
- Supervisor's name and phone number
- Description of responsibilities
- Description of the population with which the applicant worked

Personal statement describing experiences working with children and/or youth and how it has affected the applicant's decision to become a teacher. The applicant should include cultural and other diverse experiences that have contributed to personal development, reflect on innovative ways s/he has contributed (or will) to the profession, and elaborate on her/his understanding of the process of effective teaching (e.g., classroom management, accommodating different learning styles, and working with special-needs children). Limit the essay to two double-spaced pages, with 12-point font and one-inch margins.

Two letters of recommendation (submitted through the online application system) should address the applicant's ability to work with young children, education-related experience, work style, and personal attributes.

Applicants must submit their test score(s) from the following:
- Minnesota Teacher Licensure Exam
- MTLE Basic Skills Tests

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 650
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 70 to 72 major credits and null credits outside the major. The is no final exam.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Students complete foundations, methods, and student teaching coursework for licensure. Some of the coursework may be taken for undergraduate credit, before admission into the program. At least 30 graduate-level credits are required for the M.Ed. degree.

**Foundation Courses**
- CPSY 4993 - Directed Experiences in Early Childhood Education (3.0 cr)
- CPSY 5251 - Social and Philosophical Foundations of Early Childhood Education (2.0 cr)
- EDHD 5007 - Technology for Teaching and Learning (1.5 cr)
- EDHD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
- PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)
- LING 3001 - Introduction to Linguistics [SOCS] (4.0 cr)
  or CI 3610 - Linguistics for Teachers [SOCS] (3.0 cr)
  or ENGL 3601 - Analysis of the English Language (4.0 cr)

**Methods Courses**
- CI 3401W - Diversity in Children's Literature [WI] (3.0 cr)
- CI 5111 - Introduction to Elementary School Teaching (3.0 cr)
- CI 5413 - Foundations of Reading (3.0 cr)
- CI 4413 - Practicum: Working With Developing Readers (2.0 cr)
- EPSY 5625 - Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction (2.0 cr)
- EPSY 5681 - Education of Preschool Children With Disabilities: Methods and Materials (3.0 cr)
- CPSY 5252 - Facilitating Social and Emotional Learning in Early Childhood Education (3.0 cr)
- CPSY 5253 - Facilitating Cognitive and Language Learning in Early Childhood Education (3.0 cr)
- CPSY 5254 - Facilitating Creative and Motor Learning in Early Childhood Education (2.0 cr)
- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
- CI 5644 (Inactive) (1.0 cr)
  Students must register for this course twice.
  - CI 5183 - Applying Instructional Methods in the Elementary Classroom (1.0 - 2.0 cr)

**Student Teaching**
- CPSY 5281 - Student Teaching in Early Childhood Education (1.0 - 6.0 cr)
- CI 5181 - Clinical Experience in Elementary School Teaching (2.0 - 8.0 cr)

**M.Ed. Completion**
- CPSY 5187 - Master's Paper in Early Childhood Education (2.0 - 3.0 cr)
- CPSY 4334W - Children, Youth in Society [WI] (3.0 cr)
  or Another related 3-4 credit course with advisor's approval.
Twin Cities Campus

Early Childhood Policy Postbaccalaureate Certificate
Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Parkway, Minneapolis, MN 55417 (612-624-0526, fax: 612-624-6373)
Email: borde021@umn.edu
Website: http://www.cehd.umn.edu/icd/ECPolicy.html

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2011
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• Degree: Early Childhood Policy PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program is not currently accepting new students. For more information on the status of this program, please contact the Institute of Child Development.

The early childhood policy postbaccalaureate certificate gives students expertise in applying research-based knowledge to public policies affecting young children and the adults who care for them. In addition to completing coursework, students in the certificate program complete two types of applied work: participation in an individualized learning experience (ILE) that integrates and applies coursework through practicum experiences, or individual research and participation in local discussion groups as part of the McEvoy Lecture Series on Early Childhood Policy. These three certificate components—coursework, ILE, and discussion groups—provide a vehicle for students to gain a similar set of skills, and foster connection between the University and the community.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admission to the certificate will be only for fall semester to support the student cohort model. This cohort approach allows students to gain additional benefit from the interdisciplinary nature of this program, and to create collegial relationships. Admission decisions will be made by a subcommittee of the certificate faculty at an annual meeting in the spring.

Prospective students should have experience in early childhood research or practice and/or in policy or advocacy work.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The 12-credit certificate consists of one cornerstone course: CPSY 5413/PA5490 - Early Childhood and Public Policy (3 cr), one policy elective (3 cr), one open elective (3 cr), and CPSY 5414 - Individualized Learning Experience (3 cr). Most courses are offered late afternoon or evening and the certificate can be completed in two to four semesters.
Twin Cities Campus

Education Sciences Minor

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: mlif@umn.edu
Website: http://www.cehd.umn.edu/MITER/default.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 18
- Length of program in credits (Doctorate): 18
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The education sciences minor reflects an interdisciplinary effort that combines research in education with research in the basic arts and sciences to address problems of education. The minor draws on coursework from education, educational psychology, cognitive neuroscience, child development, psychology, and public policy. Coursework includes professional socialization courses presenting a general introduction to educational research and experimental methods; two advanced courses in research methods and statistics; and two advanced courses in cognition and learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework includes: a) two professional socialization courses presenting a general introduction to schools and educational research (3 cr each); b) two advanced courses in research methods and statistics (experimental research design, measurement, and statistical methods, 3 cr each); and c) two advanced courses in cognition and learning (addressing cognitive approaches to learning, 3 cr each), for a total of 18 credits.

Note: Students may not use course credits to satisfy requirements for both a graduate major and for the education sciences minor.
Twin Cities Campus

Education, Curriculum, and Instruction M.A.

Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for professional roles in preK-12 education, postsecondary and research settings, educational service agencies, and business and industry.

The M.A. degree includes formal tracks in art education; family, youth, and community; learning technologies (including online distance learning, multimedia design and development, and K-12 technology integration); literacy education (including children's and adolescent literature, critical literacy and English education, and reading education); mathematics education; science education; second languages and cultures (SLC) education (including ESL, foreign language education, and bilingual and immersion education); and social studies education. Students must have an interest in research in education or a related field; students plan a program of coursework that prepares them to conduct scholarly research in an area of expertise related to a track or tracks listed above.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Generally a bachelor's degree with licensure and/or teaching experience fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of undergraduate coursework determined acceptable by advisers and the director of graduate studies is adequate.

Special Application Requirements:
Applicants must submit scores from the GRE, three letters of recommendation from individuals familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. M.A. applications are reviewed by department faculty once per academic year, with December 1 as the deadline.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required. 

Capstone Project: All M.A. students must demonstrate familiarity with the tools of research or scholarship in their major track, the ability to work independently, and the ability to present their work effectively.

Plan B paper(s) are less formal than Plan A theses and may build more directly from coursework; papers should involve deep engagement of the research literature. A paper done for a course may serve as one of the Plan B papers, with the understanding that it would be extended and revised under the adviser's supervision.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: For SLC education track only.

A minimum GPA of 3.00 is required for students to remain in good standing.

In education, curriculum, and instruction, students may pursue Plan A (with thesis) or Plan B (with one or two papers). Plan A requires 15-18 credits in the major, depending upon the formal track chosen, and a minimum of 6 credits in one or more related fields outside the major. Plan A also requires 10 thesis credits. Plan B requires a minimum of 30 credits, which includes a minimum of 14 credits in the major and at least 6 credits in one or more related fields outside the major. Core and research course requirements are specified for Plan A and Plan B in accord with each track and are chosen in consultation with the adviser.

Program Sub-plans

Students are required to complete one of the following sub-plans.

Students may complete the program with more than one sub-plan.

Art Education

The M.A. program in art education presents opportunities for students with experience in schools or other educational settings to develop their ability to work at the intersection of theory and practice. Gaining the knowledge and skills necessary to be reflective and well-informed art educators, graduates become educational leaders in many contexts—school districts, museums, community arts organizations, government agencies—or often pursue further graduate study. Students are encouraged to take courses both across the College of Education and Human Development and the University at large and typically fulfill program requirements by exploring issues of teaching, learning, curriculum, teacher education, and school reform in urban and suburban schools, several renowned art museums in the greater Minneapolis area, and within the initial teacher licensure program at the University. The course of study is planned in consultation with the adviser to meet the academic interests and background of the students; those needs are balanced with the expected foundations in research and scholarship. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

Program faculty exhibit a strong commitment to curriculum innovation, issues of social justice and diversity, and life-long aesthetic and artistic development.

Plan A or Plan B

Plan A

Total: 31 credits

Major Coursework

Minimum of 15 credits. In addition to courses listed below, others are selected in consultation with adviser.

CI 5075 - The Social and Historical Foundations of Art Education (1.0 - 3.0 cr)
CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)
CI 8079 - Research in Art Education (3.0 cr)
CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)

Minor or Related Field
Take 6 or more credits from among the special topics offered in the following course:
CI 5050 - Issues in Art Education (1.0 - 4.0 cr)

Thesis Credits
Take a minimum of 10 credits.
CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Total: 30 credits

Major coursework
Specific courses listed below; others selected in consultation with adviser.
CI 5075 - The Social and Historical Foundations of Art Education (1.0 - 3.0 cr)
CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
CI 8075 - Seminar: Art Education (2.0 cr)

Research
CI 8095 - Problems: Art Education (1.0 - 12.0 cr)
CI 8079 - Research in Art Education (3.0 cr)
or DES 8181 - Research Ethics (1.0 cr)

Electives
Take 6 or more credits from among the special topics offered in the following course:
CI 5050 - Issues in Art Education (1.0 - 4.0 cr)
Take 6 or more credits selected in consultation with an adviser based on previous experience and areas of interest.

Elementary Education
The program in elementary education is designed to help professionals acquire and contribute to the advancement of knowledge and leadership so necessary to address the dynamic challenges of contemporary education at the elementary level. Emphasized within the program are, for example, the following: a focus on interdisciplinary approaches to curriculum development, the use of inquiry as a key pedagogical approach, the importance of a strong understanding of diversity and its social and educational implications, and child development and learning theories as the foundation for research and teaching elementary settings.

Learning Technologies
The learning technologies (LT) M.A. program prepares people for research and practice related to multimedia, design, K-12 technology integration, and online distance learning. M.A. graduates often conduct research and engage in LT-related practice in K-12, higher education, or business or industry, such as software companies. LT coursework includes hands-on learning and use of current technologies, development of technological solutions, consideration of theory and research, and conducting educational research.

The M.A. is targeted at students interested in a stronger research orientation than those who pursue the master of education degree. M.A. students, who often continue to a Ph.D. program, are required to take courses in research methodology and to write a Plan A thesis or Plan B paper to complete their degree. Master's degrees extend the content in the certificate programs and include various courses taken from inside and outside the program. Students may engage in advanced media and software design and development or develop plans for technology integration for diverse educational settings.

Plan A or Plan B

Plan A
Total: 34 credits

Major
Minimum of 18 credits.
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)

Technology certificate focus area
Take a minimum of 12 credits selected in consultation with an adviser within one of the following focus areas:
- Multimedia design and development
- K-12 technology integration
- Online distance learning

Minor or Related Field
Take six or more credits.
Thesis Credits
Take 10 or more credits(s) from the following:
• CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
-OR-

Plan B
Total: 30 credits
Major
Minimum of 14 credits. Specific courses listed below.
CI 5331 - Introduction to Learning Technologies (3.0 cr)
CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
or
An approved course in learning and cognition or adult education.
Certificate focus area
Specific courses to be selected in consultation with adviser within one of the following certificate focus areas:
- Multimedia design and development
- K-12 technology integration
- Online distance learning
Research
CI 8395 - Problems: Instructional Systems (1.0 - 6.0 cr)
DES 8181 - Research Ethics (1.0 cr)
Minor or Related Field
Take a minimum of 6 credits.

Literacy Education
The M.A. program in curriculum and instruction with an emphasis on literacy is thoughtfully designed to balance theory with practical application in a variety of educational settings. There is a deep foundation in evaluating current research and students are encouraged to contribute meaningfully to research in the field of literacy. Faculty members and students work together to study at the intersection of the strands of literacy: children's and adolescent literature, critical literacies, English education, language arts, and reading. Literacy research related to diverse learners in urban, multilingual settings is a central focus of the program. The course of study is planned in consultation with the adviser to meet the academic interests and background of the students; those needs are balanced with the expected foundations in research and scholarship. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

Plan A or Plan B

Plan A
Total: 31 credits
Major
Minimum of 15 credits. At least one seminar in literacy education is required.
CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)
Minor or Related Field
Take a minimum of 6 credits.
Thesis Credits
Take 10 or more credits(s) from the following:
• CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
-OR-

Plan B
Total: 30 credits
Major
Includes at least one seminar in literacy education. Specific courses are selected in consultation with adviser based on previous experience and areas of interest.
Research
CI 8495 - Problems: Teaching English and Reading (1.0 - 6.0 cr)
DES 8181 - Research Ethics (1.0 cr)
A minimum of one 3-credit research course selected from list of recommended courses for C&I Plan B students.
Minor or Related Field
Take a minimum of 6 credits.

Mathematics Education
The mathematics M.A. program prepares students for research and practice related to K-12 mathematics and engineering education. The M.A. is targeted at students interested in a stronger research orientation than those who pursue the master of education (M.Ed.) degree. M.A. students, who often continue on to a Ph.D. program, are required to take courses in research methodology and to write a
Plan A or Plan B paper to complete their degree. Graduate students participate in this work as teaching assistants, research assistants in externally funded projects, and as instructors.

Plan A or Plan B

Plan A

Major
Minimum of 15 credits.
CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
MTHE 8501 - Theory and Classical Research in Mathematics Education (3.0 cr)
Take 2 or more course(s) from the following:
- MTHE 5170 - Historical Topics in the Mathematics Classroom (1.0 - 3.0 cr)
- MTHE 5171 - Teaching Problem Solving (3.0 cr)
- MTHE 5172 - Teaching Probability and Statistics (3.0 cr)
- MTHE 5355 - Mathematics for Diverse Learners (3.0 cr)
- MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
- MTHE 8591 - Seminar: Mathematics Education (1.0 - 3.0 cr)
or MTHE 5xxx graduate course requiring adviser approval for 3 credits.

Minor or Related Field
Take 6 or more credits from content minor or supporting field (e.g. MATH 5xxx and/or STAT 5xxx).

Thesis Credits
Take 10 or more credits from the following:
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Total: 30 credits

Major
Minimum of 18 credits. Specific courses listed below; others selected in consultation with adviser.
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)

Research
MTHE 8571 - Research in Mathematics Education (3.0 cr)
MTHE 8995 - Problems: Mathematics Education (1.0 - 6.0 cr)
DES 8181 - Research Ethics (1.0 cr)

Minor or Related Field
Take 6 or more credits in content minor or a supporting field (e.g. MATH 5xxx and/or STAT 5xxx).

Science Education
The master's program in science education is designed to prepare scholars to conduct thoughtful research in order to assume roles as university faculty members, educational leaders, policy makers, and researchers and to contribute meaningfully to the field. The field of science education is a broad one and includes science and environmental education at the K-12 levels, the college level, in informal and adult settings, and in early childhood. Focus areas of research within the science education area are the preparation of pre-service science teachers (K-12), induction and mentoring of beginning science teachers, design and implementation of curricula across the K-college spectrum, environmental education, cooperative learning, and social justice.

Plan A or Plan B

Plan A
Total: 31 credits

Major
Minimum of 15 credits. Specific courses listed below; others selected in consultation with adviser.
CI 8570 - Advanced Topics in Science Education (1.0 - 4.0 cr)
CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)
CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)
CI 5535 - Foundations of Science Education (3.0 cr)
Additional research methods course selected in consultation with adviser (3 cr.)

Minor or Related Field
Take a minimum of 6 credits.

Thesis Credits
Take 10 or more credits from the following:
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
Plan B
Total: 30 credits

Major
Minimum of 18 credits. Specific courses listed below; others selected in consultation with adviser.
- CI 8570 - Advanced Topics in Science Education (1.0 - 4.0 cr)
- CI 8571 - Equity, Policy, and Social Justice in Science Education (3.0 cr)
- CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)
- CI 5535 - Foundations of Science Education (3.0 cr)

Research
- DES 8181 - Research Ethics (1.0 cr)
- CI 8595 - Problems: Science Education (1.0 - 6.0 cr)

At least one course in qualitative research methods, selected with adviser from list of recommended courses for C&I

Minor or Related Field
Take a minimum of 6 credits.

Second Languages and Cultures Education
Second languages and cultures (SLC) education is nationally and internationally known for its programs, which focus on English as a second language (ESL) for K-12, postsecondary, and adult classrooms; bilingual and immersion education; and traditional foreign language education in both K-12 and postsecondary settings. The program's perspective on language learning and teaching is markedly pedagogical and informed by an awareness of the role social context plays in the process of language learning and teaching. Master's students in SLC engage in coursework and projects that balance theory and research with practical application. Students pursue a course of study that is designed in collaboration with the faculty adviser to correspond to the interests and background of each student and to provide a solid understanding of research and best practice in the field. Independent scholarship is encouraged and typically comes in the form of a final project (Plan B) or a more formal thesis (Plan A).

Plan A or Plan B

Plan A
Total: 34 credits

Major
Minimum of 15 credits. Specific courses are listed below. Others are selected in consultation with adviser.
- CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)
- CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
- CI 5662 - Second Language Curriculum Design (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5658 - Foreign Language Testing and Assessment (3.0 cr)
  or CI 5642 - Assessing English Learners (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
  or CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)

Research methodology course
Choose one additional research methodology course: either quantitative (e.g., EPSY 5261 - Introduction to Statistics (3 cr) or a qualitative course selected in consultation with adviser).

Minor or Related Field
Take a minimum of 6 credits.

Thesis Credits
Take 10 or more credits from the following:
- CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Plan B
Total: 30 credits

Minimum of 18 credits. Specific courses listed below; others selected in consultation with adviser.
- CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
- CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5662 - Second Language Curriculum Design (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5642 - Assessing English Learners (3.0 cr)
  or CI 5658 - Foreign Language Testing and Assessment (3.0 cr)

Research
Minimum of 6 credits. At least one course in qualitative research methods, selected with adviser from list of recommended courses for C&I Plan B students.
CI 8695 - Problems: Second Languages and Cultures Education (1.0 - 6.0 cr)
DES 8181 - Research Ethics (1.0 cr)

Minor or Related Field
Minimum of 6 credits.

Social Studies Education
The program in social studies education focuses on issues related to curriculum, instruction and assessment in K-12 social studies. Graduate students are strongly encouraged to present research papers at professional conferences, specifically the National Council for the Social Studies and the American Educational Research Association.

Faculty maintain active research agendas with several research centers at the University including the Center for Applied Research and Educational Improvement, housed within the College of Education and Human Development, and two research centers housed outside the College: the Center for Environmental Learning and Leadership and the Center for the Study of Political Psychology. Social studies faculty research interests include the areas of political socialization, political tolerance, authentic assessment, citizenship and civics education, and democratic thought. In addition, faculty members engage in research centered on the history of curricula, multicultural and gender studies, and social justice.

Plan A or Plan B

Plan A
Total: 32-35 credits
Major
Minimum of 16 credits. Specific courses listed below; others selected in consultation with adviser.
CI 5761 - Social Studies Education for the Inservice Middle/Secondary Teacher (3.0 cr)
CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)
CI 8796 - Research Internship in Social Studies Education (1.0 - 6.0 cr)
CI 8133 - Research Methods in Curriculum and Instruction (3.0 cr)
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
One qualitative research course, selected with adviser.

Minor Or Related Field
Take a minimum of 6 credits.

Thesis Credits
Take 10 or more credits from the following:
• CI 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Total: 30 credits
Major
15 credit minimum. Specific courses listed below; other selected in consultation with adviser.
CI 5761 - Social Studies Education for the Inservice Middle/Secondary Teacher (3.0 cr)
CI 5762 - Developing Civic Discourse in the Social Studies (3.0 cr)
CI 5747 - Global and Environmental Education: Content and Practice (3.0 cr)

Research
Minimum of 9 credits.
EPSY 5261 - Introductory Statistical Methods (3.0 cr)
CI 8795 - Problems: Social Studies Education (1.0 - 6.0 cr)
DES 8181 - Research Ethics (1.0 cr)
At least one course in qualitative research methods, selected with adviser from list of recommended courses for C&I Plan B students.

Minor or Related Field
Take a minimum of 6 credits.
Twin Cities Campus

Education, Curriculum, and Instruction Minor
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for professional roles in preK-12 education, postsecondary and research settings, educational service agencies, and business and industry.

The minor in education, curriculum and instruction may include a focus in any one of the available tracks: art education; culture and teaching (at the doctoral level); family, youth, and community (including education for community, parent and family education, and youth development and programming); learning technologies (including online distance learning, multimedia design and development, and K-12 technology integration); literacy education (including children's and adolescent literature, critical literacy and English education, and reading education); mathematics education; science education; second languages and cultures education (including ESL, foreign language education, and bilingual and immersion education); and social studies education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires a minimum of 6 credits selected in consultation with the director of graduate studies.

Doctoral Level Credits
A minimum of 12 credits is required for a minor; specifically the two core courses (CI 8131 and CI 8132) and 6 more credits in the major track (selected in consultation with a faculty member in Curriculum and Instruction).

- CI 8131 - Curriculum and Instruction Core: Critical Examination of Curriculum in Context (3.0 cr)
- CI 8132 - Curriculum and Instruction Core: Teaching Theory and Research (3.0 cr)

A minimum of 6 credits selected in consultation with the director of graduate studies.
Twin Cities Campus

Education, Curriculum, and Instruction Ph.D.

Curriculum & Instruction

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 78
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By focusing on the curricular and instructional processes central to all educational endeavors, graduate programs within the Department of Curriculum and Instruction prepare students for academic and professional roles in P-12 education, postsecondary, and research settings, educational service agencies, and business and industry.

The Ph.D. degree includes formal tracks in art education; culture and teaching (including critical white studies, immigrant and urban education, popular culture, and teacher preparation and development); family, youth, and community (including education for community, parent and family education, and youth development and programming); learning technologies (including online distance learning, multimedia design and development, and K-12 technology integration); literacy education (including children's and adolescent literature, critical literacy and English education, and reading education); mathematics education; science education; second languages and cultures education (including ESL, foreign language education, and bilingual and immersion education); and social studies education.

Students must have an interest in research in education or a related field; students plan a program of coursework that prepares them to conduct scholarly research in an area of expertise related to a track or tracks listed above.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is preferred for admission to some of the tracks within the Ph.D. program, but it is not always required.

Generally a bachelor's degree with licensure and/or teaching experience fulfills the requirement. For some areas, however, there is no equivalent undergraduate program. In that case, 15 to 20 credits of undergraduate coursework determined acceptable by faculty is adequate.

Special Application Requirements:
Applicants must submit scores from the GRE, three letters of recommendation from individuals familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. Some program tracks require an example of academic writing. Doctoral applications are reviewed by department faculty once per academic year, with December 1 as the deadline.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  - IELTS
    - Total Score: 6.5
  - MELAB
    - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
42 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in second language.

A minimum GPA of 3.00 is required for students to remain in good standing.

Refer to Curriculum and Instruction (CI), and Mathematics Education (MTHE) in the course section of this catalog or in Twin Cities Courses on the University Catalog website for courses pertaining to the program.

A total of 78 credits is required for the Ph.D. Requirements include two core courses (CI 8131 and 8132) and at least 15 other credits in the selected track. Students must also complete 18 credits in research methodology including CI 8133, CI 8148, WHRE 8912 and 9 credits of depth coursework in quantitative, qualitative, or mixed methods; 12 credits in a minor or supporting program; 3 elective credits to be determined in consultation with advisor; and 24 thesis credits. Specific courses and additional work vary depending upon the track and are planned with the adviser.

Program Sub-plans
Students are required to complete one of the following sub-plans.

Art Education
The Ph.D. program in art education presents opportunities for students with experience in schools or other informal educational settings to develop necessary philosophical, theoretical, and methodological competence to make scholarly contributions to the field. Working as researchers, scholars, policy makers, and practitioners, graduates become educational leaders in universities, colleges, P-12 school districts, museums, community arts organizations, and government agencies.

Students typically carry out dissertation inquiry in local urban and suburban schools, several renowned art museums in the Minneapolis-St. Paul area, and within the initial teacher licensure program at the University. Both qualitative and quantitative research methods have guided Ph.D. candidates' inquiry on the rightness of aesthetic-based problem solving, design thinking, and media arts theory and practice in arts classrooms; teaching critical literacy in and through the arts; innovation in culture-based arts education; and other knowledge building questions specific to art teacher development and retention. Faculty and students are committed to understanding equity and social justice in both research and teaching. Graduate students often work closely with faculty in the development, implementation, and evaluation of national, state, and local arts education initiatives.

Culture and Teaching
The culture and teaching (CaT) sub-plan engages the study of education as a cultural phenomenon. Students in CaT study a range of educational processes that take place both in and beyond the borders of schools, and explore alternative epistemologies and pedagogies. Faculty and students are dedicated to seeking better understandings of issues pertaining to equity and social justice in both research and teaching. The track is interdisciplinary and collaborative, so students' work will encompass many different approaches, methods, and perspectives.

Some of CaT's courses focus on the ways in which teachers are prepared to teach; engage in ongoing professional development; and develop their own personal and professional identities within collegial communities. Other courses examine the salience of...
understanding white racial identity for pedagogy and social change; as well as the implications of globalization and immigration for teaching, learning, and curriculum. Still other courses explore popular culture and media in relation to contemporary critical theory and teaching practices. “Culture” in CaT includes thinking about “high” and “popular” cultures, the cultures of teaching and the cultures of learning, and how our responses to all influence and are influenced by everyday meanings and practices.

Elementary Education
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

This program in elementary education is designed to help professionals acquire and contribute to the advancement of knowledge and leadership so necessary to address the dynamic challenges of contemporary education at the elementary level. Emphasized within the program are, for example, the following: a focus on interdisciplinary approaches to curriculum development, the use of inquiry as a key pedagogical approach, the importance of a strong understanding of diversity and its social and educational implications, and child development and learning theories as the foundation for research and teaching in elementary settings.

Overall Ph.D. course requirements are outlined by the major (education, curriculum and instruction). Student-specific coursework is selected in consultation with adviser(s) and determined by specialization within the track, research methodology, and transfer credits.

Learning Technologies
The learning technologies (LT) program prepares students for research and practice related to multimedia, design, K-12 technology integration, and online distance learning. Ph.D. graduates often earn academic positions in higher education or become directors and leaders of development or research in business and industry. Coursework in LT includes hands-on learning and use of current technologies, development of technological solutions, research methods, and theory of curriculum, instruction, and learning.

The Ph.D. degree is targeted primarily at students interested in pursuing research careers. Student research, culminating in a dissertation, typically evaluates various learning technologies issues and interventions. Common areas of study include conditions affecting educational technology use in schools, higher education, and business settings, and tend to focus on psychological, sociological, and philosophical factors. For example, recent graduates have studied the impact of technology on learning and cognition, variables that mediate effective technology use in education, and issues related to ethical technology use.

Literacy Education
Within the literacy education track there are three specializations: (1) children's and adolescent literature, (2) critical literacy and English education, and (3) reading education. Students who have an interest in literacy outside of these specialization areas are able to work with faculty and advisers to develop a program that builds on their interests. Although faculty members work within these distinct specializations, they also enjoy collaborating on teaching, research, and writing projects across the areas embedded within literacy education. Together, faculty and graduate students in the program investigate a host of issues in the field of literacy.

The literacy education track has four overarching goals. They are:
- to apply multiple theoretical and research perspectives to problems and questions central to the field;
- to engage in research, teaching, and outreach that supports culturally and linguistically diverse literacy learners;
- to develop literacy teachers and leaders for diverse schools; and
- to influence literacy policies that address inequities and benefit all learners.

Mathematics Education
The doctoral program in mathematics education is designed to prepare scholars to conduct thoughtful research in order to assume roles as university faculty members, educational leaders, policy makers, and researchers; and to contribute meaningfully to the field. Focus areas of research within the mathematics and engineering education fields are the preparation of pre-service science teachers (K-12), induction and mentoring of beginning science teachers, design and implementation of curricula across the K-college spectrum, and social justice. Full-time students in the doctoral program will be provided teaching and research opportunities relevant to their area of interest, such as supervising student teachers, teaching pre-service courses, and grant work. Students will be encouraged to collaborate with existing faculty research projects as well as developing their own independent scholarship. Students are encouraged to present at national conferences such as the National Council of Teachers of Mathematics Annual Conference.

Science Education
The doctoral program in science education is designed to prepare scholars to conduct thoughtful research in order to assume roles as university faculty members, educational leaders, policy makers, and researchers; and to contribute meaningfully to the field. The field of science education is a broad one and includes science and environmental education at the K-12 levels, the college level, in informal and adult settings and in early childhood. Focus areas of research within the science education area are the preparation of pre-service science teachers (K-12), induction and mentoring of beginning science teachers, design and implementation of curricula across the K-
college spectrum, environmental education, cooperative learning, and social justice.

Full-time students in the doctoral program will be provided teaching and research opportunities relevant to their area of interest, such as supervising student teachers, teaching pre-service courses, and grant work. Students will be encouraged to collaborate with existing faculty research projects as well as developing their own independent scholarship. Students are encouraged to present at national conference such as the Association of Science Teacher Educators and the National Association for Research in Science Teaching.

Second Languages and Cultures Education
The Ph.D. track in second languages and cultures (SLC) focuses on the study of language use, teaching, learning, and policy across a range of educational and community settings, including programs that serve language minority and language majority learners: ESL/EFL, foreign language education, and bilingual and immersion education. The Ph.D. program is designed to assume roles as university faculty members, researchers, policy makers, and educational leaders. Independent scholarship is the cornerstone of the Ph.D. program.

The SLC Ph.D. track has four specializations that correspond to the program’s primary focus areas and faculty expertise.
1) Second language acquisition and classroom discourse research examines language learning processes and the way language is used by learners and their interlocutors in or out of school.
2) Second language pedagogy and teacher development research examines teachers’ classroom practices and strategies as well as professional identities, experiences and attitudes.
3) Language policy research involves analysis of the formation, implementation, and negotiation of language policy in national, school, community, and private spheres.
4) Languages and cultures across schools and communities research examines connections across homes, schools, and communities with an emphasis on the experience.

Social Studies Education
The program in social studies education focuses on issues related to curriculum, instruction, and assessment in K-12 social studies. Full-time graduate students generally have opportunities to supervise student teachers, teach introductory social studies classes, and conduct and publish research with one or more faculty members. Doctoral students are required to complete a research internship with one or more of the faculty as part of their study for the degree. Graduate students are strongly encouraged to present research papers at professional conferences, specifically the National Council for the Social Studies and the American Educational Research Association.

Recent Ph.D. graduates have conducted research in the areas of intercultural relations, moral development, multicultural gender-fair curriculum, social studies instructional issues, and the standards movement as it relates to social studies education. Graduates of the program have assumed positions as instructional leaders in the public schools, curriculum development specialists, social studies assessment specialists, and college/university faculty.
Twin Cities Campus

Educational Policy and Administration Ed.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 58
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), and comparative and international development education (CIDE), and work and human resource education (WHRE). Our undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is required. The preferred graduate GPA for admittance to the program is 3.50.

Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts (sent directly from institution[s] to the Graduate School), a current résumé, and three brief essays (personal statement, educational issue of interest, career goals). International students must also submit a TOEFL or IELTS score. Applicants to the international cohorts should have at least three years of experience in international education.

Special Application Requirements:
New cohorts for the Ed.D. are not started every year. Potential applicants are encouraged to check with the department before applying.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
34 credits are required in the major.
12 credits are required outside the major.
12 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The doctor of education (Ed.D.) is a professionally oriented degree program for those who will provide leadership in educational institutions. The program emphasizes breadth of preparation in educational policy and administration and in related fields. Through courses, seminars, and independent study, students learn to apply the products of disciplined inquiry to educational policy issues and practical situations in educational environments.

The Ed.D. is offered in two areas of educational policy and administration: educational administration (pre-K-12 schools) and higher education. Cohorts include those in the metropolitan area, out state Minnesota, and international schools. The Ed.D. degree is offered only in the context of cohort programs of 20-30 students each.

All Ed.D. cohort programs include department core courses, program core courses, inquiry and research courses, supporting program or minor, and field research project credits. Within the overall framework (some credits may be brought in from previous graduate work), specific course requirements are developed for each program area and cohort. See the department website for requirements in specific cohorts.

Preliminary written and oral exams are required. Students must complete a professional field project that contributes to the improvement of educational policy or practice.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Educational Administration
Domestic cohort: Students in the domestic Ed.D. cohort take 38 credits of new coursework, transfer 14 credits from a master's degree or previous graduate work (with consultation and upon adviser approval), and conduct an individual research-based, applied thesis project (12 cr).

International cohort: Students in the international Ed.D. cohort take 42-45 credits of new coursework, transfer 18 credits from a master's degree or previous graduate work (with consultation and upon adviser approval), and conduct an individual research-based, applied thesis project (12 cr).

Higher Education
Domestic cohort: The 65 credits (minimum) of coursework for the Ed.D. cohort program in higher education consists of 41 new semester credits distributed among courses in higher education and research methodology; 12 credits in a supporting program (coursework taken in areas outside OLPD); and 12 thesis credits, associated with the completion of the doctoral research project.

Students are permitted to transfer up to 12 credits of previously completed graduate-level coursework in education or related areas, subject to the approval of their faculty adviser and the director of graduate studies. These credits may be applied to the coursework listed above.
International cohort: Students in the International Ed.D. cohort take 42-45 credits of new coursework, transfer 18 credits from a master's degree or previous graduate work (with consultation and upon adviser approval), and conduct an individual research-based, applied thesis project (12 cr).

Rochester
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Same as general program description.

Same requirements are as listed in the general program description. Students may take courses on Twin Cities or Rochester campuses.
Twin Cities Campus

Educational Policy and Administration M.A.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), comparative and international development education (CIDEd), and work and human resource education (WHRE). The department's undergraduate programs focus on human resource development and business and marketing education. In addition, it offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts (sent directly from institution[s] to the Graduate School), a current résumé, and three brief essays (personal statement, educational issue of interest, career goals). The GRE is not required for EdAd M.A. applicants but is required for application to other M.A. program tracks (CIDEd, ES, and HiEd) and all tracks in the doctoral degree programs (EdD. and Ph.D.). International students must also submit a TOEFL or IELTS score, but international applicants to the M.A. program are exempt from the GRE. All applications for admission are reviewed once a year (March 1). All new students begin in fall semester unless permission to start earlier is granted by the program coordinator. The department application, letters of recommendation, résumé, and essays are submitted via the Graduate School's online application. GRE scores, transcripts (sent directly from the institution[s]), and TOEFL/IELTS score are sent to the Graduate School.

Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in related areas such as curriculum studies, public affairs, sociology, psychology, economics, political science, international relations, management science, measurement and statistics, and educational psychology. The department offers study opportunities for professionals who are employed full time as well as for those who wish to pursue graduate studies full time.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The master's is available under four program tracks: educational administration, evaluation studies, higher education, and comparative and international development education; and is offered under two plans. Plan A requires 14-18 course credits in EDPA courses, 6 course credits outside the department, and 10 thesis credits. Plan B requires 24-26 course credits in EDPA courses, 6 course credits outside the department, and a Plan B project. For details see the OLPD website under Current Students.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Comparative and International Development Education

Plan A or Plan B

Plan A
Total Plan A CIDE Credits: 34 credits

Program Core
OLPD 5087 - Seminar: Educational Policy and Administration (1.0 - 3.0 cr)

Program Specializations
Students select two courses from one of the three specializations:

Comparative and international development education
OLPD 5103 - Comparative Education (3.0 cr)
OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
OLPD 5121 - Educational Reform in International Context (3.0 cr)

Intercultural/international education
OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
OLPD 5132 - Intercultural Education and Training; Theory and Application (3.0 cr)

Global youth policy and leadership
OLPD 5141 - Global Youth Policy and Leadership: Comparative Youth Policy and Leadership (3.0 cr)
OLPD 5142 - Youth Futures in International and Global Contexts (3.0 cr)
OLPD 5381 - The Search for Children and Youth Policy in the U.S. (3.0 cr)

Research Design and Methods
3 credits to be selected in consultation with adviser.

Related Fields (6 credits outside OLPD)
The master's degree requires 6 semester credits taken outside the department that directly relate to the student's area of study. Courses totaling 6 or more credits should be selected in consultation with the adviser and should constitute a solid coursework
foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

**Electives**
The following courses are also available for elective options:

- OLPD 8087 - Seminar: Educational Policy & Administration [Pro Seminar in CID]
- OLPD 5080 - Special Topics: Human Rights Education (3 cr)

Take 6 or more credits(s) from the following:

- OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5080 - Special Topics: Educational Policy and Administration (1.0 - 3.0 cr)
- OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)
- OLPD 5102 - Knowledge Constructions and Applications in International Development Contexts (3.0 cr)
- OLPD 5144 - Cultural Models, Simulations, and Games (3.0 cr)
- OLPD 8101 - International Education and Development (3.0 cr)
- OLPD 8103 - Comparative Education (3.0 cr)
- OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)

**Thesis Credits**
Take 10 or more credits(s) from the following:

- OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

**Plan B**
Total Plan B CIDC Credits: 30 credits

**Program Core**
- OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)

**Program Specializations**
Select one of the three specializations below and choose two of its three core courses:

**Comparative and international development education**
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5121 - Educational Reform in International Context (3.0 cr)

**Intercultural/international education**
- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
- OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
- OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)

**Global youth policy and leadership**
- OLPD 5141 - Global Youth Policy and Leadership: Comparative Youth Policy and Leadership (3.0 cr)
- OLPD 5142 - Youth Futures in International and Global Contexts (3.0 cr)
- OLPD 5381 - The Search for Children and Youth Policy in the U.S. (3.0 cr)

**Electives**
8xxx courses should be taken only with the consent of the instructor.

The following courses are also available for elective options:

- EDPA 5080 - Special Topics: Gender, Education, & International Development (3 cr)
- EDPA 8087 - Seminar: Educational Policy & Administration (1-2 cr) [Advanced Seminar in International Development Education: Care Gender Project]

Take 12 or more credits(s) from the following:

- OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)
- OLPD 5102 - Knowledge Constructions and Applications in International Development Contexts (3.0 cr)
- OLPD 5144 - Cultural Models, Simulations, and Games (3.0 cr)
- OLPD 5302 - Educational Policy: Context, Inquiry, and Issues (3.0 cr)
- OLPD 8087 - Seminar: Educational Policy and Administration (1.0 - 3.0 cr)
- OLPD 8101 - International Education and Development (3.0 cr)
- OLPD 8103 - Comparative Education (3.0 cr)
- OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)

**Research Design and Methods**
3 credits to be selected in consultation with adviser.

**Related Fields (6 additional credits outside department)**
The master's degree requires 6 semester credits taken outside the department that directly relate to the student's area of study. These courses should be selected in consultation with the adviser and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

**Educational Administration**
Plan A or Plan B

Plan A

Program Core
Take 6 or more credits from the following:
• OLPD 5001 - Formal Organizations in Education (3.0 cr)
• OLPD 5041 - Sociology of Education (3.0 cr)
• OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 5302 - Educational Policy: Context, Inquiry, and Issues (3.0 cr)
• OLPD 5344 - School Law (3.0 cr)
• OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)

Research Design and Methods
Take 6 or more credits selected in consultation with adviser.

Related Fields (6 additional credits outside department)
The master's degree requires 6 credits taken outside of the department that directly relate to the student’s area of study. These courses should be selected in consultation with the adviser.

Thesis Credits
Take 10 or more credits from the following:
• OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Research Project
Plan A students will develop and carry out an empirical research project under the supervision of their adviser.

-OR-

Plan B

Required coursework
OLPD 5001 - Formal Organizations in Education (3.0 cr)
OLPD 5302 - Educational Policy: Context, Inquiry, and Issues (3.0 cr)

Program Core
Take 6 credits total from the following two areas:

Leadership courses
Take 1 or more course(s) from the following:
• OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
• OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)

Other coursework
Take 1 or more course(s) from the following:
• OLPD 5041 - Sociology of Education (3.0 cr)
• OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
• OLPD 5128 - Anthropology of Education (3.0 cr)
• OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
• OLPD 5344 - School Law (3.0 cr)
• OLPD 5346 - Politics of Education (3.0 cr)

Research Design and Methods
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Related Fields
6 additional credits outside of department, selected in consultation with adviser. These usually include additional courses from the program core or other OLPD courses.

Colloquium Paper
Students prepare a paper on an issue of relevance in school administration or revise and expand three course papers. Total of 120 hours of work required.
Take 3 or more credits from the following:
• OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)

Evaluation Studies

Plan A or Plan B

Plan A

Total Plan A ES Credits: 31-32 credits

Program Core (6 credits)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
Research Design and Methods
Two qualitative methods courses selected in consultation with adviser for a minimum of 6 credits.
Related Fields/Electives (9-10 credits)
The master's degree requires 6 semester credits taken outside the department that directly relate to the student's area of study. These courses should be selected in consultation with the adviser and should constitute a solid coursework foundation for the student's thesis.
Thesis Credits
Take 10 or more credits(s) from the following:
- OLPD 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Total Plan B ES Credits: 31-33 credits
Program Core (10 credits)
- OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
- OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
- OLPD 5524 - Evaluation Colloquium (1.0 cr)
- OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)

Research Design and Methods
Two qualitative methods courses selected in consultation with adviser for a minimum of 6 credits.
Related Fields
The master's degree requires 6 semester credits taken outside the department that directly relate to the student's area of study. These courses should be selected in consultation with the adviser and should constitute a solid coursework foundation for the student's thesis.
Other Electives
Coursework related to the student's specialization, selected in consultation with the adviser, and totaling a minimum of 6 credits. These may be OLPD or outside courses.

Colloquium Paper
The Plan B paper is prepared under the guidance of the adviser and committee. The final paper must represent no fewer than 120 hours of work.
Take 3 or more credits(s) from the following:
- OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)

Higher Education

Plan A or Plan B

Plan A
Total Plan A HiEd Credits: 34 credits
Required Coursework (6 credits)
- OLPD 5701 - U.S. Higher Education (3.0 cr)
- OLPD 5080 - Special Topics: Educational Policy and Administration (1.0 - 3.0 cr)

Program Area
Select from the course offerings listed below with adviser consultation and approval.

The following courses are also options:
- OLPD 5080 - Special Topics: Diversity and Equity in Higher Education (3 cr)
- OLPD 5080 - Special Topics: Public Engagement in Higher Education (3 cr)
- OLPD 5080 - Special Topics: External Relations in Higher Education (3 cr)
- OLPD 5080 - Special Topics: Perspectives on Leadership (3 cr)

Other courses as offered by higher education faculty.
Take 9 or more credits(s) from the following:
- OLPD 5001 - Formal Organizations in Education (3.0 cr)
- OLPD 5074 - Institutional Research in Postsecondary Education (2.0 - 3.0 cr)

Related Fields
The master's degree requires 6 semester credits taken outside the department that directly relate to the student's area of study. These courses should be selected in consultation with the adviser and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

Research Design and Methods
Students select courses in consultation with their adviser totaling a minimum of 3 credits.
**Electives**
To be determined with adviser; used to reach required total of 30 credits.

**Thesis Credits**
Take 10 or more credits(s) from the following:

- **OLPD 8777** - Thesis Credits: Master's (1.0 - 18.0 cr)
- OR -

**Plan B**
Total Plan B HiEd Credits: 30 credits

**Required Coursework**
6 credits.
- **OLPD 5701** - U.S. Higher Education (3.0 cr)
- **OLPD 5080** - Special Topics: Educational Policy and Administration (1.0 - 3.0 cr)

**Program Area**
Selected from the course offerings listed below with adviser consultation and approval.

The following courses are also options:
- **OLPD 5001** - Formal Organizations in Education (3.0 cr)
- **OLPD 5704** - College Students Today (3.0 cr)
- **OLPD 5021** - Race and Ethnicity in Higher Education (3.0 cr)
- **OLPD 5724** - Leadership and Administration of Student Affairs (2.0 - 3.0 cr)
- **OLPD 5734** - Institutional Research in Postsecondary Education (2.0 - 3.0 cr)
- **OLPD 8703** - Public Policy in Higher Education (3.0 cr)

**Related Fields**
The master's degree requires 6 semester credits taken outside the department that directly relate to the student's area of study. These courses should be selected in consultation with the adviser and should constitute a solid coursework foundation for the student's thesis. These courses may include additional methods courses taught outside the department.

**Methods Course**
Select courses in consultation with adviser for a minimum of 3 credits.

**Electives**
To be determined with adviser; used to reach required total of 30 credits.

**Colloquium Paper**
Plan B paper is prepared under the guidance of adviser and committee. The final paper must represent no fewer than 120 hours of work.

Take 3 or more credits(s) from the following:
- **OLPD 5795** - Plan B Research Design (3.0 cr)
Twin Cities Campus

Educational Policy and Administration Ph.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 76 to 85
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Its research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HIED), comparative and international development education (CIDEd), and work and human resource education (WHRE). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have completed appropriate undergraduate and graduate study. In some cases, where previous coursework or degrees are marginally related, otherwise qualified applicants will be asked to complete additional background courses after admission. Applications are encouraged from individuals who may have completed undergraduate and/or master's programs in related areas such as curriculum studies, public affairs, sociology, psychology, economics, political science, international relations, management science, measurement and statistics, and educational psychology. The department offers study opportunities for professionals who are employed full time as well as for those who wish to pursue graduate studies full time.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, two letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts (sent directly from institution[s]), and a current résumé; as well as answer required essay questions via the online application. The GRE is required for all tracks in the doctoral degree programs (Ed.D. and Ph.D.). International students must also submit a TOEFL or IELTS score. All applications for admission are reviewed once per year. Submission of all application materials for all tracks by December 5 is strongly encouraged to ensure priority consideration for assistantships awarded for the next academic year. All new students begin in fall semester unless permission to start earlier is granted by the program coordinator. The application, letters of recommendation, résumé, essays, GRE scores, transcripts (sent directly from the institution[s]), and TOEFL/IELTS score are sent to the Graduate School via the Apply Yourself online application http://www.grad.umn.edu/prospective_students/apply_online.html.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

**IELTS**
- Total Score: 6.5

**MELAB**
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

22 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Credits required by the major vary by program.

The Ph.D. is available in four program tracks: educational administration, evaluation studies, higher education, or comparative and international development education. All Ph.D. programs include 22 credits in department core courses (which include 15 credits of research methodology courses), 18 or more credits in program core courses, 12 or more course credits in a supporting program or minor, and 24 thesis credits. The minimum total of course credits varies by track (see Student Handbook on the department website for details). Preliminary written and oral exams are required. Students must complete a dissertation. Within the general framework for Ph.D. requirements, the degree program is developed by the student and his or her adviser and is subject to approval by the department's director of graduate studies and the Graduate School.

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Comparative and International Development Education**

The doctor of philosophy (Ph.D.) degree with a program emphasis in comparative and international development education (CIDE) is offered by the Department of Organizational Leadership, Policy, and Development (OLPD).

CIDE uses an interdisciplinary approach to the study of education's role in economic, political, and sociocultural development; international educational exchange; and the internationalization of education. The three specializations within CIDE are comparative and international development education; intercultural/international education; and global youth policy and leadership.

**Department Core**

22 credits

**Professional socialization seminar**

Taken fall term of first year.

OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Research courses**

- Quantitative course to be determined by student and adviser (3 cr in or outside of department)
- Qualitative course to be determined by student and adviser (3 cr in or outside of department)
- 6 credits of additional methods courses to be determined by student and adviser

OLPD 8015 - Research Design and Educational Policy (3.0 cr)

**Focal area courses**

6 credits taken anywhere at the U of M with adviser approval, in one of the following focal areas:

- Organizational theory and leadership
- Policy and evaluation
- International education
- Social and cultural foundations

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012

CEHD - 77
- Equity and diversity

**Doctoral Seminars in CIDE**

Students take 6 credits; 2 credits in each of 3 semesters starting in the spring term of the first year in the program; course numbers are listed as OLPD 8121, section 002; OLPD 8121, section 003; and OLPD 8121, section 004.

**Specialization Courses**

Students choose two courses, with a minimum of one 8xxx course for specializations with 8xxx courses.

Note: Any specialization core course not being used as core class can become an elective.

**Comparative and international development education**

Take 6 or more credits(s) from the following:

- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5121 - Educational Reform in International Context (3.0 cr)
- OLPD 8101 - International Education and Development (3.0 cr)
- OLPD 8103 - Comparative Education (3.0 cr)

or **Intercultural/international education**

Take 6 or more credits(s) from the following:

- OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
- OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)
- OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)

or **global youth policy and leadership**

Take 6 or more credits(s) from the following:

- OLPD 5141 - Global Youth Policy and Leadership: Comparative Youth Policy and Leadership (3.0 cr)
- OLPD 5142 - Youth Futures in International and Global Contexts (3.0 cr)
- OLPD 5381 - The Search for Children and Youth Policy in the U.S. (3.0 cr)

**CIDE Elective Courses**

Take exactly 12 credits(s) from the following:

- OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)
- OLPD 5102 - Knowledge Constructions and Applications in International Development Contexts (3.0 cr)
- OLPD 5144 - Cultural Models, Simulations, and Games (3.0 cr)
- OLPD 5381 - The Search for Children and Youth Policy in the U.S. (3.0 cr)
- OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)
- OLPD 8087 - Seminar in OLPD

Advanced Seminar in International Development Education: Care Gender Project

OR

Professional Seminar in CIDE

OLPD 5080 - Special Topics in OLPD

Special Topics: Gender, Education, and International Development (3 cr)

OR

Special Topics: Human Rights Education (3 cr)

**Additional Coursework**

12 or more credits from program curriculum.

**Educational Administration**

The doctor of philosophy (Ph.D.) degree with a program emphasis in educational administration (EdAd) provides an opportunity for intensive study of the field of education. It is especially suitable for students who wish to pursue careers in policy, research, or college and university teaching. It is also available to students who are interested in careers in school, district, and statewide administration, though it is more theory and research-oriented than the doctorate of education (Ed.D.) degree which is also offered by OLPD.

Educational administration offers coursework and research opportunities for those interested in making a difference in educational systems and settings that involve PreK-12 children and youth. The program is committed to supporting the development of leaders and scholars who work to continuously improve educational quality and effectiveness so that young people graduate from secondary education well prepared to continue their learning and to contribute to their communities. The program promotes understanding of schools as organizations and emphasizes application of knowledge and research to varied contexts of educational practice.

**Department Core**

22 credits

**Professional socialization seminar**

Taken fall term of first year.

OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Research courses**

15 credit minimum. In consultation with adviser choose:

- 3 credit qualititative course (in or outside of department)
- 3 credit qualitative course (in or outside of department)
- 6 credits of additional methods courses
  OLPD 8015 - Research Design and Educational Policy (3.0 cr)

**Focal area courses**
With adviser approval, take 6 credits in one of the following focal areas:
- Organizational theory and leadership
- Policy and evaluation
- International education
- Social and cultural foundations
- Equity and diversity

**Program Core: Educational Administration**
18 credits
  OLPD 5001 - Formal Organizations in Education (3.0 cr)
  OLPD 5346 - Politics of Education (3.0 cr)
  OLPD 8020 - Leadership: From Theory to Reflective Practice (3.0 cr)
  OLPD 8302 - Educational Policy Perspectives (3.0 cr)
6 or more credits of electives selected with approval of adviser.

**Additional Coursework**
12 or more credits from program curriculum.

**Evaluation Studies**
The doctor of philosophy (Ph.D.) degree with a program emphasis in evaluation studies (ES) provides an opportunity for intensive study of the techniques and process of evaluation and policy research and of the social and political context within which program evaluation occurs.

Graduates leave with a portfolio filled with evidence of their expertise with the tools of the evaluation trade--qualitative and quantitative inquiry methods, communication skills, and computer/database analysis expertise. Evaluation knowledge and skills are gleaned not only from time in the classroom but also from internships and collaboration with evaluation professionals in real-world settings. Evaluation studies students have access to some of the best evaluators in the field.

**Department Core**
22 credits

**Professional socialization seminar**
Taken fall term of first year
  OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Research courses**
15 credit minimum. In consultation with adviser choose:
- 3 credit quantitative course (in or outside of department)
- 3 credit qualitative course (in or outside of department)
- 6 credits of additional methods courses
  OLPD 8015 - Research Design and Educational Policy (3.0 cr)

**Focal area courses**
With adviser approval, take 6 credits in one of the following focal areas:
- Organizational theory and leadership
- Policy and evaluation
- International education
- Social and cultural foundations
- Equity and diversity

**Program Core: Evaluation Studies**
20 credits. Take OLPD 8596 - Evaluation Internship twice, in two different semesters.
  OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
  OLPD 5521 - Cost and Economic Analysis in Educational Evaluation (3.0 cr)
  OLPD 5524 - Evaluation Colloquium (1.0 cr)
  OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)
  OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)
  OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

**Additional Coursework**
12 or more credits from program curriculum.

**Higher Education**
The doctor of philosophy (Ph.D.) degree with a program emphasis in higher education (HIED) provides an opportunity for intensive study of the policies and organizational issues in higher education institutions and systems.

HIED focuses on the experiences, practices, and decisions of those involved in postsecondary education, as well as on the sociopolitical contexts in which higher education exists. Areas of specialization include administration and organization, policy, college
students, external relations, equity-oriented change, and research integrity.

**Department Core**
22 credits

**Professional socialization seminar**
   Taken fall term of first year.
   OLPD 8011 - Doctoral Research Seminar I (1.0 cr)

**Research courses**
- 15 credit minimum. In consultation with adviser choose:
  - 3 credit quantitative course (in or outside of department)
  - 3 credit qualitative course (in or outside of department)
  - 6 credits of additional methods courses
  OLPD 8015 - Research Design and Educational Policy (3.0 cr)

**Focal area courses**
   With adviser approval, take 6 credits in one of the following focal areas:
   - Organizational theory and leadership
   - Policy and evaluation
   - International education
   - Social and cultural foundations
   - Equity and diversity

**Program Core: Higher Education**
21 credits.
   OLPD 5701 - U.S. Higher Education (3.0 cr)
   OLPD 5704 - College Students Today (3.0 cr)
   OLPD 8702 - Administration and Leadership in Higher Education (3.0 cr)
   OLPD 8703 - Public Policy in Higher Education (3.0 cr)
   With approval of adviser, choose 9 credits focused on Higher Education.

**Additional Coursework**
12 or more credits from program curriculum.
Twin Cities Campus
Educational Psychology M.A.
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30 to 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: counseling and student personnel psychology (CSPP); school psychology; special education; psychological foundations of education (learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (including measurement, evaluation, statistics, and statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. Official transcripts from all colleges and universities attended should accompany the application. The GRE is required for all tracks. Applications to CSPP, school psychology, and special education are accepted for fall admission only. Applications to psychological foundations and quantitative methods in education are accepted throughout the year. Check directly with the program offices for current deadlines.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete at least 30 credits, including credits in EPSY core courses (statistics, measurement, learning, and social psychology or personality), and 6 credits in a related field or minor. Plan A students must take 10 thesis credits. Plan B registration varies by track.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Counseling and Student Personnel Psychology
The counseling and student personnel psychology (CSPP) program subscribes to the scientist/practitioner model, which assumes that scholarly inquiry and counseling practice are interdependent and complementary. The program's primary mission is to prepare counseling psychologists to bring a well-trained professional's attitude and interest to bear on the application of psychological and educational knowledge. In addition to becoming skilled clinicians, students learn to be critical consumers and producers of both quantitative and qualitative research. Specialty areas: community counseling, school counseling, and higher education.

Students must complete at least 48 credits, including credits in EPSY core courses (statistics, measurement, and learning), 30 credits in counseling theory and practice, and 6 credits in a related field or minor. The final exam is written; students must also submit a portfolio.

Psychological Foundations
Graduate study in psychological foundations of education prepares students for research and teaching positions in colleges and universities, schools, private industry, human service organizations, health science units, government agencies, and other research and development centers. The goal of psychological foundations of education is to apply and generate knowledge of psychological processes and methodological procedures involved in learning and teaching.

The program offers emphases in learning and cognition/educational technology or social psychological and social developmental processes in educational psychology (including human relations). Students typically choose one of these areas in addition to achieving broad competence in all aspects of the curriculum.

Students must complete at least 30 credits, including credits in EPSY core courses (statistics, measurement, learning, social psychology) and 6 credits in a related field or minor. Plan A students must also take 10 thesis credits; Plan B students take 6 research credits (EPSY 5991 or EPSY 8994). Additional course requirements are determined in consultation with faculty adviser.

Quantitative Methods in Education
Graduate study in quantitative methods in education (QME) prepares students for a wide variety of careers, including positions in test publishing firms, college and university teaching and research, research and evaluation centers, public school systems, state departments of instruction, and private industry. The goal of QME is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

The program offers emphases in measurement, evaluation, statistics, and statistics education. Students typically choose one of these areas in addition to achieving competence in all aspects of the curriculum.

QME Required Courses
In addition to EPSY core courses (statistics, measurement, learning, social psychology) and 6 credits in a related field or minor, QME students take:

EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
EPSY 5247 - Qualitative Methods in Educational Psychology (3.0 cr)
EPSY 8261 - Statistical Methods I: Probability and Inference (3.0 cr)
EPSY 8262 - Statistical Methods II: Regression and the General Linear Model (3.0 cr)

**Additional coursework**
- Students take 3 credits of internship and 3 additional credits in their area of emphasis. Plan A students must also take 10 thesis credits. Plan B students take 3 research credits (EPSY 5991 or EPSY 8994).

### School Psychology
School psychology does not offer the M.A. as a terminal degree; rather, the M.A. is required to obtain the Ed.D. or Ph.D. in educational psychology.

The M.A. is offered under Plan A (thesis) and Plan B (paper) and requires at least 30 credits: credits in EPSY core courses (statistics, measurement, learning, and social psychology) and 6 credits in a related field or minor. Plan A students must also take 10 thesis credits; Plan B students take 2 research credits (EPSY 8994).

### Special Education
The special education track offers opportunities for research and specializations in autism spectrum disorders, deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, specific learning disabilities, developmental disabilities, and self-injurious behaviors and applied behavior analysis. Early involvement in research projects and the development of original research programs in areas such as academic instructional strategies, social and cognitive development, behavioral/psychological management, child development, and technology are encouraged.

The program focuses on the attainment of core competencies required for special education professionals as well as interdisciplinary skills and goals. A complementary emphasis is placed on problem solving that is influential in the social and cultural perceptions, care, education, intervention, and support of persons with disabilities.

Students may emphasize consulting, college teaching, or research in one or more of the specializations.

Students must complete at least 30 credits, including credits in EPSY core courses (statistics, measurement, learning, and social psychology), 6 credits in special education foundations, and 6 credits in a related field or minor. Plan A students must take 10 thesis credits. Plan B students take 6 credits of research credits (EPSY 8994).
Twin Cities Campus
Educational Psychology Minor
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455; (612-624-6083; fax: 612-624-8241)
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 15
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: counseling and student personnel psychology (CSPP); school psychology; special education; psychological foundations of education (learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (including measurement, evaluation, statistics, and statistics education).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires at least 6 credits of graduate-level EPSY courses. A doctoral minor requires at least 15 credits of graduate-level EPSY courses, of which at least 9 credits must be in 8xxx courses. Course selection is determined in consultation with the educational psychology committee member.
Twin Cities Campus
Educational Psychology Ph.D.

Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54 to 120
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The educational psychology program has five tracks: counseling and student personnel psychology (CSPP); school psychology; special education; psychological foundations of education (learning and cognition/educational technology, social psychological and social developmental processes in educational psychology including human relations); and quantitative methods in education (including measurement, evaluation, statistics, and statistics education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. In addition, school psychology applicants must submit a critical issue essay, answering the following questions: Identify a critical problem facing contemporary schools in America or another country. What do you think are the social, political, and/or economic factors that are contributing to this problem? What specific solutions might you propose to tackle the problem?

Applications should be accompanied by official transcripts from all colleges and universities attended. The GRE is required for all tracks; an interview is also required for those who make the initial cut in school psychology.

Applications to CSPP, school psychology, and special education are accepted for fall admission only. Applications to psychological foundations and quantitative methods in education are accepted throughout the year. Check directly with the program offices for current deadlines. Applicants must submit the following test score(s):

GRE General Test

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 to 60 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods), 12 credits in a supporting program or minor, and 24 thesis credits.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Counseling and Student Personnel Psychology
The counseling and student personnel psychology (CSPP) program subscribes to the scientist/practitioner model, which assumes that scholarly inquiry and counseling practice are interdependent and complementary. The program's primary mission is to prepare counseling psychologists to bring a well-trained professional's attitude and interest to bear on the application of psychological and educational knowledge. In addition to becoming skilled clinicians, students learn to be critical consumers and producers of both quantitative and qualitative research.

In addition to EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods), CSPP doctoral students complete 51 credits in counseling theory and practice, practica, and internships.

Psychological Foundations
Graduate study in psychological foundations of education prepares students for research and teaching positions in colleges and universities, schools, private industry, human service organizations, health science units, government agencies, and other research and development centers. The goal of psychological foundations of education is to apply and generate knowledge of psychological processes and metrological procedures involved in learning and teaching.

The program offers emphases in learning and cognition/educational technology or social psychological and social developmental processes in educational psychology (including human relations). Students typically choose one of these areas in addition to achieving broad competence in all aspects of the curriculum.

Course requirements are determined in consultation with faculty adviser.

Quantitative Methods in Education
Graduate study in quantitative methods in education (QME) prepares students for a wide variety of careers, including positions in test publishing firms, college and university teaching and research, research and evaluation centers, public school systems, state departments of assessment, and private industry. The goal of QME is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

The program offers emphases in measurement, evaluation, statistics, and statistics education. Students typically choose one of these areas in addition to achieving competence in all aspects of the curriculum.

In addition to EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods), QME students take the following courses:
Course Group 0
Also required are 3 credits of internship and 12 additional credits in their area of emphasis.

EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
EPSY 5243 - Principles and Methods of Evaluation (3.0 cr)
EPSY 8222 - Advanced Measurement: Theory and Application (4.0 cr)
EPSY 8261 - Statistical Methods I: Probability and Inference (3.0 cr)
EPSY 8262 - Statistical Methods II: Regression and the General Linear Model (3.0 cr)
EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)

School Psychology
School psychology is an interdepartmental program involving the Departments of Educational Psychology, Psychology, and the Institute of Child Development. It is fully accredited by the American Psychological Association, the Minnesota Board of Teaching, and the National Association of School Psychologists. Through coursework and practica/internships, students develop competencies in assessment, consultation, intervention and program development, research, and evaluation. Graduates are employed as psychologists in local schools, university clinics and hospitals, community mental health centers, and as trainers/researchers in universities. Since 1988, training has focused on the delivery of psychological services in schools and school communities to promote children's and adolescent's academic, social, and behavioral success.

The program integrates didactic and experiential components of training and applied research. Students develop specific competencies through a broad range of applied experiences, including field placements, practica assignments, and a full-year internship.

Special Education
The special education track offers specializations in deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, learning disabilities, autism, and developmental disabilities. Early involvement in research projects and the development of original research programs in such areas as instructional strategies, social and cognitive development, behavioral and psychological management, child development, and technology are encouraged. Special projects and training programs supplement academic studies.

The program focuses on the attainment of core competencies and related skills, since special education professionals share many common concerns and goals. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities; and federal, state, and local legislation regarding prevention and the care, treatment, education, training, and support of persons with disabilities.
Twin Cities Campus

Educational Psychology Specialist Certificate in Education and Counseling

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241)
Email: epsy-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Counseling

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The counseling and student personnel psychology (CSPP) program subscribes to the scientist/practitioner model, which assumes that scholarly inquiry and counseling practice are interdependent and complementary. The program's primary mission is to prepare counseling psychologists to bring a well-trained professional's attitude and interest to bear on the application of psychological and educational knowledge. In addition to becoming skilled clinicians, students learn to be critical consumers and producers of both quantitative and qualitative research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.
Students must complete at least 60 credits, including 13 credits in EPSY core courses (statistics, measurement, learning, research methods, and social psychology), and 26 credits in counseling theory and practice.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Special Certificate Counseling
Students must complete at least 60 credits, including 13 credits in EPSY core courses (statistics, measurement, learning, research methods, and social psychology), and 26 credits in counseling theory and practice.
Twin Cities Campus

Educational Psychology Specialist Certificate in Education and School Psychological Services

Educational Psychology

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-4156; fax 612-624-8241)
Email: schpsy@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SchoolPsych/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Sch Psych Svc

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

School psychology is an interdepartmental program involving the Departments of Educational Psychology, Psychology, and the Institute of Child Development. It is fully accredited by the American Psychological Association, the Minnesota Board of Teaching, and the National Association of School Psychologists. Through coursework and practica/internships, students develop competencies in assessment, consultation, intervention and program development, research, and evaluation. Graduates are employed as psychologists in local schools, university clinics and hospitals, community mental health centers, and as trainers/researchers in universities. Since 1988, training has focused on the delivery of psychological services in schools and school communities to promote children's and adolescent's academic, social, and behavioral success.

The program integrates didactic and experiential components of training and applied research. Students develop specific competencies through a broad range of applied experiences, including field placements, practica assignments, and a full-year internship.

The specialist program is designed for students who want to become practitioners. It meets the Minnesota certification requirements for school psychologists.

Accreditation
This program is accredited by National Association of School Psychologists (NASP).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete at least 60 credits, including credits in EPSY core courses (statistics, measurement, learning, social psychology, and research methods). There is a written final exam.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Specialist Certificate in School Psychology
Students must complete at least 60 credits, including credits in EPSY core courses (statistics, measurement, learning, social psychology, and research methods) and NASP requirements that are delineated in terms of 11 domains of training (e.g., data-based decision-making and accountability, consultation and collaborations).
**Twin Cities Campus**

Educational Psychology Specialist Certificate in Education and Special Education

**Educational Psychology**

**College of Education and Human Development**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Educational Psychology, University of Minnesota, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241)

Email: epsy-adm@umn.edu
Website: [http://www.cehd.umn.edu/edpsych](http://www.cehd.umn.edu/edpsych)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Spec Educ

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Special education offers specializations in deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, learning disabilities, autism, and developmental disabilities. Early involvement in research projects and the development of original research programs in such areas as instructional strategies, social and cognitive development, behavioral and psychological management, child development, and technology are encouraged. Special projects and training programs supplement academic studies.

The program focuses on the attainment of core competencies and related skills, since special education professionals share many common concerns and goals. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities, and federal, state, and local legislation regarding prevention and the care, treatment, education, training, and support of persons with disabilities.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

**Special Application Requirements:**

Applicants must apply online submitting a department application, three letters of recommendation, and a statement of goals and interests. Applications are accepted for fall admission only.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to [test abbreviations](#) (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

In addition to special education coursework (selected in consultation with adviser), students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, and research methods).

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Specialist Certificate in Special Education
Special education offers specializations in deaf/hard-of-hearing, emotional behavior disorders, early childhood special education, learning disabilities, autism, and developmental disabilities. Early involvement in research projects and the development of original research programs in such areas as instructional strategies, social and cognitive development, behavioral and psychological management, child development, and technology are encouraged. Special projects and training programs supplement academic studies.

The program focuses on the attainment of core competencies and related skills, since special education professionals share many common concerns and goals. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities, and federal, state, and local legislation regarding prevention and the care, treatment, education, training, and support of persons with disabilities.

In addition to special education coursework (selected in consultation with adviser), students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, and research methods).
Twin Cities Campus
Endorsement
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development (OLPD); 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 22 to 24
- This program does not require summer semesters for timely completion.
- Degree: College of Education Additional Licensure

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The administrative licensure program offers a variety of courses specifically designed to address the competencies required by the state for the various licenses. Courses are offered throughout the year with evening courses offered during fall, spring, and summer semesters, and day courses offered during summer semester. Most students who enroll in the program are practicing teachers. On average they complete the program in one to two years.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
This program is not offered full-time and therefore is not intended for international students needing a visa to study in the United States.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students must complete all coursework with a grade of S or C or better.

An electronic portfolio presented to a review panel made up of representatives from the University and licensed practitioners is required as the last step to earning licensure.

Required courses
OLPD 5391 is not required for the director of special education license. OLPD 5387 and 5391 are not required for the director of community education license.
OLPD 5310 - Data-Driven Decision Making I (1.0 cr)
OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
OLPD 5344 - School Law (3.0 cr)
OLPD 5346 - Leaders of Human Resources Administration (3.0 cr)
OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
OLPD 5387 - Leadership for Teaching and Learning (2.0 cr)
OLPD 5391 - Special Education Law for Leaders (1.0 cr)
Program Sub-plans
Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Adult Basic Education

Agricultural Education 5-12

Career/Tech Ed: Comm Tech

Career/Tech Ed: Construction

Career/Tech Ed: Creative Dsgn

Career/Tech Ed: Early Child

Career/Tech Ed: Manufacturing

Career/Tech Ed: Medical

Career/Tech Ed: Accom Special

Career/Tech Ed: Hospitality Sv

Career/Tech Ed: Transportation

Chemistry Education 9-12

Comm Arts/Lit Educ 5-8/9-12

Comm Arts/Lit Education 5-8

Computer, Keyboarding & Related Technology Applications K-12

Deaf and Hard of Hearing

Developmental and Adaptive Physical Education

Developmental Disabilities

Director of Community Ed
Students must have a bachelor's degree plus 24 credits. Additionally, they should have 320 hours of field experience.

Required courses
OLPD 5389 - Community Education Leadership (3.0 cr)
OLPD 5394 - Leadership in Community Education Finance and Law (1.0 cr)
Additional course or experiential requirements may be determined through the pre-assessment completed as part of OLPD 5385.

Adult Education (2 cr)
Early Childhood (2 cr)
School Age Programs (2 cr)

Director of Special Education
Students must possess or complete three years of teaching experience.

60 credits beyond a bachelor's degree to include a graduate degree.

320 hours of field experience.

Required courses
OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)
OLPD 5368 - Leadership for Special Education Services (3.0 cr)
OLPD 5392 - Special Education Finance: Program Models, Policy, and Law (2.0 cr)
Early Childhood Educ Birth-Gr3
Early Childhood Special Education
Earth & Space Science Ed 9-12
Emotional and Behavioral Disorders
English as a Second Lang K-12
Learning Disabilities K-12
Life Science Education 9-12
Mathematics Education 5-8
Mathematics Education 5-8/9-12
Oral/Aural
Parent and Family Education
Physical Education K-12
Physics Education 9-12
Principal K-12
Students must possess or complete three years of teaching experience.
60 credits beyond a bachelor's degree to include a graduate degree.
320 hours of field experience.

Required courses
OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)
OLPD 5388 - Leadership for Master(ful) Scheduling (2.0 cr)

Reading
School Counseling K-12
School Psychologist
Science Education 5-8
Social Studies Educ 5-8/9-12
Social Studies Education 5-8

Superintendent
Students must possess or complete three years of teaching experience.
60 credits beyond a bachelor's degree to include a graduate degree.
320 hours of field experience.

Required courses
OLPD 5322 - Leaders in the Superintendency and Central Office (3.0 cr)
OLPD 5393 - Leading School Finance Elections (1.0 cr)

Teacher Coordinator of Work-based Learning
Technology Education 5-12
Visual Arts Education K-12
WorldLang/Cultures: Japanese K-12
WorldLang/Cultures: Arabic K-8
WorldLang/Cultures: Arabic K-12
WorldLang/Cultures: Chinese K-12
WorldLang/Cultures: French K-8
WorldLang/Cultures: French K-12
WorldLang/Cultures: German K-8
WorldLang/Cultures: German K-12
WorldLang/Cultures: Hebrew K-8
WorldLang/Cultures: Hebrew K-12
WorldLang/Cultures: Italian K-8
WorldLang/Cultures: Italian K-12
WorldLang/Cultures: Japanese K-8
WorldLang/Cultures: Latin K-8
WorldLang/Cultures: Latin K-12
WorldLang/Cultures: Norweg K-12
WorldLang/Cultures: Ojibwe K-12
WorldLang/Cultures: Polish K-12
WorldLang/Cultures: Russian K-8
WorldLang/Cultures: Russian K-12
WorldLang/Cultures: Spanish K-12
WorldLang/Cultures: Swedish K-12
Twin Cities Campus
Family Education M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies program in family education develops and strengthens professionals' competencies to work with individuals and families to enhance family life. This graduate-level, practitioner-based program is offered by the Department of Curriculum and Instruction (CI).

The program prepares licensed teachers to further develop their knowledge and skills in the family education field or non-licensed professionals to work with adults, youth, or children in a variety of settings. Students may fulfill requirements for a parent educator license, parent education certificate, or community and learning certificate as part of this degree.

With guidance from faculty advisers, students choose at least 30 semester credits of work that may include courses, independent study, internships, and workshops.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree from an accredited institution in family studies, child psychology, early childhood education, nutrition, or related fields. A 2.80 overall GPA in undergraduate work.

Special Application Requirements:
All applicants must submit the following items:
- Official transcripts from all postsecondary institutions attended or currently attending, except the University of Minnesota. Transcripts must be received from the issuing school in a sealed and stamped envelope, and mailed to CEHD Student Services, 360 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455.
- Any student with a U.S. bachelor's degree or a comparable foreign degree from an accredited college or university may apply to CEHD. Official transcripts of all previous post-secondary academic study must be submitted. Transcripts from coursework completed at universities outside of the United States must be evaluated by a professional credential evaluation center. Request a "course-by-course" evaluation. This process can take four to six weeks; please plan in advance. A suggested provider of this service is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400).

All applicants must upload or submit the following items with their online applications:
- Résumé
- Personal Statement describing professional goals compatible with the family education mission (one page)
- Application fee of $55 (charged when the online application is submitted). Fee must be paid with a credit card.

Note: This program is not offered full-time and therefore is not intended for international students needing a visa to study in the U.S.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

**IELTS**
- Total Score: 6.5

**MELAB**
- Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 30 major credits and null credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Plan C requires 30 credits in consultation with the adviser.

Students complete:
- 15 credits in family education, including CI 5902 - Family Education Perspectives (3 cr)
- 5-6 credits in coursework with a focus on educational processes that are not limited to a specific subject matter (family ed courses do not count for this (e.g., CI 5949); however, adult learning in OLPD and learning technologies in C&I can)
- 9-10 credits in coursework with a supporting focus on family, children, and/or youth issues
- an oral examination

**Course Group 0**

FSOS 5902 - Family Education Perspectives (3.0 cr)
FSOS 5904 - Contemporary Family Education (3.0 cr)
FSOS 5900 - Special Topics in Family, Youth, and Community (1.0 - 4.0 cr)
FSOS 5908 - Family and Work Relationships (3.0 cr)
FSOS 5912 - Sexuality Education (3.0 cr)
FSOS 5914 - Education for Family Communication (3.0 cr)
FSOS 5906 - Program Planning in Family Education (3.0 cr)
CI 5923 - Educational Strategies in Family Education (3.0 cr)
FSOS 5932 - Introduction to Parent Education (1.0 cr)
FSOS 5937 - Parent-Child Interaction (3.0 cr)
FSOS 5942 - Everyday Experiences of Families (2.0 cr)
FSOS 5943 - Parent Learning and Development: Implications for Parent Education (2.0 cr)
FSOS 5944 - Parent Education Curriculum (2.0 cr)
FSOS 5945 - Teaching and Learning in Parent Education (2.0 cr)
FSOS 5946 - Assessment and Evaluation in Parent Education (2.0 cr)
FSOS 5949 - Student Teaching in Parent Education (2.0 cr)
YOST 5952 - Everyday Lives of Youth (3.0 cr)
YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
YOST 5972 - Education in the Community (3.0 cr)
YOST 5974 - The Democratic Learning Community (3.0 cr)

**Program Sub-plans**

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.
Morris
Requirements for this sub-plan are the same as family education general program description.

Students may take courses on Twin Cities or Morris campuses.

Professional Studies
The M.Ed./professional studies program in family education develops and strengthens professionals' competencies to work with individuals and families to enhance family life. This graduate-level, practitioner-based program is offered by the Department of Curriculum and Instruction (CI). The program prepares licensed teachers to further develop their knowledge and skills in the family education field or non-licensed professionals to work with adults, youth, or children in a variety of settings. Students may fulfill requirements for a parent educator license, parent education certificate, or community and learning certificate as part of this degree. With guidance from faculty advisers, students choose at least 30 semester credits of work that may include courses, independent study, internships, and workshops.

The sub-plan requires 15 credits in family education, including CI 5902 - Family Education Perspectives (3 cr), 5-6 credits in coursework with a focus on educational processes that are not limited to a specific subject matter, and 9-10 credits in coursework with a supporting focus on family, children, and/or youth issues. An oral examination is also part of this program.

Required Coursework
Take 1 or more course(s) from the following:
• FSOS 5902 - Family Education Perspectives (3.0 cr)
Course Group 1
Some of the family education courses available to M.Ed. students include:
FSOS 5900 - Special Topics in Family, Youth, and Community (1.0 - 4.0 cr)
FSOS 5904 - Contemporary Family Education (3.0 cr)
FSOS 5906 - Program Planning in Family Education (3.0 cr)
FSOS 5908 - Family and Work Relationships (3.0 cr)
FSOS 5912 - Sexuality Education (3.0 cr)
FSOS 5914 - Education for Family Communication (3.0 cr)
CI 5923 - Educational Strategies in Family Education (3.0 cr)
FSOS 5932 - Introduction to Parent Education (1.0 cr)
FSOS 5933 - Parent Learning and Development: Implications for Parent Education (2.0 cr)
YOST 5952 - Everyday Lives of Youth (3.0 cr)
YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
YOST 5974 - The Democratic Learning Community (3.0 cr)
YOST 5972 - Education in the Community (3.0 cr)

Rochester
Requirements for this sub-plan are the same as family education general program description.

Students may take courses on Twin Cities or Rochester campus.
Twin Cities Campus
Family Social Science M.A.
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/Graduate

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program of study uses methods of social science to examine family systems and their interactions with various environments. The curriculum supports study in several broad theme areas: family economic well-being, families and mental health, family diversity, and relationships and development across the life span.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Three overall criteria guide admissions decisions: 1) evidence of strong academic preparation and the ability and desire to perform graduate level scholarship, including research; 2) fit of the applicant's professional goals with family social science (FSoS) faculty scholarship and with the overall FSoS mission, that is, enhancing the well-being of diverse families in a changing world; and 3) unique contributions applicant would make to FSoS values, including social relevance, collaboration, inclusiveness, excellence, innovation, and diversity.

Special Application Requirements:
For more information about application requirements and procedures, consult the Family Social Science Admissions and Orientation web page at http://www.cehd.umn.edu/fsos/Graduate/admissionOrient.asp.

Applicants for the Plan A master's program are reviewed only once per year. The application deadline is December 1 for admission fall semester of the following year. Applicants for the Plan B master's program are considered during the academic year, once they are complete, but not later than April 1, and students may begin graduate study the semester after the application is approved.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 20 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students must demonstrate familiarity with the tools of research or scholarship in the field of family social science, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project.

The project should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The graduate faculty specifies both the nature and extent of the options available to satisfy this requirement, and whether the requirement is to be satisfied in conjunction with, or independent of, the courses in the student's program.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

The M.A. program is offered under Plan A and Plan B. Plan A requires at least 30 credits, including at least 20 course credits, of which 6 credits are outside the department in a related field, and 10 thesis credits. The Plan A master's is recommended for students who intend to pursue a Ph.D. degree.

Plan B requires at least 30 credits, including at least 26 course credits, of which 6 credits are outside the department in a related field, and at least 4 credits for a Plan B project. The Plan B master's is for students who wish to further their education so that they may hold positions of responsibility serving families. Although the instruction is based on research, the Plan B degree is not intended to provide intensive research training. The Plan B program is understood to be a terminal degree and is not recommended for students who intend to pursue the Ph.D. degree. Consult the department for the most current information.
Twin Cities Campus

Family Social Science Minor
Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/Graduate

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program of study for the family social sciences graduate minor uses methods of social science to examine family systems and their interactions with various environments. The curriculum supports study in several broad theme areas: family economic well-being, families and mental health, family diversity, and relationships and development across the life span.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Master’s students must complete at least 6 credits of 5xxx or 8xxx coursework in family social science. All courses must be taken A-F and completed with a GPA of at least 3.00.

A doctoral minor requires at least 12 credits of 8xxx courses in family social science including FSOS 8001 - Conceptual Frameworks in the Family (3 credits). All courses for the minor must be taken A-F and completed with a GPA of at least 3.00.
Twin Cities Campus
Family Social Science Ph.D.

Family Social Science
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Family Social Science, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116; fax: 612-625-4227)
Email: fsosgrad@umn.edu
Website: http://www.cehd.umn.edu/fsos/Graduate

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program of study for the Ph.D. in family social science uses methods of social science to examine family systems and their interactions with various environments. The curriculum supports study in several broad theme areas: family economic well-being, families and mental health, family diversity, and relationships and development across the life span.

Accreditation
This program is accredited by Commission on Accreditation for Marriage and Family Therapy Education.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Three overall criteria guide admissions decisions: 1) evidence of strong academic preparation and the ability and desire to perform graduate level scholarship, including research; 2) fit of the applicant's professional goals with family social science (FSoS) faculty scholarship and with the overall FSoS mission, that is, enhancing the well-being of diverse families in a changing world; and 3) unique contributions the applicant would make to FSoS values, including social relevance, collaboration, inclusiveness, excellence, innovation, and diversity.

Special Application Requirements:
Students may apply for admission to the Ph.D. program, family science specialization, after completing either a bachelor's degree or a master's degree. Students who enter the Ph.D. program with a bachelor's degree are expected to fulfill the requirements for an M.A. degree in the process of working toward the Ph.D. Students applying for the specialization in marriage and family therapy must have a clinical master's degree. Students cannot earn a clinical master's degree in the Department of Family Social Science.

For more information about application requirements and procedures, consult the Family Social Science Admissions and Orientation web page at http://www.cehd.umn.edu/fsos/Graduate/admissionOrient.asp.

Applicants for the doctoral program are reviewed only once per year. The application deadline is December 1, for admission fall semester of the following year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

33 credits are required in the major.
15 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Courses in the Ph.D. degree program must contribute to an organized program of study and research. The program includes at least 72 credits beyond the master's degree, including 48 course credits and 24 dissertation credits. Coursework includes at least 12 credits in a minor or supporting program; 24 credits in one of the two designated specializations of family science or marriage and family therapy; and 12 credits in core family content and advanced research methods. An optional teaching internship program is recommended for students who are planning for careers in higher education.

Major Field Credits--Depending on previous preparation and the nature of the research undertaken, the number of credits required for individual students, even within the same major field, may vary considerably. Courses included in the official degree program cannot be used to meet both major and outside credit requirements.
Twin Cities Campus

Human Resource Development M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies program in human resource development (HRD) focuses on training of human resources and organizational change issues. This graduate-level, practitioner-based program can be tailored to meet the needs of individual students. The HRD program is offered by the Department of Organizational Leadership, Policy, and Development (OLPD) in the College of Education and Human Development (CEHD). Courses at the University of Minnesota campus are offered at a variety of times, including late afternoons and evenings. Students may also enroll in courses offered during the summer and at off-campus sites.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
All applicants must upload or submit a résumé and personal statement describing their career goals and rationale for interest in the M.Ed. program (limit two pages) along with the application.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 22 major credits and 12 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 2.80 is required for students to remain in good standing.

**Core Course Requirements**
Students must complete at least 34 credits, including the following courses:
- **OLPD 5201** - Strategies for Teaching Adults (3.0 cr)
- **OLPD 5605** - Strategic Planning through Human Resources (3.0 cr)
- **OLPD 5696** - Internship: Human Resource Development (1.0 - 10.0 cr)
- **OLPD 5615** - Training and Development of Human Resources (3.0 cr)
- **OLPD 5607** - Organization Development (3.0 cr)
- **OLPD 5607** - Survey: Human Resource Development and Adult Education (3.0 cr)
- **OLPD 5819** - Evaluating and Using Research in Organizations and Education (3.0 cr)

Twelve (12) elective credits approved by a faculty adviser.

**U of M HRD UG Degree Continuing Students**
Students holding an undergraduate HRD degree from the University of Minnesota will not be required to retake courses completed during the undergraduate program. However, these students must complete at least 19 credits in HRD-designated courses, including:
- **OLPD 5605** - Strategic Planning through Human Resources (3.0 cr)
- **OLPD 8601** - Advanced Training and Development of Human Resources (3.0 cr)
- **OLPD 8602** - Advanced Organization Development (3.0 cr)
- **OLPD 5819** - Evaluating and Using Research in Organizations and Education (3.0 cr)

Twelve (12) elective credits approved by a faculty adviser.

**Program Sub-plans**
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Rochester**
Requirements for the Rochester sub-plan are the same as those listed in general description. Students may take courses on Twin Cities or Rochester campuses.
**Twin Cities Campus**

Human Resource Development Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006, fax: 612-624-3377)
Email: [olpd@umn.edu](mailto:olpd@umn.edu)
Website: [http://www.cehd.umn.edu/olpd](http://www.cehd.umn.edu/olpd)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Human Resource Development PBacc Cert Grad

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The certificate program in human resource development (HRD) focuses on training of human resources and organizational change issues. The HRD program is offered by the Organizational Leadership, Policy, and Development (OLPD) in the College of Education and Human Development (CEHD). Courses at the University of Minnesota campus are offered at a variety of times, including late afternoons and evenings.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

The remaining credits can be selected from HRD coursework or ADED 5101 - Strategies for Teaching Adults (3 cr).

**Required Courses**
- OLPD 5801 - Survey: Human Resource Development and Adult Education (3.0 cr)
- OLPD 5615 - Training and Development of Human Resources (3.0 cr)
- OLPD 5607 - Organization Development (3.0 cr)
- OLPD 5696 - Internship: Human Resource Development (1.0 - 10.0 cr)

**Program Sub-plans**
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Rochester**
Several courses available on the Twin Cities campus are also available on the University of Minnesota Rochester campus. See [http://www.r.umn.edu/academics/programs/certificate/hrd/index.htm](http://www.r.umn.edu/academics/programs/certificate/hrd/index.htm) for more information.
Rochester sub-plan requirements are the same as those for the general certificate program. Students may take required courses on either campus.
Twin Cities Campus

Infant and Early Childhood Mental Health Postbaccalaureate Certificate

Institute of Child Development

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Institute of Child Development, 51 East River Road, Minneapolis, MN 55455 (612-625-2252; fax: 612-624-6373)
Email: sarazet@umn.edu
Website: http://www.cehd.umn.edu/icd/affiliatedprograms.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 21
- This program requires summer semesters for timely completion.
- Degree: Infant & Early Childhood Mental Health PBac Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota Infant and Early Childhood Mental Health (IECMH) Certificate Program is an intensive, interdisciplinary postbaccalaureate training program for students and professionals in domains of mental health, health and early care and education.

The program serves to deepen the knowledge and skills of individuals working in birth-to-five prevention, intervention, program administration, and policy development, and to prepare individuals to provide leadership in expanding the breadth and depth of relationship-based services and policies.

The IECMH certificate program is founded on a core set of principles of infant and early childhood mental health practice, asserting that services to families should be relationship-based, culturally sensitive, grounded in an understanding of developmental theory and research with special attention to the effects of trauma, and supported by reflective practice.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Applicants must hold at least a baccalaureate degree from an accredited college or university in a related area (e.g., child development, social work, child psychology) or document at least two years of work experience in a related field.

Special Application Requirements:

Applicants must have at least two years of documented experience in early childhood research or practice.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Course Group 0
CPSY 5501 - Foundations in Infant and Early Childhood Mental Health I (3.0 cr)
CPSY 5503 - Foundations in Infant and Early Childhood Mental Health II (3.0 cr)
CPSY 5506 - Infant Observation Seminar I (1.0 cr)
CPSY 5511 - Infant Observation Seminar III (1.0 cr)
CPSY 5513 - Assessment in Infant and Early Childhood Mental Health: DC 0-3R (2.0 cr)
CPSY 5515 - Assessment in Infant and Early Childhood Mental Health: NCAST (2.0 cr)
CPSY 5518 - Prevention and Intervention in Infant and Early Childhood Mental Health I (3.0 cr)
CPSY 5521 - Prevention and Intervention in Infant and Early Childhood Mental Health II (3.0 cr)
CPSY 5523 - Reflective Supervision in Infant and Early Childhood Mental Health: Community-based (1.0 cr)
CPSY 5525 - Reflective Supervision in Infant and Early Childhood Mental Health: Clinical (1.0 cr)
Twin Cities Campus

Innovations in Undergraduate Multicultural Teaching and Learning
Postbaccalaureate Certificate

Postsecondary Teaching and Learning

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Postsecondary Teaching and Learning, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-8705; fax: 612-625-0709)
Email: pstlgrad@umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Inno in Ugrd Multicult Tchng & Lrnng PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in innovations in undergraduate multicultural teaching and learning aims to contribute long-term, systemic, and comprehensive solutions to improve the quality of teaching and learning for all undergraduates, particularly those who traditionally have been underprepared for and underserved in higher education. The program is specifically designed to create a practical context in which to focus on multicultural student success. The required core courses and practicum experience are designed to provide opportunities to apply multicultural education theory to practice and engage as reflective practitioners.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Students may apply to the PSTL graduate certificate program at any time during the year; there is no set application deadline. All applicants must complete the CEHD online application and submit a one- to two-page personal statement. The Personal Statement should address: interest in the program; professional/academic or community qualifications; what the student will bring to the program, and; how completion of the certificate will build on the applicant's capacity to transform postsecondary teaching and learning. Visit http://www.cehd.umn.edu/PsTL/Certificate/apply.asp for more information about how to apply.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

To obtain a certificate in innovations in undergraduate multicultural teaching and learning, students are required to take 3 core courses and two electives for a minimum of 15 credit hours. The 3 core PSTL courses are listed below.

Students also choose 6 elective credits. For graduate courses taken at another university, the PSTL director of graduate studies (DGS) will need to approve the courses. For University of Minnesota graduate coursework, either choose 6 credits from the list of approved electives or seek permission from the PSTL DGS.

**Course Group 0**
PSTL 5105 - Increasing Access and Success in Undergraduate Classrooms (3.0 cr)
PSTL 5106 - Multicultural Teaching and Learning in Diverse College Contexts (3.0 cr)
PSTL 5196 - Supervised Practicum in Multicultural Postsecondary Teaching and Learning (3.0 cr)
Twin Cities Campus
International Education Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary minor in international education is for students enrolled in any M.A. or doctoral program who wish to enter careers in research, consulting, administration, and teaching in an international context. The minor offers a coordinated set of courses from the Departments of Curriculum and Instruction; Educational Policy and Administration; Educational Psychology; Human Resource Education; the School of Kinesiology; and the Institute of Child Development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Each program is developed in consultation with the student, the student's adviser, major director of graduate studies, and director of graduate studies for international education. Requirements include OLPD 5103 - Comparative Education and OLPD 5124 - Critical Issues in International Education (one for master's, both for doctoral); research OLPD 5121 (for doctoral students only); and area-specific coursework. Electives from the University may be added with the adviser's consent and director of graduate studies approval.

Program requirements
Doctoral Requirements
- OLPD 5121 - Educational Reform in International Context (3.0 cr)
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)

Master Requirements
Take 1 or more course(s) from the following:
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5124 - Critical Issues in International Education and Educational Exchange (3.0 cr)

Area specific coursework
Take at least one course for either the master's or doctoral minor.

- OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
- OLPD 5132 - Intercultural Education and Training: Theory and Application (3.0 cr)
- EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5432 - Foundations of Individual/Organizational Career Development (3.0 cr)
• EPSY 5461 - Cross-Cultural Counseling (3.0 cr)
• EPSY 8403 - Social/Cultural Contexts: Counseling and Skills (3.0 cr)
• FSOS 8005 - Multicultural Issues in Family Social Science (3.0 cr)
• OLPD 5612 - International Human Resource Development (3.0 cr)
• OLPD 5697 - International Field Study in Human Resource Development (3.0 cr)
• OLPD 5825 - Diversity Issues and Practices in Work and Human Resource Education Settings (3.0 cr)
• OLPD 8842 - Comparative Systems in Work and Human Resource Education (3.0 cr)
Twin Cities Campus
Interpersonal Relationships Research Minor

Institute of Child Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, University of Minnesota, S354 Elliott Hall, 75 East River Parkway, Minneapolis, MN 55455 (612-626-0025)
Email: simps108@umn.edu
Website: http://www.cehd.umn.edu/icd/IrelMinor

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2011
• Length of program in credits (Doctorate): 14
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in interpersonal relationships research provides doctoral students with a broad theoretical and methodological foundation for research on behavioral interaction patterns between two persons and the impact of these interactions.

A recently recognized and rapidly advancing interdisciplinary field of scientific inquiry, interpersonal relationships research has its roots in psychology, sociology, family studies, communication, and nursing. The program brings together faculty and students from eight University departments and schools.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The doctoral minor requires at least 14 graduate credits, including three required core courses and additional elective courses selected from an approved list. The required courses are IREL 8001 (1 cr each of 2 semesters), IREL 8021 (3 cr), and either PSY 5204 (3 cr) or PSY 8202 (3 cr).

Required Coursework
IREL 8001 - Proseminar in Interpersonal Relationships Research (2.0 cr)
IREL 8021 - Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships (3.0 cr)
PSY 5204 - Psychology of Interpersonal Relationships (3.0 cr)
    or PSY 8202 - Close Relationships (3.0 cr)
Twin Cities Campus
Kinesiology M.S.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Kinesiology M.S. students concentrate their studies in one of the following areas: behavioral aspects of physical activity, biomechanics and neuromotor control, exercise physiology, human factors/ergonomics, motor learning/motor development, sport and exercise psychology, or sport sociology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Although prospective masters students generally have an undergraduate degree in kinesiology, physical education, or sport and exercise science, others with a baccalaureate degree who have related preparation and a significant background and interest in the scientific study of physical activity may be admitted.

Special Application Requirements:
Applicants must submit a University of Minnesota Graduate School application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Typically, students are admitted for the fall semester.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Listening Score: 14
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is an independent research project with the adviser that meets the following guidelines: Involves a total of approximately 120 hours of work; demonstrates familiarity with the tools of research and scholarship in the field of kinesiology; demonstrates the ability to work independently; and demonstrates the ability to effectively present the results of the investigation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

M.S. students select an emphasis in behavioral aspects of physical activity, biomechanics/neuromotor control, exercise physiology, human factors/ergonomics, motor learning/motor development, sport and exercise psychology, or sport sociology.

The M.S. is offered under Plan A and Plan B. Plan A requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field, and 10 thesis credits (8777). Plan B also requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field, 4 credits of a research project (8995), and 6 additional credits in any of these areas.

For both Plan A and Plan B, students must take KIN 5981 (3 cr), KIN 8980 (1 cr), and in the related field or minor, EPSY 5261 (3 cr) or EPSY 8261 (3 cr) or equivalent. A GPA of at least 3.00 is required to maintain good standing and to graduate.

**Course Group 0**

**KIN 5981** - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
**KIN 8980** - Graduate Research Seminar in Kinesiology (1.0 cr)
**EPSY 5261** - Introductory Statistical Methods (3.0 cr)
**EPSY 8261** - Statistical Methods I: Probability and Inference (3.0 cr)
Twin Cities Campus  
Kinesiology Minor  
Kinesiology, School of  
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

• Program Type: Graduate minor related to major  
• Requirements for this program are current for Fall 2011  
• Length of program in credits (Masters): 6  
• Length of program in credits (Doctorate): 12  
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphasis areas in the School of Kinesiology's master's and doctoral programs are behavioral aspects of physical activity, biomechanics/neuromotor control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport and exercise psychology, or sport sociology.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires at least 6 credits of graduate-level kinesiology courses. A doctoral minor requires at least 12 credits of graduate-level kinesiology courses, including 5171 (3 cr) and 8980 (1 cr).

Doctoral Minor
A doctoral minor requires at least 12 credits of graduate-level kinesiology courses.
KIN 5171 - Foundations of Kinesiology (3.0 cr)
KIN 8980 - Graduate Research Seminar in Kinesiology (1.0 cr)
**Twin Cities Campus**

**Kinesiology Ph.D.**

*Kinesiology, School of***

**College of Education and Human Development**

Link to a list of faculty for this program.

**Contact Information:**

School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)

Email: *kin@umn.edu*

Website: [http://cehd.umn.edu/kin](http://cehd.umn.edu/kin)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](http://cehd.umn.edu/kin) section of the catalog website for requirements that apply to all major fields.

Ph.D. students pursue an individualized program with an emphasis in behavioral aspects of physical activity, biomechanics/neuromotor control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport and exercise psychology, or sport sociology.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

It is preferred that applicants have completed a master’s degree in the field of kinesiology or a related field and achieved an overall minimum GPA of 3.50.

Applicants must have completed a baccalaureate degree, generally in kinesiology, physical education, or sport and exercise science; or related preparation and a significant background and interest in the scientific study of physical activity.

**Special Application Requirements:**

Applicants must submit a University of Minnesota Graduate School application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Typically, students are admitted for the fall semester.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Listening Score: 14
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Ph.D. students pursue an individualized program with an emphasis in behavioral aspects of physical activity, biomechanics/neuromotor control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport and exercise psychology, or sport sociology.

The Ph.D. requires at least 48 course credits and 24 thesis credits, for a total of 72 credits. Course credits include 24 credits in kinesiology, 9 credits in statistical methods, 12 credits in a supporting program or minor (statistical methods courses may be included), and an additional 3 credits in any of these areas. Kinesiology course credits must include 5171 and 5981 (achieving a grade of A or B in each), 2 to 6 credits of 8980, and at least 12 credits of 8xxx. Statistical methods courses must include EPSY 8261 or equivalent and EPSY 8262 or equivalent (achieving a grade of A or B in each). A GPA of at least 3.00 is required to maintain good standing and to graduate.

Course Group 0
KIN 5171 - Foundations of Kinesiology (3.0 cr)
KIN 5981 - Research Methodology in Kinesiology, Recreation, and Sport (3.0 cr)
KIN 8980 - Graduate Research Seminar in Kinesiology (1.0 cr)
EPSY 8261 - Statistical Methods I: Probability and Inference (3.0 cr)
EPSY 8262 - Statistical Methods II: Regression and the General Linear Model (3.0 cr)
Twin Cities Campus

Leadership in Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a [list of faculty](#) for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: [http://www.cehd.umn.edu/olpd/](http://www.cehd.umn.edu/olpd/)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies program in leadership in education, offered jointly by the Department of Organizational Leadership, Policy, and Development (OLPD) and the Department of Curriculum and Instruction (C&I) in the College of Education and Human Development (CEHD), builds leadership skills and facilitates analysis of K-12 school culture, policies, and practice.

This program develops educational leaders who can serve in schools that foster continuous learning and improvement. Program participants are prepared to advance team, school-wide, and district-wide reform initiatives for coherent educational systems and programs. This program addresses formal and informal leadership methods, emphasizing the roles and contributions of teachers as leaders of instructional improvement, including ways that teachers and principals work together to promote collaborative school cultures.

This 30-semester credit program emphasizes the essential components of leadership, including collaboration, group dynamics, continuous professional learning, school policy, school culture, design and facilitation of improvement initiatives, innovations in teaching and assessment practice, creation of coherent learning experiences, cross-cultural education, and technology.

Students are encouraged to begin the program with other educators from the same school or district. Most students complete the degree in two to three years while continuing to teach full time. Some degree coursework is offered at convenient, off-campus sites in the Twin Cities area.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to [test abbreviations](#)(TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. The is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Course Requirements

CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
CI 5177 - Practical Research (3.0 cr)
OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)
OLPD 5374 - Leadership for Professional Development (4.0 cr)
CI 5178 - Project in Teacher Leadership (3.0 - 6.0 cr)
   or OLPD 5361 - Project in Teacher Leadership (3.0 cr)

Electives

14 or more credits of elective courses. Students often choose elective credits aligned with certificates in staff development, school technology, reading, and school administration.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester

Singapore
Twin Cities Campus
Literacy Education M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/professional studies program in literacy education is designed to improve the quality of literacy education in K-12 schools.

The program aims to address the growing state and national emphasis on pupils' reading skills and achievement. This graduate-level, practitioner-based program of at least 30 semester credits is designed for K-12 teachers whose assignment includes reading instruction.

The literacy education program provides instruction on current developments in literacy theory and research, as well as teaching methods for reading, writing, language, speech, and media studies. Students will learn to develop instructional units, evaluate and assess K-12 pupils' literacy skills, and develop technology tools to teach them. The program also encourages students to become "literacy leaders" in their schools and school systems.

Program faculty include nationally known researchers in the field, who provide research-based instructional methods. The program focuses on understanding and conducting research in literacy learning, preparing teachers to use research-based teaching methods, and to conduct research on ways to improve the quality of their teaching. The program is offered by the Department of Curriculum and Instruction (C&I) in the College of Education and Human Development (CEHD).

With guidance from faculty advisers, students complete 30 semester credits of work in three areas: a core academic program in education, coursework specific to the area of literacy education, and elective coursework. Courses at the University of Minnesota are offered at a variety of times, including late afternoons and summer session.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree from an accredited college or university.

Special Application Requirements:
All applicants must submit the following items:
- Official transcripts from all post-secondary institutions attended or currently attending, except the University of Minnesota. Transcripts must be received from the issuing school in a sealed and stamped envelope, and mailed to CEHD Student Services, 360 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455.
- Any student with a U.S. bachelor's degree or a comparable foreign degree from an accredited college or university may apply to CEHD. Official transcripts of all previous post-secondary academic study must be submitted. Transcripts of coursework completed at a university outside of the United States must be evaluated by a professional credential evaluation center. Request a "course-by-course" evaluation. This process can take four-six weeks; please plan in advance. A suggested provider of this service is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-9470 (414-289-3400).
All applicants must upload or submit the following items with their online applications:
- Résumé
- Personal statement describing your goals (one page)
- Application fee of $55 (charged when the online application is submitted). Fee must be paid with a credit card.
- All non-native English speakers and/or international students must submit an official score report from the Test of English as a Foreign Language (TOEFL). (Exceptions may be granted for applicants who will have completed 16 semester or 24 quarter credits within the past 24 months in residence as a full-time student at an accredited institution of higher learning in the United States before entering the University of Minnesota.) Please see the program's website for further information and a link to the online application.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

**Plan C:** Plan C requires 24 major credits and 6 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

### Core Requirements

Take the following 6 credits:

- CI 5155 - Contemporary Approaches to Curriculum: Instruction and Assessment (3.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)

### Literacy Education Requirements

Take 18 or more credits(s) from the following:

- CI 5401 - Literature for the Elementary School (3.0 cr)
- CI 5402 - Introduction to Special Collections (3.0 cr)
- CI 5403 - Creative Writing For and By Children (3.0 cr)
- CI 5404 - Culturally Diverse Books for Children and Adolescents (3.0 cr)
- CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
- CI 5411 - Teaching Reading in the Elementary School (3.0 cr)
- CI 5412 - Reading Difficulties: Instruction and Assessment (3.0 cr)
- CI 5415 - Literacy Development in the Primary Grades (3.0 cr)
- CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
- CI 5431 - Introduction to Instructional Leadership in K-12 Reading (3.0 cr)
- CI 5432 - Instructional Leadership in Reading in Kindergarten and the Elementary Grades (3.0 cr)
- CI 5433 - Instructional Leadership in Reading for the Middle and Secondary Grades (3.0 cr)
- CI 5434 - Professional Development and Evolving Practice in K-12 Reading (3.0 cr)
- CI 5435 - Instructional Leadership in Preventing Reading Difficulties (3.0 cr)
- CI 5441 - Teaching Literature in the Secondary School (2.0 - 3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5442 - Literature for Adolescents (3.0 cr)
• CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
• CI 5461 - Teaching Composition in the Secondary School (2.0 cr)
• CI 5462 - Evaluating and Assessing Writing (3.0 cr)
• CI 5472 - Teaching Film, Television, and Media Studies (3.0 cr)
• CI 5475 - Teaching Digital Writing: Blogs, Wikis, Online Talk, Podcasting, and E-Portfolios to Teach Writing (3.0 cr)

Electives
Electives may be selected from graduate-level courses (5xxx and above) at the University of Minnesota, as approved by faculty advisers. Course lists are available from advisers. Students are advised to choose courses that reflect learning issues faced in the classroom, including special education, secondary language, or cultural diversity issues.

Take 6 or more credits(s) from the following:
• CI 5331 - Introduction to Learning Technologies (3.0 cr)
• CI 5337 - Planning for K-12 Technology Design and Integration (3.0 cr)
• CI 5344 - Facilitating Technology Integration in Classrooms I (1.0 cr)
• CI 5361 - Teaching and Learning with the Internet (3.0 cr)
• CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
• CI 5642 - Assessing English Learners (3.0 cr)
• CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
• CI 5651 - Foundations of Second Languages and Cultures Education (3.0 cr)
• CI 5656 - Teaching Literacy in Second Language Classrooms (3.0 cr)
• CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
• YOST 5952 - Everyday Lives of Youth (3.0 cr)
• YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
• COMM 5404 - Language and Culture (3.0 cr)
• COMM 5406 - Communication and Gender (3.0 cr)
• OLPD 5372 - Youth in Modern Society (3.0 cr)
• ENGL 5090 - Readings in Special Subjects (1.0 - 4.0 cr)
• ENGL 5200 - Readings in American Literature (3.0 cr)
• ENGL 5300 - Readings in American Minority Literature (3.0 cr)
• EPSY 5112 - Knowing, Learning, and Thinking (4.0 cr)
• EPSY 5113 - Psychology of Instruction and Technology (3.0 cr)
• EPSY 5114 - Psychology of Student Learning (3.0 cr)
• EPSY 5151 - Cooperative Learning (3.0 cr)
• EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
• EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
• EPSY 5613 - Foundations of Special Education I (3.0 cr)
Twin Cities Campus
Multicultural College Teaching and Learning M.A.
Postsecondary Teaching and Learning
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Postsecondary Teaching and Learning, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-8705; fax: 612-625-0709)
Email: pstlgrad@umn.edu
Website: http://www.cehd.umn.edu/PsTL

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of arts in multicultural college teaching and learning offered by the Department of Postsecondary Teaching and Learning (PsTL) provides an opportunity for intensive study of a transformative approach to teaching and learning to promote access to and success for traditionally underserved students. The program is multidisciplinary and a broad understanding of multiculturalism is employed that includes race, ethnicity, class, gender, sexual orientation, disability, age, and religion, so as to acknowledge that personal identity is complex and intersectional. Students engage in a critical examination of contemporary frameworks in educational theory, as well as the study of best practices for addressing them, such as multicultural education, critical pedagogy, assessment, and classroom research. Students are required to complete a semester-long supervised practicum and a two-semester supervised internship.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
In addition to the on-line application, students will also need to upload the following documents as part of their application: two letters of recommendation from persons familiar with the applicant's scholarship and research potential; and a current résumé. In addition, the most important part of the application is a personal statement describing the applicant's interest in the program, professional/academic and/or community qualifications, what the applicant will bring to the diversity of the cohort and the profession, and how completion of the M.A. will build on the applicant's capacity to improve and transform teaching and learning at the postsecondary level.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 21 major credits and 9 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B master's degree requires students to complete a capstone project. Students must demonstrate familiarity with the tools of research or scholarship in multicultural college teaching and learning, the ability to work independently, and the ability to present the results of their investigation effectively. The Plan B capstone project will involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The PsTL graduate faculty will specify the nature and extent of the options available to satisfy this requirement. In conjunction with the capstone project, students must enroll in the 3 credit PsTL 8315 Plan B Capstone Seminar.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The Plan A master's requires a minimum of 34 credits. Students must complete a minimum of 18 credits in the major field and a minimum of 6 credits in one or more related fields of study outside the major, as well as 10 thesis credits and a master's thesis. The Plan B master's degree requires a minimum of 30 credits. Students must complete 18 credits in the major field and a minimum of 6 credits in one or more related fields of study outside the major and take the 3 credit Plan B Capstone Seminar and complete a capstone project.
Twin Cities Campus
Multicultural College Teaching and Learning Minor
Postsecondary Teaching and Learning
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Post Secondary Teaching and Learning, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-8705; fax: 612-625-0709)
Email: pstlgrad@umn.edu
Website: http://www.cehd.umn.edu/PsTL

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

PsTL’s graduate minors in multicultural college teaching and learning are designed for current University of Minnesota graduate students who want to study innovative strategies to increase access and success of diverse undergraduate students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Coursework planned with PsTL DGS.
Online Distance Learning Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Goals of the distance learning certificate include:
- Developing knowledge and skills in the best practices for designing and delivering online distance learning
- Engaging with current research about distance learning, current practices, and learning theory
- Providing opportunities to practice designing, developing, and delivering online distance learning
- Creating learning communities where students can reflect on their own teaching, reading, designing, and writing
- Allowing students to learn from each other

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Applicant must hold a bachelor's degree from an accredited college or university, or be currently enrolled in a University of Minnesota graduate-level degree program.

Special Application Requirements:
Admission is open to degree-seeking and non-degree seeking students.
Applicants must submit the following application materials online:
- Unofficial transcripts from all post-secondary institutions you have attended or are currently attending, except the University of Minnesota
- A one-page goal statement

For complete application instructions, please see the program’s website.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
  The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Courses
Certificate coursework completed as an undergraduate student cannot be applied to graduate-level degree programs.
- CI 5321 - Foundations of Distance Education (3.0 cr)
- CI 5323 - Online Learning Communities (3.0 cr)
- CI 5325 - Designing and Developing Online Distance Learning (3.0 cr)
- CI 5327 - Designing Online Adventure Learning (3.0 cr)
Twin Cities Campus

Parent Education Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-2545; fax: 612-624-8277)
Email: cigs@umn.edu
Website: http://cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 16
- This program requires summer semesters for timely completion.
- Degree: Parent Education PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The parent education certificate program is designed to prepare professionals to plan, coordinate, and teach parent education programs and services for families with children from early childhood through adolescence.

The 16-credit program prepares professionals who are well qualified to deliver programs designed to address the intellectual, emotional, cultural, social, and physical needs of parents and children. In addition to educational settings that may include public-school parent education programs, preschools, child care centers, and Head Start programs, parent educators may also work in health care and social-service agencies and institutions, and faith-based settings.

Certificate courses are offered online. Online coursework is designed to meet the needs of local and distance learners in Minnesota, around the country and the world.

Students participate in live online chat sessions and weekly reflections with their course instructors. They interview parents, read the latest research, and view presentations by University of Minnesota faculty and noted experts in the field.

The capstone course (CI 5949 - Student Teaching in Parent Education) allows students to teach and interact with parents in a parent education setting under the supervision of a licensed or highly qualified parent educator approved by core faculty. This individualized student teaching allows each program participant to integrate and apply what they have learned to parent education experiences, preparing them for professional work in the field.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission

Special Application Requirements:
Complete the equivalent of six semester undergraduate or graduate credits in child development courses before entering the parent education certificate program, completed within 10 years of admission to the certificate program. If these credits have not been completed at the time of application, the applicant may be admitted conditionally until they are completed and recorded on a transcript. The following CEHD courses are examples of child development courses that may meet this requirement:

CPSY 4302 - Infant Development
CPSY 4331 - Social and Personality Development
CPSY 4343 - Cognitive Development

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Course Group 0
Note: CI 5943 through CI 5949 must be taken in the sequence listed. CI 5932, CI 5937, and CI 5942 can be taken in any sequence.
- FSOS 5932 - Introduction to Parent Education (1.0 cr)
- FSOS 5937 - Parent-Child Interaction (3.0 cr)
- FSOS 5942 - Everyday Experiences of Families (2.0 cr)
- FSOS 5943 - Parent Learning and Development: Implications for Parent Education (2.0 cr)
- FSOS 5944 - Parent Education Curriculum (2.0 cr)
- FSOS 5945 - Teaching and Learning in Parent Education (2.0 cr)
- FSOS 5946 - Assessment and Evaluation in Parent Education (2.0 cr)
- FSOS 5949 - Student Teaching in Parent Education (2.0 cr)
Twin Cities Campus
PK-12 Administration Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Leadership, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-625-9087; fax: 612-624-3377)
Email: licensure@umn.edu
Website: http://www.cehd.umn.edu/olpd/grad-programs/Adm-Licensure/default.html

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 22
- This program requires summer semesters for timely completion.
- Degree: PK-12 Administration PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Housed within the University of Minnesota’s Department of Organizational Leadership, Policy, and Development (OLPD), the licensing and leadership development program for educational administrators offers an individualized program to prepare aspiring administrators for the following licenses:
- K-12 principal
- Superintendent
- Director of special education
- Director of community education

The administrative licensure program offers a variety of courses specifically designed to address the competencies required by the state for the various licenses.

Accreditation
This program is accredited by Minnesota Board of School Administrators and the NCATE.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.00 is required for students to remain in good standing.

Further requirements: K-12 principal, superintendent, and director of special education
- Possess or complete three years of teaching experience
- 60 credits beyond a bachelor's degree to include a graduate degree
- 320 hours of field experience

Further requirements: director of community education
- A bachelor's degree plus 24 credits
- 320 hours of field experience

Exit requirements
An electronic portfolio presented to a review panel made up of representatives from the University and licensed practitioners is required as the last step to earning licensure.

Required for All Licenses
- OLPD 5385 - Licensure Seminar: Program Policies and Inclusionary Leadership (1.0 cr)
- OLPD 5386 - Leadership Portfolio Seminar (1.0 cr)
- OLPD 5324 - Strategic Financial Planning and Policy for Educational Leaders (3.0 cr)
- OLPD 5344 - School Law (3.0 cr)
- OLPD 5348 - Leaders of Human Resources Administration (3.0 cr)
- OLPD 5387 - Leadership for Teaching and Learning (2.0 cr)
- OLPD 5310 - Data-Driven Decision Making I (1.0 cr)
- OLPD 5391 - Special Education Law for Leaders (1.0 cr)

Licensure-Specific Course Requirements

K-12 principal
- OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)
- OLPD 5388 - Leadership for Master(ful) Scheduling (2.0 cr)

-OR-

School superintendent
- OLPD 5322 - Leaders in the Superintendency and Central Office (3.0 cr)
- OLPD 5393 - Leading School Finance Elections (1.0 cr)

-OR-

Director of special education
- OLPD 5368 - Leadership for Special Education Services (3.0 cr)
- OLPD 5392 - Special Education Finance: Program Models, Policy, and Law (2.0 cr)
- OLPD 5321 - The Principal as Leader of High-Performing Schools (3.0 cr)

-OR-

Director of community education
- OLPD 5389 - Community Education Leadership (3.0 cr)
- OLPD 5394 - Leadership in Community Education Finance and Law (1.0 cr)

Take 6 credits, in consultation with adviser, from outside of OLPD in the areas of:
- Adult Education (2 cr)
- Early Childhood (2 cr)
- School Age Programs (2 cr)
Twin Cities Campus
Prevention Science Minor
Institute of Child Development
Graduate School

Link to a list of faculty for this program.

Contact Information:
Prevention Science Program, 202 Child Development, 51 East River Parkway, Minneapolis, MN 55455 (612-625-4321; fax: 612-624-6373)
Email: prevsci@umn.edu
Website: http://www.preventionscience.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Prevention science is defined for the purposes of this program as the scientific study of systematic efforts to reduce the incidence of unhealthy or maladaptive behavior, and to promote health and adaptive behavior in populations across the life span through designing and evaluating interventions, and utilizing knowledge about them more strategically.

The fundamental assumption of this free-standing minor is that future researchers and scholars will be most able to meet the challenges and changes occurring in society and in their chosen professions and disciplines if their training is comprehensive and transdisciplinary.

Prevention science is a rapidly expanding interdisciplinary field and this program will increase opportunities for the University's academic researchers to partner with communities to address the complex issues facing society.

Six areas of concentration will be offered. Students will be expected to select one as a major emphasis. Areas of concentration are: 1) promotion of mental health and well being across the life span; 2) interventions in education, health, and social services; 3) social policy; 4) family and community studies (early stage research, needs assessments, action research); 5) methodology; 6) individualized concentration.

For more information about these areas of concentration, visit www.cehd.umn.edu/icd/PrevSci/concentrations.html.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's and doctoral minors are developed in consultation with, and should be approved in advance by, the director of graduate studies for prevention science. The master's minor requires at least 9 credits, including PREV 8001 - Introduction to Prevention Science (3 cr) and 6 credits of elective courses primarily from the student's area of concentration.

The doctoral minor requires at least 13 credits, ordinarily including PREV 8001 - Introduction to Prevention Science (3 cr), PREV 8005 - Capstone course (1 cr), and 9 credits of elective courses primarily from the students area of concentration.

The purpose of the minor is to provide students with interdisciplinary training in prevention science; therefore, all students will be required to fulfill the elective requirements for the minor by taking courses outside their major. Courses counting toward a student's major may not be counted toward the minor.

Required Coursework
PREV 8001 - Prevention Science Core (3.0 cr)
PREV 8005 - Prevention Science Capstone Course (1.0 cr)
Twin Cities Campus

Professional Development Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Staff Development PBacc Certificate Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in professional development is designed to prepare leaders in designing, implementing, and evaluating learning opportunities for preK-12 educators and related staff.

This 12- to 15-credit graduate-level program offers professional development opportunities for teachers, administrators, and others involved in school improvement initiatives. Throughout the program, students are required to reflect on their learning, make explicit connections between theory and practice, and design staff development processes and materials for use in their own work contexts.

Through the program, participants will:
- Learn to apply research-based standards for staff development
- Be prepared for the multifaceted roles and competencies of staff developers
- Identify organizational and leadership capacities for effective staff development policies and practices
- Be able to articulate effective staff learning principles, designs, and strategies
- Evaluate staff development, including its effects on students, staff, and systems
- Learn to work effectively with groups, including both facilitation and training models of learning
- Identify and access staff development resources, including current research and best practices literature
- Gain awareness of individual strengths and areas for continuous improvement as a professional educator and leader of staff learning

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Admission is open to degree-seeking or non-degree seeking students. Applicants must have at least three years of experience working as education or related professionals in preK-12 education.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses
OLPD 5364 - Context and Practice of Educational Leadership (3.0 cr)
OLPD 5374 - Leadership for Professional Development (4.0 cr)
OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)

Additional Coursework
With certificate program faculty approval, students choose and complete 2-5 credits of coursework focusing on a topic that interests them. Students can complete this requirement in one of two ways.
Take 2 - 5 credits(s) from the following:
• OLPD 5095 - Problems: Educational Policy and Administration (1.0 - 3.0 cr)
  or focused elective coursework chosen with program faculty approval.
Twin Cities Campus

Program Evaluation Minor
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Program evaluation is an area of inquiry that uses both quantitative and qualitative methods to address questions of concern to policy makers, administrators, managers, and, in some cases, program participants. In this era of competing developments—increased accountability and the democratization of research activity—knowledge of program evaluation is a useful and valuable commodity. The program evaluation minor is an interdisciplinary effort providing intensive study of the techniques and process of evaluation and policy research, in addition to the social and political context within which program evaluation occurs. The graduate minor in program evaluation offers a coordinated set of courses designed for students who wish to have the knowledge and skills necessary to conduct evaluations combined with their graduate majors or professional fields of study. Courses include readings, discussions, and assignments designed to develop the skills essential to professionals intending to use or conduct evaluation in non-profit and for-profit organizations.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students need a minimum of 15 credits for the doctoral minor and a minimum of 9 credits for the master’s minor. Individual programs are designed through consultation by the student, the major adviser, and the director of graduate studies.
Twin Cities Campus
Program Evaluation Postbaccalaureate Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Program Evaluation Postbaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program evaluation certificate program offers intensive study of applied methods of evaluating programs and services in school, health, government, nonprofit agencies and market research settings. This interdisciplinary program surveys program evaluation techniques and processes, and examines the social and political contexts of the studies. The program allows working professionals from a variety of disciplines to formalize their training in program evaluation by earning a certificate in this area. Demand for trained professionals in program evaluation has increased steadily to meet the reporting needs of funding agencies, policy makers, and program managers in the public and private sectors. Graduates of evaluation studies programs have found employment in county government, social service agencies, state departments, and research consulting firms and businesses.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A completed graduate-level degree, master of education (M.Ed.) or master of arts (M.A.), in an appropriate content area, including education, social work, public health, or public policy.

Students must demonstrate relevant academic background, including research methodology and experience in a field in which program evaluation is practiced (e.g., public health, social work, or education). Admission will be based on an assessment of the applicant's advanced knowledge and level of professional experience in the field of program evaluation.

Special Application Requirements:
Enrollment in the certificate program will be limited to a maximum of 10 students per calendar year.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Required Coursework
8-9 credits
Foundations of evaluation
Take 1 or more course(s) from the following:
• OLPD 5501 - Principles and Methods of Evaluation (3.0 cr)
• PA 5311 - Program Evaluation (3.0 cr)
• PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
• SW 8603 - Program Evaluation (2.0 cr)

**Evaluation theory**
OLPD 8502 - Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives (3.0 cr)

**Internship in evaluation**
OLPD 8596 - Evaluation Internship (1.0 - 9.0 cr)

**Elective Coursework**
Students may choose elective coursework from the following list. Additional courses may be approved by the program coordinator of evaluation studies.

Take 3 or more credits(s) from the following:
- CI 8115 - Curriculum and Achievement Outcomes in a Diverse Society (3.0 cr)
- CI 8148 - Conducting Qualitative Studies in Educational Contexts (3.0 cr)
- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- OLPD 5061 - Ethnographic Research Methods (3.0 cr)
- OLPD 8595 - Evaluation Problems (1.0 - 6.0 cr)
- EPSY 5221 - Principles of Educational and Psychological Measurement (3.0 cr)
- EPSY 5244 - Survey Design, Sampling, and Implementation (3.0 cr)
- FSOS 8013 - Qualitative Family Research Methods (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- SW 8602 - Direct Practice Evaluation (2.0 cr)
- OLPD 5841 - Evaluation of WHRE (3.0 cr)
- WHRE 8914 - Critical Science Research (3 cr)
- OLPD 5524 - Evaluation Colloquium (1.0 cr)

**Program Sub-plans**
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Information can be found at http://www.r.umn.edu/academics/programs/certificate/program-evaluation/index.htm.

Sub-plan requirements are the same as those on the Twin Cities campus.
Twin Cities Campus

Social and Philosophic Studies Education Minor

Organizational Leadership, Policy and Development

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor provides a multidisciplinary foundation for the study of education from the perspectives of history, philosophy, and the social sciences. The minor program is shaped to suit the particular needs and interests of the student at either the master's or doctoral level. In consultation with a faculty member in social and philosophic studies of education in the Department of Organizational Leadership, Policy, and Development, EDPA 5xxx and 8xxx courses are selected both in EDPA and in related fields.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Master's or Doctoral

M.A. Students
Area I: History and Philosophy of Education
Take 1 or more course(s) from the following:
• OLPD 5021 - Historical Foundations of Modern Education (3.0 cr)
• GWSS 5103 - Feminist Pedagogies (3.0 cr)

Area II: Social Sciences and Education
Take 1 or more course(s) from the following:
• OLPD 5041 - Sociology of Education (3.0 cr)
• OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
• OLPD 5103 - Comparative Education (3.0 cr)
• OLPD 5128 - Anthropology of Education (3.0 cr)
• OLPD 5302 - Educational Policy: Context, Inquiry, and Issues (3.0 cr)
• OLPD 8002 - Critical Issues in Contemporary Education (3.0 cr)
• OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)

-OR-

Doctoral Students
Area I: History and Philosophy of Education
Take 2 or more course(s) from the following:
• OLPD 5021 - Historical Foundations of Modern Education (3.0 cr)
Area II: Social Sciences and Education

Take 2 or more course(s) from the following:

- GWSS 5103 - Feminist Pedagogies (3.0 cr)
- OLPD 5041 - Sociology of Education (3.0 cr)
- OLPD 5044 - Introduction to the Economics of Education (3.0 cr)
- OLPD 5103 - Comparative Education (3.0 cr)
- OLPD 5128 - Anthropology of Education (3.0 cr)
- OLPD 5302 - Educational Policy: Context, Inquiry, and Issues (3.0 cr)
- OLPD 8002 - Critical Issues in Contemporary Education (3.0 cr)
- OLPD 8104 - Innovative Systems Thinking in Education and Culture (3.0 cr)
Twin Cities Campus
Social Work M.S.W.
School of Social Work
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Social Work, 105 Peters Hall, 1404 Gortner Avenue, St. Paul, MN 55108 (612-625-1220; fax: 612-624-3744)
Email: swadmis@umn.edu
Website: http://cehd.umn.edu/ssw

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 50
- This program does not require summer semesters for timely completion.
- Degree: Master of Social Work

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S.W. prepares students for advanced social work practice. A 50-credit program and a 34-credit advanced standing program are available. The curriculum offers concentrations in direct or community practice.

Accreditation
This program is accredited by Council on Social Work Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An undergraduate degree in a related discipline is not required, however, students with a bachelor's degree in social work from an accredited program are eligible for advanced standing.

A foundation in the liberal arts and one year of work experience in human services is preferred. Work experience may include paid, volunteer, and intern positions.

Special Application Requirements:
in order to apply, applicants are required to submit a specified personal statement, writing sample, resume, transcripts, and three letters of recommendation. All application instructions are posted on the School of Social Work website.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 25 major credits and null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S.W. requires 50 credits; a 34-credit advanced standing program is available to graduates of undergraduate social work programs accredited by the Council on Social Work Education. All credits for the M.S.W. can be completed in two years of full-time study, or three years of part-time study, and must be completed within seven years of the date of the earliest coursework taken for the degree.

The 50-credit program includes a set of required foundation courses (25 cr), courses from a selected concentration, two field internships, and social work electives.

A maximum of 24 credits may be transferred from the following sources with School of Social Work approval: up to 8 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota; up to 24 credits from another regionally and professionally accredited school of social work if the student was registered as a graduate student in the program.

The 34-credit advanced standing program includes courses from a selected concentration, one field internship, and social work electives. A maximum of 16 credits may be transferred from the following sources with School of Social Work approval: 16 credits completed as a graduate student in another accredited M.S.W. program; up to 6 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota.

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Weekend

Students can complete course requirements on Friday evenings and Saturdays, however, some required program components such as field placements take place during workday business hours.
Twin Cities Campus
Social Work Ph.D.
School of Social Work
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Social Work, 105 Peters Hall, 1404 Gortner Avenue, St. Paul, MN  55108 (612-625-1220; fax: 612-624-3744)
Email: swadmis@umn.edu
Website: http://cehd.umn.edu/ssw

• Program Type: Doctorate
• Requirements for this program are current for Fall 2011
• Length of program in credits: 64
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. program in social work prepares students to provide intellectual leadership for the social work profession through advanced levels of scholarship, research, theory development, and policy analysis. Students are expected to acquire skill in research design and statistics and to develop a comprehensive knowledge of social work and social welfare history, theory, and policy.

The Ph.D. program does not focus on the development of advanced skills for clinical practice. However, students gain knowledge of practice theory and research related to social work practice. Many graduates assume positions as university faculty. Consequently, the program offers opportunities for students to acquire skills in teaching and curriculum development.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A master's degree is required.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

The Ph.D. program emphasizes mastery of student- and program-determined objectives rather than an accumulation of course credits. Degree requirements vary according to the student's background and educational goals. Typically 40 credits plus 24 required thesis credits beyond the M.S.W. are required. Required courses include core seminars in social work research, social welfare history, social welfare policy, and theory and model development; a social work teaching course; a supervised research practicum and practicum seminar; supporting program courses; statistics courses. Students must also have teaching experience in the School of Social Work while in the program and fulfill the computer skills requirement.
Twin Cities Campus
Special Education M.Ed.
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 250 Educational Science Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax 612-624-8241)
Email: sped-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych/Programs/SpecialEd/MEd-prospective.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduates of the University of Minnesota special education teacher licensure programs are student-centered, collaborative professionals who deliver robust, high-quality, and specialized educational services, adding value to the learning and development of infants, children, and adults with disabilities from diverse cultural backgrounds.

Program graduates are knowledgeable in the following areas:
- Engaging in collaborative problem solving with families and professionals to meet the academic, social, behavioral, and life skills needs of individuals with disabilities;
- Implementing—and supporting others' implementation of—evidence-based instruction and intervention with fidelity to improve student outcomes;
- Using reliable and valid assessment data to make individualized educational decisions;
- Systematically selecting and adapting instructional supports to meet individual needs, based on data and knowledge of individual learning, developmental, cultural differences;
- Maximizing expectations and learning opportunities for individuals with disabilities in the Least Restrictive using the full continuum of services; and
- Upholding principles of professionalism and ethics in their practice.

Accreditation
This program is accredited by NCATE/BOT, Council of Exceptional Children (CEC) and Council on Education of the Deaf (CED).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Experience in working with children and/or people with disabilities is preferred.

Special Application Requirements:
upload the following additional materials into the appropriate areas of the online application:
- The special education application form
- LD addendum, if applicable
- DD addendum, if applicable
- One to two page applicant statement outlining goals, interests, experiences, etc.
- Résumé
- Two letters of recommendation [.pdf], preferably from individuals in the education field (for the online application, applicant's will be asked to enter recommenders' information into the online application; a message will be automatically sent to those recommenders with
further instructions on how to submit their letters)
- MLTE Basic Skills Tests
- Unofficial transcripts from all collegiate institutions attended (Students who are accepted will need to send official transcripts in a sealed envelope. University of Minnesota graduates need not submit University of Minnesota transcripts to Student Services.)
- International applicants should submit a foreign transcript evaluation from an accredited reviewer (ECS http://www.ece.org/ or WES http://www.wes.org/students/index.asp)

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 16 major credits and 12 credits outside the major. The is no final exam. A capstone project is required.

Capstone Project: A portfolio and integrated paper/mini research project/comprehensive exam is required. The student and her/his adviser will develop the individual's M.Ed. graduate plan. Once the student's project is decided he/she will register for 2-3 credits of EPSY 5991.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

16 credits in Special Education; 12 credits in a related area of study.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Deaf and Hard of Hearing
The professional development program in special education specializing in deaf/hard of hearing leads to K-12 classroom licensure and a M.Ed. degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who are deaf or hard of hearing. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for deaf or hard of hearing students and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Course requirements are determined in consultation with faculty adviser.

Developmental Disabilities
The professional development program in special education specializing in developmental disabilities leads to K-12 classroom licensure and a M.Ed. degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have developmental disabilities. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with developmental disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.
Early Childhood Special Education

The professional development program in special education specializing in early childhood special education (ECSE) leads to teaching licensure for work with children from birth through age five as well as a M.Ed. This program is designed to prepare teachers to work in a variety of educational settings, including home and school, with children who have a variety of developmental delays and disabilities.

The ECSE program philosophy focuses on cultural and social diversity and meeting the needs of individual children who have disabilities. Further, the ECSE program emphasizes the delivery of evidence-based practices within the natural routines of families and preschools when addressing the individualized needs of children. Graduates are prepared to assess, analyze, monitor, and problem solve the developmental and educational needs of young children and their families. With that, graduates of the ECSE program are prepared to be leaders in the field for the identification early intervention needs, provision of research-based services, and facilitation of successful transitions to kindergarten.

Course requirements are determined in consultation with faculty adviser.

Emotional and Behavioral Disabilities

The professional development program in special education specializing in emotional and behavioral disorders leads to K-12 classroom licensure and a M.Ed. degree and is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity and meeting the needs of individual students who have emotional and behavioral disorders. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with emotional and behavioral disorders and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Course requirements are determined in consultation with faculty adviser.

Learning Disabilities

The professional development program in special education specializing in learning disabilities leads to K-12 classroom licensure and a M.Ed. degree. It is designed to prepare teachers to work in a variety of educational settings.

The program philosophy focuses on cultural and social diversity, and meeting the needs of individual students who have learning disabilities. Graduates are prepared to assess, analyze, and problem solve the challenges of learning for students with learning disabilities and their families, focusing on the objective of providing effective teaching practices and instructional strategies.

Course requirements are determined in consultation with faculty adviser.

Teacher Licensure Exempt

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Students in the M.Ed. program in special education who do not hold a valid Minnesota elementary, secondary, or K-12 classroom teaching license must complete additional foundational education coursework to be eligible for a license to teach in their specialization area. This is called the classroom teaching license exemption, and the coursework is in compliance with the exemption requirements of the Minnesota Board of Teaching.
Twin Cities Campus

Specialist in Education and General Education Administration Certificate
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Genl Educ/Admin

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. Our research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), comparative and international development education (CIDE), and work and human resource education (WHRE). Our undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Applications are not accepted for the certificate of specialist in this program. Students in the program are drawn from currently enrolled doctoral students who apply by submitting a Change of Status.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

This program's structure is currently under review.
**Twin Cities Campus**

**Specialist in Education and Special Education Administration Certificate**

**Organizational Leadership, Policy and Development**

**College of Education and Human Development**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: [http://www.cehd.umn.edu/olpd](http://www.cehd.umn.edu/olpd)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Certificate of Specialist in Educ/Genl Educ/Admin

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development prepares administrators, scholars, and analysts for leadership roles in education. The department is committed to the preparation of leaders who can act effectively and ethically within the structures, processes, and cultural contexts of organized education.

The department also offers various certificate programs (including program evaluation, staff development, disability policy and services, and preK-12 administration), an individualized concentration in youth leadership development, and minors in international education, social and philosophic studies of education, and program evaluation. See the department website for details on minors and certificate programs.

These graduate programs incorporate relevant knowledge from the behavioral and social sciences and the humanities, with primary reliance on sociology, management science, political science, psychology, public affairs, economics, philosophy, history, and anthropology.

**Program Delivery**
This program is available:
*via classroom (the majority of instruction is face-to-face)*

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
*GRE*

International applicants must submit score(s) from one of the following tests:
*TOEFL*
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
*IELTS*
  - Total Score: 6.5
*MELAB*
  - Final score: 80

Key to [test abbreviations](#)(GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The specialist certificate requires a minimum of 60 credits: at least 30 credits in educational administration, including 3 credits in leadership and 3 credits in policy; at least 6 credits in curriculum and instruction; at least 9 credits taken outside of educational administration (collateral field) and/or in additional certificate or licensure areas in educational policy and administration; and a course in human relations. Up to 30 credits may be transferred from other programs outside the College of Education and Human Development or from other accredited universities. Registration for OEPD 5385 - Licensure Seminar and OEPD 5386 - Portfolio Seminar plus completion of an electronic portfolio and oral examination are required. The oral is an examination of all program areas as well as of the knowledge, skills, and dispositions for each competency required by the Minnesota Board of School Administrators for licensure as an educational administrator.
Twin Cities Campus

Sport Management M.A.
Kinesiology, School of
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of arts in sport management provides academic excellence by combining theoretical instruction and practical experience to prepare tomorrow's leaders for success in the sports industry and marketplace. Students develop the tools of research and learn core concepts through an interdisciplinary curriculum with an emphasis on cultivating new ideas and improving operations in the sport industry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit a University of Minnesota Graduate School application which includes a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal, quantitative, and analytical writing) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly writing sample; and transcripts. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Typically, students are admitted for the fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Listening Score: 14
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 16 major credits, 10 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 16 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is an independent research project with the adviser that meets the following guidelines: involves a total of approximately 120 hours of work; demonstrates familiarity with the tools of research and scholarship in the field of kinesiology; demonstrates the ability to work independently; demonstrates the ability to effectively present the results of the investigation.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.A. is offered under Plan A and Plan B. Plan A requires 36 credits, including 16 core course credits in kinesiology, 6 research core course credits, 4 elective credits, and 10 thesis credits (8777). The program must include 6 course credits in a minor or related field. Plan B also requires 36 credits, including 16 core course credits in kinesiology, 6 research core course credits, 10 elective credits, and 4 credits of a research project (8995). The program must include 6 course credits in a minor or related field. A GPA of at least 3.00 is required to maintain good standing and to graduate.

Thesis Credits: Master's

Plan A
Take 10 or more credits(s) from the following:
  • KIN 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

-OR-

Plan B
Take 4 or more credits(s) from the following:
  • KIN 8995 - Research Problems in Kinesiology (1.0 - 9.0 cr)
Twin Cities Campus

Sport Management Minor

Kinesiology, School of

College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
School of Kinesiology, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax: 612-626-7700)
Email: kin@umn.edu
Website: http://cehd.umn.edu/kin

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sport management is an interdisciplinary field that provides students with academic training and field experience for careers in sport and fitness management professions. The sport management program encompasses many different subjects, including sociology, business, marketing, communications, and psychology.

Program Delivery
This program is available:
* via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires at least 6 credits of graduate-level sport management courses.
Twin Cities Campus
Talent Development and Gifted Education Postbaccalaureate Certificate
Educational Psychology
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Educational Psychology, 56 East River Road, Minneapolis, MN 55455 (612-624-6083; fax: 612-624-8241)
Email: psyf-adm@umn.edu
Website: http://www.cehd.umn.edu/edpsych

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2011
• Length of program in credits: 12
• This program does not require summer semesters for timely completion.
• Degree: Talent Development/Gifted Education PBac Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This 12-credit certificate program is intended to give teachers, administrators, education professionals, and other individuals with an interest in the education of gifted and talented students the opportunity to obtain the knowledge and skills necessary to develop, implement, and supervise programs in the education of gifted and talented students.

Program Delivery
This program is available:
• primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
Special Application Requirements:
Applicants to this program must have completed a bachelor's degree from an accredited institution. Student applications will be reviewed by a committee of individuals affiliated with the program. Detailed application instructions are available at the program website under the certificates link.

Applicants must submit the following application materials:
- Unofficial transcripts from all post-secondary institutions attended or currently attending, including the University of Minnesota. Transcripts can be uploaded directly into the Apply Yourself online application system (see program website)
- For coursework completed outside of the United States, transcripts must be evaluated by a professional credential evaluation center. Request a 'course-by-course' evaluation. This process can take 4-6 weeks; please plan accordingly. Students can use any provider that is an accredited member of the National Association of Credential Evaluation Services (NACES). A suggested provider is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400, fax: 414-289-3411).
- Answer the following program specific questions on a separate sheet of paper and upload into the online application system: 1) Why are you interested in the talent development and gifted education certificate program? 2) What are your primary areas of interest related to talent development and gifted education?

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Required Courses
EPSY 5101 - Intelligence and Creativity (3.0 cr)
EPSY 5191 - Education of the Gifted and Talented (3.0 cr)
EPSY 5991 - Independent Study in Educational Psychology (1.0 - 8.0 cr)

Elective course
One course (minimum 3 credits) selected with the approval of the certificate program director. Examples include coursework in learning and cognition, social psychology of education, measurement, or coursework in another discipline such as curriculum and instruction, educational administration, child development, or psychology.
Twin Cities Campus
Teaching M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-2545)
Email: cigs@umn.edu
Website: http://www.cehd.umn.edu/CI

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of education (M.Ed.)/initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Accreditation
This program is accredited by Minnesota Board of Teaching and the NCATE (National Council for Accreditation of Teacher Education).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a fully developed knowledge base of the subject area.
- A transcript review can be completed before applying. To have transcript(s) reviewed, please email a copy of all unofficial transcripts to the attention of the Prospective Graduate Student Adviser and Recruiter at the program email address above. Students with completed coursework from outside the United States must arrange for a transcript evaluation.
- Classroom experience with appropriate grade levels-100 paid or unpaid hours
- Cultural and other diversity experience
- Personal statement

Special Application Requirements:
Two letters of recommendation (submitted through the online application system) addressing the applicant's education-related experience, work style, and personal attributes. Include at least one letter from a K-12 site supervisor listed on the résumé.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Coursework

EDHD 5001 - Learning, Cognition, and Assessment (3.0 cr)
EDHD 5003 - Developmental and Individual Differences in Educational Contexts (2.0 cr)
EDHD 5004 - Teaching Students With Special Needs in Inclusive Settings (2.0 cr)
EDHD 5005 - School and Society (2.0 cr)
EDHD 5007 - Technology for Teaching and Learning (1.5 cr)
EDHD 5009 - Human Relations: Applied Skills for School and Society (1.0 cr)
PUBH 6003 - Fundamentals of Alcohol and Drug Abuse for Teacher Education (1.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Arabic
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework

CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)
CI 5699 Clinical Experiences in Second Languages.
LING 5001 - Introduction to Linguistics (4.0 cr)
or LING 3001 - Introduction to Linguistics [SOC 5] (4.0 cr)
CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
CI 5641 - Language, Culture, and Education (3.0 cr)
CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Art
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The art education initial licensure program at the University of Minnesota is designed to help students become inquiring, analytical, and reflective professional educators who can help all students understand and appreciate art. The program seeks to develop thoughtful practitioners who are enthusiastic about and prepared for leadership roles in the schools. Master of education (M.Ed.)/initial licensure
programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
- CI 5078 - Application of Aesthetic Theory in Education (2.0 cr)
- CI 5069 - Curriculum Innovations in Art Education (3.0 cr)
- CI 5065 - Improving Art Programs in the Schools (3.0 cr)
- CI 5096 - Art Education: Practicum (1.0 - 6.0 cr)
- EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5008 - Theory and Practice of Teaching Art in Elementary Schools (1.0 - 2.0 cr)
- CI 5097 - Student Teaching in Art Education (8.0 cr)
- CI 5049 - Art Media Techniques (1.0 - 4.0 cr)

Chemistry
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence. The college offers a solid mix of theory and practice, as well as all of the resources that come with studying at a top research institution. M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers.

Required Coursework
- EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5530 - Secondary Science Teaching: Laboratory-based Instruction (3.0 cr)
- CI 5531 - Teaching Middle School Science (3.0 cr)
- CI 5596 - Clinical Experience in Middle School Science (4.0 cr)
- CI 5532 - Teaching Secondary School Science (3.0 cr)
- CI 5597 - Clinical Experience in Secondary School Science Teaching (4.0 - 8.0 cr)

Take 12 or more credits from the following:
- CI 5533 - Current Developments in Science Teaching (3.0 cr)
- CI 5535 - Foundations of Science Education (3.0 cr)
- CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)
- CI 5539 - Improving Secondary Science Instruction: Surviving the First Two Years (3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)

Chinese
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Course Group 0
- CI 5452 Reading in the Content Areas for Initial Licensure Candidates.
- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
- CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)
- CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
- CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
- CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)
- LING 3001 - Introduction to Linguistics [SOCS] (4.0 cr)
- or LING 5001 - Introduction to Linguistics (4.0 cr)

Three graduate credits on a topic approved by SLC faculty, recommended courses include:
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
Earth Science
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence, by taking advantage of the college's solid mix of theory and practice, as well as all the resources that come with studying at a top research institution. M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
- CI 5530 - Secondary Science Teaching: Laboratory-based Instruction (3.0 cr)
- EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5531 - Teaching Middle School Science (3.0 cr)
- CI 5596 - Clinical Experience in Middle School Science (4.0 cr)
- CI 5532 - Teaching Secondary School Science (3.0 cr)
- CI 5597 - Clinical Experience in Secondary School Science Teaching (4.0 - 8.0 cr)
- • CI 5533 - Current Developments in Science Teaching (3.0 cr)
- • CI 5535 - Foundations of Science Education (3.0 cr)
- • CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)
- • CI 5539 - Improving Secondary Science Instruction: Surviving the First Two Years (3.0 cr)
- • CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)

Elementary
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The elementary education initial licensure program is designed to help students become inquiring, analytical, and reflective professional educators who can help students succeed in school. The program also seeks to develop thoughtful practitioners who are enthusiastic about and prepared for leadership roles in the schools. The M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with the Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
- CI 5111 - Introduction to Elementary School Teaching (3.0 cr)
- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5426 - Language Arts Instruction in the Elementary Grades (3.0 cr)
- CI 5402 - Science Instruction in the Elementary Grades (3.0 cr)
- CI 5702 - Social Studies Instruction in the Elementary Grades (3.0 cr)
- CI 5822 - Mathematics Instruction in the Elementary Grades (3.0 cr)
- CI 5645 - Teaching English Learners in the Elementary Classroom (3.0 cr)
- CI 5285 - Clinical Experience in Elementary School Teaching (12.0 cr)
- CI 5286 - Student Teaching Seminar: Elementary Education (3.0 cr)
- CI 5287 - Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools (3.0 cr)

English
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The English education initial licensure program is designed to develop inquiring, analytical, and reflective professional educators prepared to teach in the classroom and lead in the schools. These educators can help students succeed in mastering a wide range of written and spoken communication skills.

The M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
- CI 5441 - Teaching Literature in the Secondary School (2.0 - 3.0 cr)
- CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
- CI 5461 - Teaching Composition in the Secondary School (2.0 cr)
- CI 5481 - Developments in Teaching English and Speech (3.0 cr)
- CI 5496 - Directed Experiences in Teaching English (8.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
Take 12 or more credits(s) from the following:

- CI 5472 - Teaching Film, Television, and Media Studies (3.0 cr)
- CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
- CI 5422 - Teaching Writing in Schools (3.0 cr)
- CI 5462 - Evaluating and Assessing Writing (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5442 - Literature for Adolescents (3.0 cr)
- CI 5475 - Teaching Digital Writing: Blogs, Wikis, Online Talk, Podcasting, and E-Portfolios to Teach Writing (3.0 cr)

**English as a Second Language**

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching—a nationally recognized approach to teacher education.

### Required Coursework

- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- CI 5425 - Reading Instruction in the Elementary Grades (3.0 cr)
- CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
- CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)
- CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
- CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
- CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)
- CI 3001 - Survey of Art Activities (2.0 cr)
- or LING 5001 - Introduction to Linguistics (4.0 cr)

Three graduate credits on a topic approved by SLC faculty, recommended courses included below.

Take 3 or more credits(s) from the following:

- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

### French

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching—a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

### Required Coursework

- LING 5001 - Introduction to Linguistics (4.0 cr)
- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
- CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)
- CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
- CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
- CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

### Other Coursework

Graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits(s) from the following:
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

**General Science**

Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence, taking advantage of the college's solid mix of theory and practice, as well as all the resources that come with studying at a top research institution. The M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

**Required Coursework**

- CI 5530 - Secondary Science Teaching: Laboratory-based Instruction (3.0 cr)
- EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5531 - Teaching Middle School Science (3.0 cr)
- CI 5596 - Clinical Experience in Middle School Science (4.0 cr)
- CI 5532 - Teaching Secondary School Science (3.0 cr)
- CI 5597 - Clinical Experience in Secondary School Science Teaching (4.0 - 8.0 cr)

**Topic Courses**

Three graduate credits on a topic approved by SLC faculty, recommended courses include:

Take 3 or more credits(s) from the following:
- CI 5533 - Current Developments in Science Teaching (3.0 cr)
- CI 5535 - Foundations of Science Education (3.0 cr)
- CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)
- CI 5539 - Improving Secondary Science Instruction: Surviving the First Two Years (3.0 cr)
- CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)

**German**

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

**Required Coursework**

- LING 5001 - Introduction to Linguistics (4.0 cr)
- CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
- EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
- CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
- CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)
- CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
- CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
- CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

**Topic Coursework**

Three graduate credits on a topic approved by SLC faculty, recommended courses include:

Take 3 or more credits(s) from the following:
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
Hebrew

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework

LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5654 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Topic Coursework

Three graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits from the following:
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Japanese

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework

LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Topic Coursework

Three graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits from the following:
- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5646 - English Grammar for ESL Teachers (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
- CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
- CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
- LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
- CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)
Italian
The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help
enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of
world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and
practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following
licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish,
Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal
aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew,
Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must
obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework
LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Topic Coursework
Three graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits(s) from the following:
• CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
• CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
• CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
• CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Latin
The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help
enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of
world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and
practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following
licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish,
Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal
aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew,
Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must
obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework
LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Topic Coursework
Three graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits(s) from the following:
• CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
• CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
• CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
• CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)

Life Science
Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence, taking advantage of the college's solid mix of theory and practice, as well as all the resources that come with studying at a top research institution. M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
CI 5530 - Secondary Science Teaching: Laboratory-based Instruction (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5531 - Teaching Middle School Science (3.0 cr)
CI 5596 - Clinical Experience in Middle School Science (4.0 cr)
CI 5532 - Teaching Secondary School Science (3.0 cr)
CI 5597 - Clinical Experience in Secondary School Science Teaching (4.0 - 8.0 cr)

Other Coursework
Take 12 or more credits(s) from the following:
• CI 5533 - Current Developments in Science Teaching (3.0 cr)
• CI 5535 - Foundations of Science Education (3.0 cr)
• CI 5536 - Equity, Policy, and Assessment in Science Education (3.0 cr)
• CI 5539 - Improving Secondary Science Instruction: Surviving the First Two Years (3.0 cr)
• CI 5540 - Special Topics: Science Education (1.0 - 8.0 cr)

Mathematics
The mathematics education initial licensure program at the University of Minnesota is designed to help students become accomplished professional mathematics educators, and inquiring, analytical, and reflective professional educators prepared to teach in the classroom and lead in the schools.

The M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
MTHE 5011 - Arithmetic Structures in School Mathematics (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
MTHE 5021 - Algebraic Structures in School Mathematics (3.0 cr)
MTHE 5031 - Geometric Structures in School Mathematics (3.0 cr)
MTHE 5696 - Student Teaching in Mathematics (1.0 - 8.0 cr)
MTHE 5314 - Teaching and Learning Mathematics (3.0 cr)
MTHE 5366 - Technology-Assisted Mathematics Instruction (3.0 cr)
MTHE 5993 - Directed Studies in Mathematics Education (2.0 cr)

Other Coursework
Take 3 or more credits(s) from the following:
• MTHE 5100 - Topics in Mathematics Education (1.0 - 6.0 cr)
• MTHE 5155 - Rational Number Concepts and Proportionality (3.0 cr)
• MTHE 5171 - Teaching Problem Solving (3.0 cr)
• MTHE 5172 - Teaching Probability and Statistics (3.0 cr)

Norwegian
The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew,
Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

**Required Coursework**

**LING 5001 - Introduction to Linguistics (4.0 cr)**
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

**Topic Coursework**

Graduate credits on a topic approved by SLC faculty, recommended courses include:

Take 3 or more credits from the following:

- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

**Ojibwe**

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrollees become accomplished second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

**Required Coursework**

LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

**Topic Coursework**

Graduate credits on a topic approved by SLC faculty, recommended courses include:

Take 3 or more credits from the following:

- CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- CI 5641 - Language, Culture, and Education (3.0 cr)
- CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

**Physics**

Science teachers are in high demand, and this program will prepare students to step into the classroom with confidence, taking advantage of the college's solid mix of theory and practice, as well as all the resources that come with studying at a top research institution. The M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous, professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.
Required Coursework

**CI 5530** - Secondary Science Teaching: Laboratory-based Instruction (3.0 cr)
**EDHD 5008** - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
**CI 5531** - Teaching Middle School Science (3.0 cr)
**CI 5596** - Clinical Experience in Middle School Science (4.0 cr)
**CI 5532** - Teaching Secondary School Science (3.0 cr)
**CI 5597** - Clinical Experience in Secondary School Science Teaching (4.0 - 8.0 cr)

Other Coursework

Take 12 or more credits(s) from the following:
- **CI 5533** - Current Developments in Science Teaching (3.0 cr)
- **CI 5535** - Foundations of Science Education (3.0 cr)
- **CI 5536** - Equity, Policy, and Assessment in Science Education (3.0 cr)
- **CI 5539** - Improving Secondary Science Instruction: Surviving the First Two Years (3.0 cr)
- **CI 5540** - Special Topics: Science Education (1.0 - 8.0 cr)

Polish

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework

**LING 5001** - Introduction to Linguistics (4.0 cr)
**CI 5620** - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
**EDHD 5008** - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
**CI 5631** - Second Language Curriculum Development and Assessment (3.0 cr)
**CI 5632** - Literacy and Language Development in Second Language Classrooms (3.0 cr)
**CI 5646** - English Grammar for ESL Teachers (3.0 cr)
**CI 5699** - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
**CI 5634** - Content-Based Instruction in Second Language Settings (3.0 cr)
**CI 5635** - Culture and Diversity in Second Language Classrooms (3.0 cr)
**LGTT 5101** - Applications of Technology in Language Teaching (3.0 cr)
**CI 5696** - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Other Coursework

Take 3 or more credits(s) from the following:
- **CI 5619** - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- **CI 5641** - Language, Culture, and Education (3.0 cr)
- **CI 5647** - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- **CI 5657** - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- **CI 5660** - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Russian

The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework

**LING 5001** - Introduction to Linguistics (4.0 cr)
Cl 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
Cl 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
Cl 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
Cl 5646 - English Grammar for ESL Teachers (3.0 cr)
Cl 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
Cl 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
Cl 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGT 5101 - Applications of Technology in Language Teaching (3.0 cr)
Cl 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Other Coursework
Graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits from the following:
- Cl 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- Cl 5641 - Language, Culture, and Education (3.0 cr)
- Cl 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- Cl 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- Cl 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Second Languages and Culture
The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following languages are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework
LING 5001 - Introduction to Linguistics (4.0 cr)
Cl 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
Cl 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
Cl 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
Cl 5646 - English Grammar for ESL Teachers (3.0 cr)
Cl 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
Cl 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
Cl 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGT 5101 - Applications of Technology in Language Teaching (3.0 cr)
Cl 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Other Coursework
Graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits from the following:
- Cl 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
- Cl 5641 - Language, Culture, and Education (3.0 cr)
- Cl 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
- Cl 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
- Cl 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Social Studies
The social studies education initial licensure program is designed to help students become an inquiring, analytical, and reflective professional educators prepared to teach in grades 5-12 classrooms and lead in the schools. The program seeks to develop educators who are advocates for young people and the social studies, and can help youth to become thoughtful and active citizens in a culturally diverse, democratic society.

The M.Ed./initial licensure programs are for individuals with bachelor's degrees who want to become licensed teachers. These graduate-level programs provide rigorous professional teacher preparation in accordance with Standards of Effective Practice for Teachers (SEPT) and content standards adopted by the Minnesota Board of Teaching.

Required Coursework
CI 5741 - Introduction to Social Studies Education (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5742 - Advanced Methods of Teaching the Social Studies (3.0 cr)
CI 5743 - The Social Sciences and the Social Studies (3.0 cr)
CI 5792 - Clinical Experiences in Teaching Social Studies (1.0 - 8.0 cr)
CI 5744 - Seminar: Reflecting on Professional Development in Social Studies Education (3.0 cr)
CI 5745 - Engaging Youth With Social Studies Texts (3.0 cr)
CI 5746 - Global and Multicultural Education in the Secondary Classroom (3.0 cr)

Spanish
The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework
LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Other Coursework
Graduate credits on a topic approved by SLC faculty, recommended courses include:
Take 3 or more credits(s) from the following:
• CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
• CI 5641 - Language, Culture, and Education (3.0 cr)
• CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
• CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
• CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)

Swedish
The second languages and cultures education (SLC) initial licensure program at the University of Minnesota is designed to help enrolled students become accomplished professional second language educators for grades K-12. The program integrates the fields of world languages and English as a Second Language (ESL), enabling teachers from both fields to learn from each other. Theory and practice are also linked through concurrent coursework and student teaching, a nationally recognized approach to teacher education.

Native speakers of English who are seeking licensure in a world language must demonstrate proficiency in that language. The following licensure options are available: Arabic, Chinese, French, German, Hebrew, Italian, Japanese, Latin, Norwegian, Ojibwe, Polish, Russian, Spanish, and Swedish. Candidates must have advanced proficiency in the language and an understanding of the formal aspects of the language, such as grammar and writing. Nonnative speakers of Arabic, Mandarin Chinese, French, German, Hebrew, Italian, Japanese, Norwegian, Polish, Russian, Spanish, or Swedish who are seeking a K-12 license in any of these languages must obtain a score of at least "advanced low" on the Oral Proficiency Interview (OPI).

Required Coursework
LING 5001 - Introduction to Linguistics (4.0 cr)
CI 5620 - Introduction to Second Language Acquisition for Language Teachers (3.0 cr)
EDHD 5008 - Reading in the Content Areas for Initial Licensure Candidates (1.0 - 2.0 cr)
CI 5631 - Second Language Curriculum Development and Assessment (3.0 cr)
CI 5632 - Literacy and Language Development in Second Language Classrooms (3.0 cr)
CI 5646 - English Grammar for ESL Teachers (3.0 cr)
CI 5699 - Clinical Experiences in Second Languages (3.0 - 12.0 cr)
CI 5634 - Content-Based Instruction in Second Language Settings (3.0 cr)
CI 5635 - Culture and Diversity in Second Language Classrooms (3.0 cr)
LGT 5101 - Applications of Technology in Language Teaching (3.0 cr)
CI 5696 - Practicum: Teaching World Languages and Cultures in Elementary Schools (2.0 - 6.0 cr)

Other Coursework
Graduate credits on a topic approved by SLC faculty, recommended courses are listed below:
  Take 3 or more credits from the following:
  - CI 5619 - Teaching World Languages and Cultures in Elementary Settings (3.0 cr)
  - CI 5641 - Language, Culture, and Education (3.0 cr)
  - CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
  - CI 5657 - Teaching Speaking and Listening in Second Language Classrooms (3.0 cr)
  - CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
Twin Cities Campus

Teaching Writing and Critical Literacy Postbaccalaureate Certificate

Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-4006)
Email: ciinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Teaching, Writing & Critical Literacy PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in teaching writing and critical literacy prepares preK-college educators to strengthen their skills and knowledge of current practice and research in the teaching of critical reading and writing. The certificate is a 15-credit program for degree-seeking and non-degree seeking students.

Writing and reading complement one another, and their interconnectedness is critical to literacy instruction. This certificate will offer advanced knowledge of the teaching of literacy through a focused, rigorous program while developing practicing educators’ skills as teachers and writers in a supportive learning community.

Changing literacy needs of students from all socioeconomic and educational backgrounds demand highly qualified teachers of reading and writing at the K-12 and postsecondary levels. Educators must prepare K-12 students to meet testing requirements at the state and national levels. In addition, teachers must meet the increasing literacy needs that accompany Minnesota’s changing demographics of growing immigrant and English language learner (ELL) populations. Educators also must prepare students to communicate effectively by using new technologies.

The certificate program seeks to accomplish the following goals:
- Develop effective strategies for teaching the writing process to English-language learners and diverse populations, as well as reading and writing across the curriculum
- Engage educators in current research about composition, reading, and learning theory
- Create learning communities where educators reflect on their own teaching, reading, and writing
- Give educators opportunities to learn from other practicing educators

This program begins with a three-week, three-credit Minnesota Writing Project (MWP) Invitational Institute and then extends to allow educators to choose from a wider range of courses from multiple University departments throughout the academic year.

Educators will have seven years to complete the certificate, beginning with the first coursework completed for the program, and must maintain a 2.80 overall grade point average (GPA).

This interdisciplinary certificate includes coursework from the departments of Curriculum and Instruction (C&I); English; Writing Studies; Institute of Linguistics, English as a Second Language, and Slavic Languages and Literatures (ILES); and the Center for Writing.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must be licensed teachers or administrators. Non-licensed teachers may be admitted with faculty letters of recommendation if program space is available.
Submit the following application materials:
- A completed application form [.pdf; download and complete]
- Copies of all postsecondary transcripts. Unofficial copies of transcripts are acceptable.
- A résumé
- A statement of purpose that explains the relationship of courses and research completed to professional goals (suggested length: two pages)
- Two letters of recommendation addressing teaching accomplishments and potential for further study

International applicants must submit score(s) from one of the following tests:

• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

• IELTS
  - Total Score: 6.5

• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required Coursework
CI 5463 - Minnesota Writing Project Annual Invitational Summer Institute (3.0 cr)
CI 5469 - Minnesota Writing Project Directed Studies (1.0 - 3.0 cr)
Students also complete one of the following courses in the teaching of reading and/or writing courses.
  CI 5442 - Literature for Adolescents (3.0 cr)
  or CI 5451 - Teaching Reading in Middle and Secondary Grades (3.0 cr)
  or CI 5462 - Evaluating and Assessing Writing (3.0 cr)
Two additional courses appropriate for educators in the certificate are required and will come from a wide range of course designators listed below. Available regular offerings, and topics courses and program seminars will vary from year to year, and will change as the relevant fields create new areas of inquiry.
  CI 5145 - Critical Pedagogy (3.0 cr)
  or CI 5177 - Practical Research (3.0 cr)
  or CI 5404 - Culturally Diverse Books for Children and Adolescents (3.0 cr)
  or CI 5410 - Special Topics in the Teaching of Literacy (1.0 - 3.0 cr)
  or CI 5411 - Teaching Reading in the Elementary School (3.0 cr)
  or CI 5417 - Elementary literacy Instruction for ESL Students (3.0 cr)
  or CI 5442 - Literature for Adolescents (3.0 cr)
  or CI 5462 - Evaluating and Assessing Writing (3.0 cr)
  or CI 5475 - Teaching Digital Writing: Blogs, Wikis, Online Talk, Podcasting, and E-Portfolios to Teach Writing (3.0 cr)
  or CI 5647 - Teaching Middle and Secondary Immigrant and Refugee Students With Limited Formal Schooling (3.0 cr)
  or CI 5660 - Special Topics in the Teaching of Second Languages and Cultures (1.0 - 4.0 cr)
  or EPSY 5612 - Understanding of Academic Disabilities (3.0 cr)
  or EPSY 5615 - Advanced Academic Interventions (3.0 cr)
  or EPSY 5644 - Language Development and Programming for Deaf/Hard of Hearing Children (3.0 cr)
  or EPSY 5646 - Reading and Writing Practices with Deaf/Hard of Hearing Children (3.0 cr)
  or EPSY 5618 - Specialized Interventions for Students With Disabilities in Reading and Written Language (3.0 cr)
  or EPSY 8117 - Writing Empirical Paper and Research/Grant Proposals in Education and Psychology (3.0 cr)
  or ENGL 5630 - Theories of Writing and Writing Instruction (3.0 cr)
  or ENGL 5790 - Topics in Rhetoric, Composition, and Language (3.0 cr)
  or LGTT 5101 - Applications of Technology in Language Teaching (3.0 cr)
  or LING 4002 - Linguistic Analysis (3.0 cr)
or LING 5001 - Introduction to Linguistics (4.0 cr)
or LING 5461 - Conversation Analysis (3.0 cr)
or LING 5900 - Topics in Linguistics (1.0 - 4.0 cr)
or WRIT 5531 - Introduction to Writing Theory and Pedagogy (3.0 cr)
or WRIT 5664 - Science Writing for Popular Audiences (3.0 cr)
or SLS 5101 - Academic Writing in TESOL (1.0 cr)
or SLS 5401 - Language Analysis for Teachers of English as a Second Language (4.0 cr)
or SLS 5721 - Methods in Teaching English as a Second Language (3.0 cr)
or OLPD 5814 - Developmental Writing and the College Student: Theory and Practice (3.0 cr)
or CI 5147 - Language, Culture, and Education.
or EPSY 8116 - Reading for Meaning: Cognitive Processes in the Comprehension of Texts.
Twin Cities Campus
Technology Enhanced Learning: K-12 Technology Integration Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-4006)
Email: ciinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Spring 2013
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: T E L: K-12 Technology Integration PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The K-12 technology integration certificate program prepares students to use technology (computers and the web) to develop instructional materials for use in a wide range of educational contexts. The program is designed for K-12 teachers or administrators interested in using technology in the classroom.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must hold a bachelor's degree from an accredited college or university, or be currently enrolled in a University of Minnesota graduate-level degree program.

Applicants must submit the following online:
- Unofficial transcripts from all post-secondary institutions that have been attended or are currently being attended, except the University of Minnesota
- A one page goal statement
For complete application instructions, please see the program’s website.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Transfer credits may not be applied to this certificate program.
Certificate coursework completed as an undergraduate student cannot be applied to graduate level degree programs.

Required Coursework
- CI 5337 - Planning for K-12 Technology Design and Integration (3.0 cr)
- CI 5344 - Facilitating Technology Integration in Classrooms I (1.0 cr)
- CI 5351 - Technology Tools for Educators (3.0 cr)
- CI 5361 - Teaching and Learning with the Internet (3.0 cr)
Technology Enhanced Learning: Multimedia Design and Development
Postbaccalaureate Certificate
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-4006)
Email: ciinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Spring 2013
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: TEL: Multimedia Design & Dev PBacc Cert Grad

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This certificate program in technology enhanced learning (TEL) prepares students to use technology (computers and the Internet) to develop instructional materials for use in a wide range of educational and training contexts. The program is designed for K-12 teachers, higher education instructors, corporate trainers, and other professionals interested in using technology to support instruction.

Coursework focuses primarily on production and design of electronic educational software for use in education and training contexts. Courses are offered at the University of Minnesota at a variety of times, including late afternoons and Saturdays. Courses are also offered during the summer and, occasionally, at off-campus sites.

The multimedia design and development program is one of three TEL certificates offered by the college's Department of Curriculum and Instruction (C&I). TEL certificates in K-12 technology integration and online distance learning are also available.

Because TEL certificate requirements can be incorporated into the master of education (M.Ed.)/professional studies program in learning technologies, students can earn a certificate while earning the M.Ed. degree. However, students not admitted to the M.Ed. program can earn a certificate separately.

This program is available partially online. Depending on the semester and preference of the learner, between 30 to 50 percent of the program is available online.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Program admission is available to graduate-level students only; a completed bachelor's degree is required.

Applicants must submit the following application materials:
- Unofficial transcripts from all post-secondary institutions that have been or are currently being attended, except from the University of Minnesota
- A one-page goal statement

For complete application instructions, please see the program's website.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Certificate coursework completed with undergraduate student status cannot be applied to graduate-level degree programs.

Transfer credits may not be applied to this certificate program.

Required Coursework

- CI 5362 - Foundations of Interactive Design for Web-based Learning (3.0 cr)
- CI 5363 - New Media and Interaction Design for Web-based Learning (3.0 cr)
- CI 5336 - Planning for Multimedia Design and Development (3.0 cr)
- CI 5367 - Interactive Multimedia Instruction (3.0 cr)
Twin Cities Campus

Work and Human Resource Education Ed.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 74
- This program does not require summer semesters for timely completion.
- Courses in this program are taught in the Twin Cities and Rochester campuses (Adult Education and Human Resource Development specializations only).
- Degree: Doctor of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. The department's research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), comparative and international development education (CIDE), and work and human resource education (WHRE). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program offers specializations in adult education; agricultural, food, and environmental education; human resource development; and comprehensive work and human resources education. Students combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of work and community education; social, economic, historical, political, cultural, educational, technological, and psychological contexts within which work and community education exist; and types of research that contribute to or apply that knowledge to the specialization.

Special Application Requirements:
Prospective doctoral degree students should have academic background and experience in at least one specialization area.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 450
  - General Test - Quantitative Reasoning: 450
  - General Test - Analytical Writing: 3

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
38 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A written preliminary exam in each of the program areas (general aspects, research, and specialization) and a final oral exam are required.

The Ed.D. requires 60 course credits and 24 field study credits (thesis credits). Course credits include a minimum of 22 credits in the department core, which includes a minimum of 15 credits in research, and a minimum of 28 credits in the program core, 4 of which must be internship credits. Course credits must also include 12 credits from outside the department, which may overlap with those in the department and program cores.
Twin Cities Campus

Work and Human Resource Education M.A.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30 to 34
- This program does not require summer semesters for timely completion.
- Courses in this program are taught primarily in the Twin Cities campus, but some classes may be taught on UM-Rochester campus from time to time.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. The department's research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe.

Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), comparative and international development education (CIDE), and work and human resource education (WHRE). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

The program offers specializations in adult education; agricultural, food, and environmental education; human resource development; and comprehensive work and human resources education. The business and industry education specialization is no longer taking new students.

Students combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of work and community education; social, economic, historical, political, cultural, educational, technological, and psychological contexts within which work and community education exist; and types of research that contribute to or apply that knowledge to the specialization.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Prospective master's students generally have completed an undergraduate degree or extensive coursework in the specialization area.

Prospective doctoral degree students should have academic background and experience in at least one specialization area.

Special Application Requirements:
Scores from the GRE General Test are required for applicants with a bachelor's degree from a U.S. institution. Applicants should designate the specific specialization to which they seek admission in their goal statement. A current résumé is required. Students are admitted each fall and spring.
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 to 20 major credits and 10 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.A. is offered under Plan A and Plan B. Students in either plan complete a minimum of 30 to 34 credits of 5xxx courses, including 14 credits in the major and 6 credits in the related field. Plan A students also take 10 thesis credits; Plan B students complete a 3- to 6-credit project or paper, with remaining credits taken in either the major or related field.
Twin Cities Campus

Work and Human Resource Education M.Ed.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd/

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. The department's research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), comparative and international development education (CIDE), and work and human resource education (WHRE). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

Professional experience in a work and human resource education field or an undergraduate major in education with an appropriate content field.

Special Application Requirements:
Applicants are required to submit a resume and personal statement describing career goals and rationale for interest in the M.Ed. program (limit two pages) along with the application.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations: (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework

OLPD 5819 - Evaluating and Using Research in Organizations and Education (3.0 cr)
OLPD 5893 - Directed Study in WHRE (1.0 - 4.0 cr)
OLPD 5806 - Philosophy and Practice of Career and Technical Education (2.0 cr)
  or OLPD 5811 - Education for Work (3.0 cr)
  or OLPD 5823 - Work-Based Learning Policies (2.0 cr)
  or OLPD 5813 - Enhancing Work-based Learning Through Collaboration (2.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Comprehensive Work and Human Resource Education

Morris

Rochester

Requirements for this sub-plan are the same as those listed in general description. Students may take courses on the Twin Cities or Rochester campuses.
Twin Cities Campus

Work and Human Resource Education Ph.D.
Organizational Leadership, Policy and Development
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Organizational Leadership, Policy, and Development, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455
(612-624-1006; fax: 612-624-3377)
Email: olpd@umn.edu
Website: http://www.cehd.umn.edu/olpd

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 74
- This program does not require summer semesters for timely completion.
- Rochester (Adult Education and Human Resource Development specializations only).
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Organizational Leadership, Policy, and Development is a leader in advancing knowledge about educational and organizational change in local, national, and international contexts. The department's research, teaching, and outreach reflect a commitment to interdisciplinary and intercultural engagement with educators, scholars, and policy makers seeking to enhance leadership, policy, and development around the globe. Students in the M.A. and Ph.D. programs choose from one of five complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), comparative and international development education (CIDE), and work and human resource education (WHRE). Undergraduate programs focus on human resource development and business and marketing education. In addition, the department offers a variety of programs for practicing professionals and various licensure programs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the Ph.D. program should have a U.S. master's degree or international equivalent.

The program offers specializations in adult education; agricultural, food, and environmental education; human resource development; and comprehensive work and human resources education. Students combine study and related experiences to develop, apply, analyze, synthesize, and evaluate knowledge of the purposes, practices, issues, and problems of work and community education; social, economic, historical, political, cultural, educational, technological, and psychological contexts within which work and community education exist; and types of research that contribute to or apply that knowledge to the specialization.

Prospective doctoral degree students should have academic background and experience in at least one specialization area.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 450
  - General Test - Quantitative Reasoning: 450
  - General Test - Analytical Writing: 3

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
38 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. requires 60 course credits and 24 thesis credits. Course credits include a minimum of 22 credits in the department core with a minimum of 15 credits in research, and a minimum of 31 credits in the program core. Course credits must also include two graduate-level statistics courses and 12 credits from outside the department, which may overlap with those in the department and program cores.
Youth Development Leadership M.Ed.
Curriculum & Instruction
College of Education and Human Development

Link to a list of faculty for this program.

Contact Information:
Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-4006)
Email: ciinfo@umn.edu
Website: http://www.cehd.umn.edu/ci

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Education

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Youth development leadership (YDL) is a graduate degree offered for people who work with youth in traditional and nontraditional settings, and who are committed to the healthy development of young people. Effectiveness depends upon keeping up with the challenges facing today's youth, which requires continual learning and professional growth. This degree is an excellent career opportunity for anyone working with youth, regardless of his or her previous academic background.

The M.Ed. in youth development leadership emphasizes:
- a community-based model of positive youth development;
- experiential learning models;
- leadership and community building by encouraging consultation among faculty, professional youth workers, fellow students, and young people;
- diverse, flexible, and interdisciplinary faculty and curriculum that provide an informed understanding of practices, policies, and ethics of youth development work;
- positive professional development;
- collaborative approach to learning;
- interdisciplinary curriculum;
- cohort of other youth work professionals, for supportive learning environment;
- diverse faculty dedicated to healthy youth development and committed to helping students develop a course of study that meets their professional and personal needs and interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A bachelor's degree from an accredited institution.

At least two years of experience working with youth.

Special Application Requirements:
All applicants must submit the following items:
- Official transcripts from all post-secondary institutions attended or currently attending, except the University of Minnesota. Transcripts must be received from the issuing school in a sealed and stamped envelope, and mailed to CEHD Student Services, 360 Education Sciences Bldg. 56 East River Road, Minneapolis, MN 55455.
- Any student with a U.S. bachelor's degree or a comparable foreign degree from an accredited college or university may apply to CEHD. Official transcripts of all previous post-secondary academic study must be submitted. Transcripts from coursework completed at a university outside of the United States must be evaluated by a professional credential evaluation center. Request a course-by-course evaluation. This process can take four-six weeks; please plan in advance. A suggested provider of this service is Educational Credential Evaluators (ECE), P.O. Box 514070, Milwaukee, WI 53203-3470 (414-289-3400, fax: 414-289-3411).
All applicants must upload or submit the following items with their online applications:
- Résumé
- Personal statement describing career goals and rationale for interest in the M.Ed. program (limit two pages)
- Letters of recommendation from at least two persons (e.g., administrators, colleagues, instructors) familiar with the applicant's performance who can attest to his or her capacity for youth development leadership
- Application fee of $55, charged when the online application is submitted. Fee must be paid with a credit card.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 20 major credits and 10 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The portfolio is a demonstration and personal assessment of individual learning and leadership in youth development work and in the YDL program. Successful completion of the portfolio presentation is the final requirement of the YDL program.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework

- YOST 5952 - Everyday Lives of Youth (3.0 cr)
- YOST 5954 - Experiential Learning: Pedagogy for Community and Classroom (3.0 cr)
- YOST 5956 - Organizational Approaches to Youth Development (3.0 cr)
- YOST 5958 - Community: Context for Youth Development Leadership (3.0 cr)
- YOST 5960 - Seminar in Youth Development Leadership (1.0 - 4.0 cr)
- YOST 5962 - Leadership Field Experience: Youth Development (4.0 cr)

Elective Credits

10 or more elective credits must be selected with approval of faculty adviser.
Twin Cities Campus
Animal Sciences M.S.
Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/gradprogram/index.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the animal sciences M.S. concentrate on one of the animal sciences subdisciplines: genetics, growth biology, nutrition, physiology, or production systems. Students have the option of tailoring their individual programs to include study in more than one subdiscipline and to emphasize basic or applied science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project requires approximately 120 hours to complete. The nature and extent of the project is agreed upon in advance by the student and faculty adviser.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Plan A requires a minimum of 14 semester credits in the major and 6 credits in a designated minor or related field outside the major. Selection of courses to fulfill this requirement and development of the thesis project are primarily the responsibility of the student and faculty adviser. Students also must register for a minimum of 10 thesis credits. An official program of study, listing coursework to be completed and a thesis title, is submitted to a Graduate Studies Committee and the director of the animal sciences graduate program for review and then forwarded to the Graduate School for approval.

Plan B requires a minimum of 30 credits, which must include 14 or more credits in the major area and at least 6 credits in one or more related fields outside the major. The balance of credits is chosen by agreement between the adviser and student. In addition to coursework, students must complete the Plan B Capstone Project, which requires approximately 120 hours. The nature and extent of the project is agreed upon in advance by the student and faculty adviser.
Twin Cities Campus
Animal Sciences Minor
Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/gradprogram/index.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students pursuing a minor in animal sciences concentrate on one of the animal sciences subdisciplines: genetics, growth biology, nutrition, physiology, or production systems. Students have the option of tailoring their program to include study in more than one subdiscipline and to emphasize basic or applied science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Requirements are designed to fit the student's needs. A master's minor requires 6 credits in areas not closely related to the major; no more than 2 of these credits may be in research or special problems. A doctoral minor requires 12 credits in areas not closely related to the major; no more than 3 of these credits may be in research or special problems.
Twin Cities Campus
Animal Sciences Ph.D.
Animal Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Animal Science, 305 Haecker Hall, 1364 Eckles Avenue, Saint Paul, MN 55108 (612-624-3491; fax: 612-625-5789)
Email: ansci@umn.edu
Website: http://www.ansci.umn.edu/gradprogram/index.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 76
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Ph.D. program concentrate on one of the animal sciences subdisciplines: genetics, growth biology, nutrition, physiology, or production systems. Students have the option of tailoring their program to include study in more than one subdiscipline and to emphasize basic or applied science.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in agriculture or a biological field with training in biology, chemistry, physics, and mathematics is required.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
40 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The Ph.D. degree is granted chiefly in recognition of the candidate's achievements and knowledge in a specific field. Although there is no minimum number of credits required, students typically complete 40-50 credits to develop competency in their field of interest. Students must register for a minimum of 24 thesis credits. Appropriate graduate level courses taken at another university may be approved for transfer. Coursework completed under an M.S. program can be counted towards the Ph.D. degree. The student is expected to maintain a B average or better in all coursework.
Twin Cities Campus

Applied Economics M.S.

College of Food, Agricultural and Natural Resource Sciences

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g004.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. degree in applied economics prepares students for employment opportunities in the public and private sector and for further graduate study. This rigorous but flexible program includes core coursework in economic theory and quantitative methods and offers opportunities for specialized coursework and research in all the fields of study offered by the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The following coursework is considered the minimum preparation for the M.S. program: micro and macroeconomic theory at the intermediate undergraduate level, statistics, two semesters of calculus, and introductory linear algebra. Additional coursework in economics, statistics, and math is highly desirable and recommended, especially for students who intend to apply for the doctoral program after completion of the M.S. degree.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with the applicant's scholarship and research potential, a complete set of college or university transcripts, and a clearly written statement of academic and career interests, goals, and objectives. For complete application instructions, visit the website: http://www.apecgrad.umn.edu/Admissions/index.htm. Students should apply by the December deadline to ensure priority consideration for admissions and funding.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: A project that demonstrates familiarity with the theoretical and empirical tools of economics. The Plan B project requires between 4 and 6 project credits (APEC 8793).

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

M.S. students are required to complete graduate-level courses in microeconomic theory, macroeconomic theory, and econometrics or statistics. Students are also required to participate in a 1-credit M.S. seminar. Both Plan A and Plan B require at least 30 credits, of which at least 14 credits must be in the major field and at least 6 credits must be in a related field or minor. The major field must include a minimum of 9 credits in applied economics (excluding thesis and special topics, independent study, and the M.S. seminar). Plan A requires 10 thesis credits. Plan B requires a 4- to 6-credit project.

For more information about program requirements, refer to the department's Graduate Program Student Handbook: http://www.apecgrad.umn.edu/prod/groups/cfans/@pub/@cfans/@apec/documents/asset/cfans_asset_352638.pdf.
Twin Cities Campus

Applied Economics Minor

Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g004.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate study in applied economics requires an operational knowledge of economic theory and modern methods of quantitative analysis, as well as practical application in specialized fields of inquiry, which include consumer behavior and household economics; health economics; labor economics; policy analysis; production and marketing economics; resource and environmental economics; and trade and development economics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

M.S. students must complete at least 9 credits of 5xxx or 8xxx courses in applied economics. Ph.D. students must complete at least 15 credits of 5xxx or 8xxx courses in applied economics. Courses for the minor must be approved by the director of graduate studies. All courses in the minor must be taken A-F and completed with a GPA of 3.00 or higher.
Twin Cities Campus

Applied Economics Ph.D.

Applied Economics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Applied Economics Graduate Program, 231 Ruttan Hall, 1994 Buford Avenue, Saint Paul, MN 55108-6040 (612-625-3777; fax: 612-625-6245)
Email: apecdgs@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g004.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 59
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. degree program in applied economics prepares students for careers in academia, government, and the private sector. This rigorous program includes core coursework in economic theory, quantitative methods, and two fields of specialization selected from the following: consumer behavior and household economics; production and marketing economics; trade and development economics; natural resource and environmental economics; health economics; labor economics; and policy analysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The minimum preferred undergraduate GPA for admittance to the program is a B average (3.00/4.00). Most admitted students will have a higher GPA.

Applicants for the Ph.D. degree should have completed an M.S. degree in economics, agricultural economics, or a related field; or have equivalent coursework and research experience. Applicants without a master's degree are, except in a few special cases, considered for admission into the M.S. program.

Prior training should include micro- and macro-economic theory at the master's level, multivariate calculus, differential equations and linear algebra, and mathematical statistics. Students lacking background in economics or quantitative methods may be required to complete additional coursework before entering the program.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with the applicant's scholarship and research potential, a complete set of college or university transcripts, and a clearly written statement of academic and career interests, goals, and objectives. For complete application instructions, visit the website: http://www.apecgrad.umn.edu/Admissions/index.htm. Students should apply by the December deadline to ensure priority consideration for admissions and funding.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS  
  - Total Score: 6.5  
• MELAB  
  - Final score: 80  
The preferred English language test is Test of English as Foreign Language  

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
23 credits are required in the major.  
12 credits are required outside the major.  
24 thesis credits are required.  

This program may be completed with a minor.  

Use of 4xxx courses towards program requirements is not permitted.  

A minimum GPA of 3.00 is required for students to remain in good standing.  

Courses in economic theory, applied econometrics, welfare economics, and applied economic methods are to be completed on the A-F grade basis. At least two-thirds of the credits included in any Ph.D. degree program must be taken under the A-F grading system, and it is preferred that students maintain a 3.00 GPA in the program.  

Written preliminary examinations for the Ph.D. degree include an examination in microeconomic theory and field examinations in two of the seven Ph.D. fields offered by the Applied Economics Graduate Program. The 8xxx courses in the program prepare students for field exams. An approved minor (e.g., economics or statistics) can be substituted for one field exam in the department.  

After passing the written preliminary examinations, the student must take a preliminary oral examination. This exam can be on coursework, a thesis prospectus, or some combination. It is administered by a committee of four people, including three from the Applied Economics Graduate Program and one other graduate faculty member from outside the program. At the conclusion of the thesis research, students complete a final oral examination, which consists of a public seminar (in which the candidate presents the thesis) and a closed meeting between the candidate and the appointed examining committee.  

For specific program requirements please consult the department’s Graduate Program Student Handbook:  
Twin Cities Campus
Applied Plant Sciences M.S.
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, Department of Horticultural Science, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsc@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applied plant sciences is an interdisciplinary program for educating students to become professional scientists well grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Plant Biology; Plant Pathology; Soil, Water, and Climate; Landscape Architecture; and related departments. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a B.S. or B.A. degree in agriculture, biology, or other related life science. Students with a B.S. or B.A. degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements:
Applicants must submit scores from the General (Aptitude) Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written personal statement of career interests, goals, and objectives as part of the online application. Students should apply by December 1 for admission into fall semester of the following year. Students should apply by October 1 for admission into spring semester of the following year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 550

Key to test abbreviations (TOEFL, IELTS, MELAB).
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Determined in consultation with advisor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under Plan A (with thesis) and Plan B (with project). Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits. Students are required to complete the courses in the common curriculum and the requirements for their specialization, and to present one graduate seminar. Additional course requirements are flexible and are determined in consultation with the student's adviser(s) and advisory committee.

Required core courses counted toward the required 14 major credits:
- STAT 5021 - Statistical Analysis (or equivalent) (4 cr)
- AGRO 5121 - Applied Experimental Design (4 cr)
- STAT 5303 - Experimental Design (4 cr)
- AGRO 5311 - Research Methods in Crop Improvement and Production (1 cr)
- AGRO/HORT 8270 - Seminar (1 cr)
- APSC 8123 - Ethics (0.5 cr)

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Agronomy and Agroecology

Students conduct research to increase their knowledge of cropping systems and weed science, including alternative approaches and management strategies. Emphasis is on improving production efficiency and profitability in an environmentally sound approach that benefits society. Mechanisms of crop physiology and ecology underlying plant responses to the environment are a particular emphasis of this track.

M.S. Plan A degree: 14 credits in the major that should include the core courses listed below; 6 credits in related fields or a minor; 10 thesis credits are required.

Two agroecology/agronomy courses:
- AGRO 4005 - Applied Crop Physiology and Development (4 cr)
- AGRO 4505 - Integrated Weed Management (3 cr)
- AGRO 4401 - Plant Genetics and Breeding (4 cr)
- SAGR 8010 - Sustainable Agriculture Colloquium (2 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3 cr)
- AGRO 5999 - Special Topics: Agro-ecosystems Analysis Summer Field Course (3 cr)

A course in plant biology such as:
- PBIO 5516 - Plant Cell Biology (3 cr)
- PBIO 5412 - Plant Physiology (3 cr)

Ecology courses can be counted for the 6 credits in related fields or a minor:
- BIOL 5407 - Ecology (3 cr)
EEB 4068 - Plant Physiological Ecology (3 cr)
EEB 4609 - Ecosystem Ecology (3 cr)
EEB 5053 - Ecology: Theory and Concepts (4 cr)
HORT 5071 - Restoration and Reclamation Ecology (3 cr)
ESPM 5108 - Ecology of Managed Systems (4 cr)
ESPM 5345 - Sustainable Land Use Planning and Policy (3 cr)

Courses listed within the agroecology/agronomy, plant biology, and ecology groups are provided as a guide for students and faculty. Other courses can be substituted with agreement of the adviser, advisory committee, and DGS.

Horticulture
Students conduct research related to fruits, vegetables, potatoes, flowers, ornamental trees and shrubs, or turf; on the physiology, production, environmental impact of cropping systems; and use of horticultural crops. Research areas include the effect of horticultural commodities on human health, hormonal, and stress physiology; flower development and flowering physiology; integrated pest management; post harvest physiology; and cropping system strategies. Students get a broad range of experiences in the field, greenhouse, and/or laboratory using genetic, molecular, biochemical, and ecological tools to answer research questions.

Specialization courses:
Area 1 - Cross Commodity Horticulture
HORT 4071W - Applications of Biotechnology to Plant Improvement (4 cr)
AGRO 4505 - Integrated Weed Management (4 cr)
HORT 4461 - Horticultural Marketing
HORT 5007 - Advanced Plant Propagation (3 cr) (Sp even yrs)
HORT 5023 - Public Garden Management (2 cr)
HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3 cr)
STAT 5302 - Applied Regression Analysis (4 cr)
AGRO 5321 - Ecology of Agricultural Systems (3 cr)
MKTG 6051 - Marketing Research (4 cr)
MKTG 6055 - Buyer Behavior (4 cr)
MBA 6210 - Marketing Management (3 cr)
SAGR 8010 - Colloquium in Sustainable Agriculture (2 cr)
HORT 8044 - Manipulation of Plant Growth and Reproduction (2 cr), Spring (even yrs)

Area 2 - Commodity-based Horticulture
HORT 4061 - Turfgrass Management (4 cr)
HORT 4062 - Turfgrass Weed and Disease Science (3 cr), Fall (odd yrs)
HORT 4063 - Turfgrass Science (3 cr)
HORT 4141W - Plant Production I (4 cr)
HORT 5031 - Organic Viticulture and Fruit Production (3 cr), Fall (odd yrs)
HORT 5032 - Organic Vegetable Production (3 cr), Spring (odd yrs)
HORT 5051 - Plant Production II (4 cr)
HORT 5052 - Specialty Greenhouse Crop Production (3 cr), Fall (even yrs)
HORT 5071 - Restoration and Reclamation Ecology (3 cr)

Plant Breeding and Plant Molecular Genetics
This track allows students to select from genetic research projects ranging from applied plant breeding projects emphasizing breeding procedures and methodologies to molecular genetic projects doing biotechnology, genetic engineering, and genomic research in agronomic and horticultural crops. These research projects give students the opportunity to integrate the latest developments in the laboratory with applied applications in the field to reach the overarching goal of developing new germplasm that will improve the sustainability of our food/feed/fiber/fuel systems.

APSC 8123 - Ethics (0.5 cr)
AGRO 5311 - Orientation to MN Crop Production & Res. Methods (1 cr)
AGRO/HORT 8270 - Seminar in Applied Plant Sciences (1 cr)
STAT 5021 - Statistical Analysis (4 cr)
HORT/PIPA 8005 - Supervised Teaching (2 cr)
or GRAD 8101 - Teaching in Higher Education (3 cr)
AGRO/HORT 8280 - Current Topics in Applied Plant Sciences (1 cr)
or AGRO 8010 - Colloquium in Sustainable Agriculture (2 cr)

Molecular Genetics Area (3 cr)
Genetics Area (3 cr)
Plant Breeding Area (3 cr)

Additional courses in Genetics, Molecular Genetics, Plant Breeding, and Statistics areas (9 cr)
Additional courses in supporting program or minor field (excludes courses in Genetics, Molecular Genetics, Plant Breeding areas) (12 cr)
Thesis credits after written and oral preliminary exams have been passed: APSC 8888 (24 cr)
**Twin Cities Campus**

**Applied Plant Sciences Minor**

*Agronomy & Plant Genetics, Horticultural Science*

**College of Food, Agricultural and Natural Resource Sciences**

Link to a list of faculty for this program.

**Contact Information:**
Department of Agronomy and Plant Genetics, Department of Horticultural Science, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsc@umn.edu
Website: [http://www.appliedplantsciences.umn.edu](http://www.appliedplantsciences.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](http://www.umn.edu) section of the catalog website for requirements that apply to all major fields.

Applied plant sciences is an interdisciplinary program for educating students to become professional scientists well grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Plant Biology; Plant Pathology; Soil, Water, and Climate; Landscape Architecture; and related departments. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A Ph.D. minor requires 12 credits from among 4xxx, 5xxx, and 8xxx courses in the areas of specialization, with only one 4xxx course allowed.
Twin Cities Campus
Applied Plant Sciences Ph.D.
Agronomy & Plant Genetics, Horticultural Science
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Agronomy and Plant Genetics, Department of Horticultural Science, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108-6026 (612-625-4742; fax: 612-625-1268)
Email: apsc@umn.edu
Website: http://www.appliedplantsciences.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applied plant sciences is an interdisciplinary program for educating students to become professional scientists well grounded in the applied disciplines of agronomy/agroecology, horticulture, and plant breeding/molecular genetics. Graduates of the program are able to provide innovative leadership and contribute to problem solving within their disciplines in the public or private sector and within society at large. The program develops the quantitative and qualitative research skills necessary to conduct high quality research and scholarship. Students gain broad familiarity with all of the disciplines within the program and gain in-depth knowledge within their area of expertise. The program's graduate faculty is drawn primarily from the Department of Agronomy and Plant Genetics and the Department of Horticultural Science; but also from the Departments of Ecology, Evolution, and Behavior; Plant Biology; Plant Pathology; Soil, Water, and Climate; and related departments. Students choose from among four specialization tracks: agronomy/agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students entering the program should have a foundation in the physical and biological sciences, preferably with some emphasis in plant science. A minimum of 10 credits of math and physics, 12 credits of chemistry and biochemistry, and 15 credits of biological and/or agricultural sciences are recommended for admission. In addition, students should have completed a B.S. or B.A. degree in agriculture, biology, or other related life science. Students with a B.S. or B.A. degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements:
Applicants must submit scores from the General (Aptitude) Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written personal statement of career interests, goals, and objectives as part of the online application. Students should apply by December 1 for admission into fall semester of the following year. Students should apply by October 1 for admission into spring semester of the following year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

27 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Ph.D. students are required to complete the courses in the common curriculum, the requirements for their respective specialization, and present one graduate seminar; 24 thesis credits are also required. Additional course requirements are flexible and are determined in consultation with the student's adviser(s) and advisory committee.

Required core courses* counted toward the required 14 major credits:
STAT 5021 - Statistical Analysis (or equivalent) (4 cr)
or AGRO 5121 - Applied Experimental Design (4 cr)
or STAT 5303 - Experimental design (4 cr)
AGRO 5311 - Research Methods in Crop Improvement and Production (1 cr)
AGRO/HORT 8270 - Seminar (1 cr)
APSC 8123 - Ethics (0.5 cr)
AGRO/HORT 8280 - Current Topics in Applied Plant Sciences (2 cr)
*AGRO/HORT 8005 - Supervised Teaching Experience (2 cr)

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Agronomy and Agroecology**

Students conduct research to increase their knowledge of cropping systems and weed science, including alternative approaches and management strategies. Emphasis is on improving production efficiency and profitability in an environmentally sound approach that benefits society. Mechanisms of crop physiology and ecology underlying plant responses to the environment are a particular emphasis of this track.

Two agroecology/agronomy courses:
AGRO 4005 - Applied Crop Physiology and Development (4 cr)
AGRO 4401 - Plant Genetics and Breeding (4 cr)
AGRO 4505 - Integrated Weed Management (3 cr)
SAGR 8010 - Sustainable Agriculture Colloquium (2 cr)
AGRO 5321 - Ecology of Agricultural Systems (3 cr)
AGRO 5999 - Special Topics: Agro-ecosystem Analysis Summer Field Course (3 cr)

A course in plant biology such as:
PBIO 5412 - Plant Physiology (3 cr)
PBIO 5416 - Plant Morphology, Development, and Evolution (4 cr)

Ecology courses such as the following can be counted toward the 12 credits in related fields or a minor:
BIOL 5407 - Ecology (3 cr)
EEB 4068 - Plant Physiological Ecology (3 cr)
EEB 4609 - Ecosystem Ecology (3 cr)
EEB 5053 - Ecology: Theory and Concepts (4 cr)
HORT 5071 - Restoration and Reclamation Ecology (3 cr)
ESPM 5108 - Ecology of Managed Systems (4 cr)
ESPM 5245 - Sustainable Land Use Planning and Policy (3 cr)

**Horticulture**

Students conduct research related to fruits, vegetables, potatoes, flowers, ornamental trees and shrubs, or turf; and on the physiology, production, environmental impact of cropping systems, and use of horticultural crops. Research areas include the effect of horticultural commodities on human health, hormonal, and stress physiology; flower development and flowering physiology; integrated pest management; post harvest physiology; and cropping system strategies. Students get a broad range of experiences in the field, greenhouse, and/or laboratory using genetic, molecular, biochemical, and ecological tools to answer research questions.

**Specialization courses:**

**Area 1 - Cross Commodity Horticulture**

- HORT 4071W - Applications of Biotechnology to Plant Improvement (4 cr)
- AGRO 4505 - Integrated Weed Management (4 cr)
- HORT 4461 - Horticultural Marketing
- HORT 5007 - Advanced Plant Propagation (3 cr), Spring (even yrs)
- AGRO 5021 - Introduction to Plant Breeding (3 cr)
- HORT 5023 - Public Garden Management (2 cr)
- HORT 5131 - Student Organic Farm Planning, Growing, and Marketing (3 cr)
- STAT 5302 - Applied Regression Analysis (4 cr)
- AGRO 5321 - Ecology of Agricultural Systems (3 cr)
- MKTG 6051 - Marketing Research (4 cr)
- MKTG 6055 - Buyer Behavior (4 cr)
- MBA 6210 - Marketing Management (3 cr)
- SAGR 8010 - Colloquium in Sustainable Agriculture (2 cr)
- HORT 8023 - Evolution of Crop Plants (3 cr)
- HORT 8044 - Manipulation of Plant Growth and Reproduction (2 cr), Spring (even yrs)
- AGRO 8305 - Physiological Ecology of Plants in Natural and Managed Ecosystems (4 cr)
- AGRO 8605 - Advanced Management of Agroecosystems (3 cr)

**Area 2 - Commodity-based Horticulture**

- HORT 4061 - Turfgrass Management (4 cr)
- HORT 4062 - Turfgrass Weed and Disease Science (3 cr), Fall (odd yrs)
- HORT 4063 - Turfgrass Science (3 cr)
- HORT 4141W - Plant Production I (4 cr)
- HORT 5031 - Organic Viticulture and Fruit Production (3 cr), Fall (odd yrs)
- HORT 5032 - Organic Vegetable Production (3 cr) Spring (odd yrs)
- HORT 5051 - Plant Production II (4 cr)
- HORT 5052 - Specialty Greenhouse Crop Production (3 cr), Fall (even yrs)
- HORT 5071 - Restoration and Reclamation Ecology (3 cr)

**Plant Breeding and Plant Molecular Genetics**

This track allows students to select from genetic research projects ranging from applied plant breeding projects emphasizing breeding procedures and methodologies to molecular genetic projects doing biotechnology, genetic engineering, and genomic research in agronomic and horticultural crops. These research projects give students the opportunity to integrate the latest developments in the laboratory with applied applications in the field to reach the overarching goal of developing new germplasm that will improve the sustainability of our food/feed/fiber/fuel systems.

- HORT/PIPA 8005 - Supervised Teaching (2 cr)
- or GRAD 8101 - Teaching in Higher Education (3 cr)
- AGRO/HORT 8280 - Current Topics in Applied Plant Sciences (1 cr)
- or AGRO 8010 - Colloquium in Sustainable Agriculture (2 cr)

**Molecular Genetics Area (3 cr)**

**Genetics Area (3 cr)**

**Plant Breeding Area (3 cr)**

Additional courses in Genetics, Molecular Genetics, Plant Breeding, and Statistics areas (9 cr)

Additional courses in supporting program or minor field (excludes courses in Genetics, Molecular Genetics, Plant Breeding areas) (12 cr)

**Genetics**

- EEB 5042 - Quantitative Genetics (3 cr), Fall
- AGRO 8231 - Chromosome Biology (4 cr), Fall (even years)
GCD 8131 - Advanced Genetics and Genomics (3 cr), Spring

Molecular Genetics
GCD 4034 - Molecular Genetics, (3 cr), Spring
AGRO 8241 - Molecular and Cellular Genetics of Plant Improvement (3 cr), Spring (odd years)

Plant Breeding
AGRO/HORT 8201 - Advanced Plant Breeding (3 cr), Fall (odd years)
AGRO 8202 - Breeding for Quantitative Traits in Plants (3 cr), Spring (even years)

Statistics
AGRO 5121 - Applied Experimental Design (4 cr), Spring
STAT 5301 - Applied Regression Analysis (4 cr), Fall and Spring

Other Suggested Courses
Agroecology
SAGR 8010 - Colloquium in Sustainable Agriculture (2 cr), Fall

Biochemistry
BIOC 5401 - Advanced Metabolism and its Regulation (3 cr), Fall
BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3 cr), Fall
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3 cr), Fall

Biotechnology/Genetics/Genomics
ANSC 5200 - Statistical Genetics and Genomics (4 cr), Fall
PBIO/PIPA 5301 - Plant Genomics (3 cr), Fall
HORT 4071 - Applications of Plant Biotechnology to Crop Improvement (4 cr), Fall
PPIP 5515 - Plant Cell Biology (3 cr), Spring
GCD 8121 - Advanced Molecular Genetics (3 cr)

Evolution
AGRO/HORT 8023 - Evolution of Crop Plants (2 cr), Spring (odd yrs)
EEB 5221 - Molecular and Genomic Evolution (3 cr), Spring

Physiology
PBIO 5412 - Plant Physiology (3 cr), Fall
HORT 8044 - Manipulation of Plant Growth and Reproduction (2 cr), Spring (even yrs)

Plant Pathology
PIPA 5103/8103 - Plant-Microbe Interactions (3 cr), Spring
PIPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3 cr), Fall
PIPA 5480 - Principles of Plant Pathology (3 cr), Fall
PIPA 8104 - Plant Virology (2 cr), Spring
PIPA 8105 - Plant Bacteriology (2 cr), Spring
**Twin Cities Campus**

**Bioproducts and Biosystems Science, Eng and Mgmt M.S.B.B.S.E.M.**

*Bioproducts and Biosystems Engineering*

**College of Food, Agricultural and Natural Resource Sciences**

Link to a list of faculty for this program.

**Contact Information:**

Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)

Email: bbe@umn.edu

Website: [http://www.bbe.umn.edu](http://www.bbe.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: M S Bioproducts & Biosystems Science, Eng & Mgmt

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The master of science degree in the bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more.

Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management.

Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Students seeking a master's degree should have a bachelor's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S or international university. Applicants should have a performance level on previous academic work required for a degree of at least a 3.0 GPA (on a 4.0 grading scale).

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 20 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students complete a smaller project or projects that involve a total of about 120 hours of work and write Plan B papers on their projects.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All master's level students must take BBE 8001 - Seminar I (1 cr) and BBE 8002 - Seminar II (1 cr). All master's level students must take BBE 8013 - Parameter Estimation (3 cr) unless they can demonstrate to the BBE 8013 instructor that they have already mastered the course material or have justified the selection of a suitable alternative.

Degree programs are expected to include mostly 5xxx and 8xxx courses. If the degree program contains more than three 4xxx courses, students and their advisers are asked to include a letter of explanation when the degree program is submitted for approval.

If a master's degree program includes more than 4 credits of special problems or advanced problems courses, students and their advisers are asked to include a letter of explanation when the degree program is submitted for approval.
Bioproducts and Biosystems Science, Eng and Mgmt Minor

Bioproducts and Biosystems Engineering

College of Food, Agricultural and Natural Resource Sciences

Twin Cities Campus

Link to a list of faculty for this program.

Contact Information:
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: http://www.bbe.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more. Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management. Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For master's students, a minor consists of at least 6 credits of BBE courses numbered 4xxx or higher. For doctoral students, a minor consists of at least 12 credits of BBE courses numbered 4xxx or higher.
**Twin Cities Campus**

**Bioproducts and Biosystems Science, Eng and Mgmt Ph.D.**

*Bioproducts and Biosystems Engineering*

**College of Food, Agricultural and Natural Resource Sciences**

Link to a list of faculty for this program.

**Contact Information:**
Department of Bioproducts and Biosystems Engineering, Biosystems and Agricultural Engineering Building, 1390 Eckles Avenue, St. Paul, MN 55108 (612-625-7733; fax: 612-624-3005)
Email: bbe@umn.edu
Website: [http://www.bbe.umn.edu](http://www.bbe.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The Ph.D. degree offered by the bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering, and management in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management.

Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials, and more.

Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management.

Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

**Program Delivery**

This program is available:
- **via classroom** (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.20.

Students seeking the Ph.D. should have a bachelor's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university.

**Special Application Requirements:**

Students seeking the Ph.D. should also have a master's degree in engineering, mathematics, the physical or biological sciences, or a related field from a recognized U.S. or international university. Applicants should have a performance level on previous academic work required for a degree of at least a 3.2 GPA (on a 4.0 grading scale). Students expecting to pursue a Ph.D. normally complete a master of science Plan A degree before starting their Ph.D. programs. Exceptional students who want to go straight to the Ph.D. from the bachelor's level may be admitted subject to conditions agreed upon by the adviser, the director of graduate studies, and the graduate program coordinator.

Applicants must submit their test score(s) from the following:
- **GRE**
International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

33 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

All Ph.D. degree programs must include BBE 8001 - Seminar I (1 cr), BBE 8002 - Seminar II (1 cr). Any of these courses taken at the master's level count toward the Ph.D. and do not have to be retaken.

The Ph.D. in bioproducts and biosystems science engineering and management requires extended study and intense intellectual effort conducting cutting-edge research and advancing the forefront of knowledge in the subject matter area. Students develop skills that enable them to define problems or research questions, plan research, conduct independent research and/or lead research efforts, analyze data, and effectively communicate research results to a variety of audiences. All Ph.D. degree programs must include a minimum of 45 graduate course credits beyond the B.S. degree and a minimum of 24 doctoral thesis credits (BBE 8888). A minimum of 12 course credits must be in a minor field or in a supporting program. Ph.D. degree programs should contain a minimum of 9 course credits in a concentrated area of scientific or mathematical theoretical development that is related to the student's research.
Twin Cities Campus
Conservation Biology M.S.
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 187 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-624-7751)
Email: consbio@umn.edu
Website: http://www.consbio.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Conservation Biology (CB) Program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select a named track, fisheries and aquatic biology, which offers an aquatic specialization. Students may also pursue a joint degree in law and conservation biology through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A B.S./B.A. degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but may be required to take selected courses in biology.

Special Application Requirements:
A statement of career goals and three letters of recommendation evaluating the applicant's potential for graduate study are required. Scores less than five years old from the General Test of the GRE are required. TOEFL is required for applicants who speak English as a second language. Applicants to the joint law degree program must also apply to the Law School. Application deadline is December 15. Typically, students only are admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B master's students must demonstrate familiarity with the tools of research or scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project. The Plan B project should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The advisory committee specifies both the nature and extent of the options available to satisfy this requirement, subject to approval by the DGS. The Plan B project must be satisfied independent of the courses in the student's program.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Students must complete a minimum of 30 credits in the biological and social aspects of conservation biology. For Plan A students, 10 of these credits are thesis credits; for Plan B students, 10 of these credits are for electives.

Joint- or Dual-degree Coursework: Joint Degree in Conservation Biology and Law
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Fisheries and Aquatic Biology
Three-quarters of the global ecosystem is water and most is a global commons. Many biologists and economists argue that freshwater is one of the most critical global resources and that the functional integrity and biodiversity within freshwater and marine ecosystems are highly threatened. The Fisheries and Aquatic Biology (FAB) track is available for M.S., Ph.D., and joint degree students wishing to emphasize this concentration within a CB major. The track name can be indicated on the student's transcript (this is optional) and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in fisheries or aquatic biology. Combined with a typical undergraduate degree in biology or natural resource science, careful selection of courses in the graduate program will satisfy the educational requirements for professional certification by the American Fisheries Society.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Requests for admission to the track may be made during the application process or at any time after the student is admitted to the CB graduate program. Students in the track must meet all requirements for the M.S. in CB.

Students who designate this track will be expected to work closely with their Student Advisory Committee (SAC) to develop an appropriate course of study. The track coordinator will review each student's academic program to examine how track expectations are met and forward it with a recommendation to the DGS for approval.

In addition to course requirements for the conservation biology major, students in the FAB track must take at least three courses from the following list:
EEB 5601 - Limnology (3 cr)
ENT 5361 - Aquatic Insects (3 cr)
FW 5136 - Biology of Fishes (3 cr)
FW 5401 - Fish Physiology and Behavior (3 cr)
FW 5455 - Sustainable Aquaculture (3 cr)
FW 5601 - Fisheries Population Analysis (3 cr)
FW 5604 - Fisheries Ecology and Management (3 cr)
FW 8448 - Fishery Science (3 cr)
FW 8459 - Stream and River Ecology (3 cr)
FW 8465 - Fish Habitats and Restoration (3 cr)
ESPM 5061 - Water Quality: Management of a Natural Resource (3 cr)
ESPM 5575 - Wetlands Conservation (3 cr)

Other advanced courses or colloquia on fisheries or aquatic biology that are not listed here may also satisfy needs of students in the track. In addition, master's students are required to enroll for at least one semester of FW 8200 - Seminar for 1 credit.
Twin Cities Campus

Conservation Biology Minor
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 187 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-624-7751)
Email: consbio@umn.edu
Website: http://www.consbio.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Conservation Biology (CB) Program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select a named track, fisheries and aquatic biology, which offers an aquatic specialization. Students may also pursue a joint degree in law and conservation biology through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor may be earned by completing the two required courses for a major, plus participating in one semester of the conservation biology seminar. A doctoral minor may be earned by completing the two required courses for a major, participating in one semester of the conservation biology seminar, and completing 6 elective credits. Electives are determined in consultation with the director of graduate studies and the student's advisory committee.
Twin Cities Campus

Conservation Biology Ph.D.
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 187 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-624-7751)
Email: consbio@umn.edu
Website: http://www.consbio.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 46
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Conservation Biology (CB) Program has two complementary objectives leading to a unique multidisciplinary program. The first is to provide students with sound graduate training in the biological sciences relevant to the global conservation of plants, animals, and ecosystems. The second objective promotes the study of social, political, and economic sciences that relate to recognition and solution of conservation problems. Students may select a named track, fisheries and aquatic biology, which offers an aquatic specialization. Students may also pursue a joint degree in law and conservation biology through the joint law degree program. The overall goal of the program is to prepare students to develop solutions or approaches to address problems that are scientifically and environmentally sound and likely to be acted upon or implemented within their social and political context.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A B.S./B.A. degree in biology or a closely related field is preferred. Applicants with a baccalaureate degree in another field are accepted, but these individuals may be required to take selected courses in biology. In general, Ph.D. applicants holding a baccalaureate degree are first expected to complete a master's degree.

Special Application Requirements:
A statement of career goals and three letters of recommendation evaluating the applicant's potential for graduate study are required. Letters of recommendation should be sent directly to the Conservation Biology Program Office. Scores less than five years old from the General Test of the GRE are required. TOEFL is required for applicants who speak English as a second language. Applicants to the joint law degree program must also apply to the Law School. Application deadline is January 1. Typically, students are admitted only for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
10 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Ph.D. students complete 46 credits, including 10 credits in courses required as part of the major, 12 credits in a minor or supporting program, and 24 thesis credits. Students are expected to show competency in both the biological and social sciences. With their advisory committee, students develop a program that emphasizes the ecological and social aspects of conservation biology. Dissertation research may require proficiency in supporting areas (e.g., statistics, computing, communications).

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Fisheries and Aquatic Biology
Three-quarters of the global ecosystem is water and most is a global commons. Many biologists and economists argue that freshwater is one of the most critical global resources and that the functional integrity and biodiversity within freshwater and marine ecosystems are highly threatened. The Fisheries and Aquatic Biology (FAB) track is available for M.S., Ph.D., and joint degree students wishing to emphasize this concentration within a CB major. The track name can be indicated on the student's transcript (this is optional) and may be useful to the graduate for obtaining jobs with many federal and state agencies where such expertise is specified in job announcements or hiring criteria. The track designation clearly indicates that the student has specialized coursework and research or project experience leading to expertise in fisheries or aquatic biology. Combined with a typical undergraduate degree in biology or natural resource science, careful selection of courses in the graduate program will satisfy the educational requirements for professional certification by the American Fisheries Society.

Students in the track must be advised or co-advised by a faculty member affiliated with the track. Request for admission to the track may be made during the application process or any time after the student is admitted to the CB graduate program. Students in the track must meet all requirements for the Ph.D. in CB.

Students who designate this track will be expected to work closely with their Student Advisory Committee (SAC) to develop an appropriate course of study. The track coordinator will review each student's academic program to examine how track expectations are met and forward it with a recommendation to the DGS for approval.

In addition to course requirements for the conservation biology major, students in the FAB track must take at least three courses from the following list:
EEB 5601 - Limnology (3 cr)
ENT 5361 - Aquatic Insects (3 cr)
FW 5136 - Biology of Fishes (3 cr)
FW 5401 - Fish Physiology and Behavior (3 cr)
FW 5455 - Sustainable Aquaculture (3 cr)
FW 5601 - Fisheries Population Analysis (3 cr)
FW 5604 - Fisheries Ecology and Management (3 cr)
FW 8448 - Fishery Science (3 cr)
FW 8459 - Stream and River Ecology (3 cr)
FW 8465 - Fish Habitats and Restoration (3 cr)
ESPM 5061 - Water Quality: Management of a Natural Resource (3 cr)
ESPM 5575 - Wetlands Conservation (3 cr)

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Other advanced courses or colloquia on fisheries or aquatic biology that are not listed here may also satisfy needs of students in the track. In addition, doctoral students are required to enroll for at least two semesters of FW 8200 - Seminar for 1 credit per semester.
Twin Cities Campus
Entomology M.S.
Entomology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Avenue, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor’s degree with a major in a biological science is a prerequisite. Preference is given to students with a broad background in the basic sciences. Admission depends primarily on applicant’s undergraduate record, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements:
Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, and objectives. Three letters of recommendation are required from persons well acquainted with the student's academic record, and should be either uploaded or sent directly to the department.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 600
  - General Test - Quantitative Reasoning: 600

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL). For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 20 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must present one graduate seminar (ENT 8300) and must take Scientific Communication and Ethics (ENT 8061). Students must also pass three written examination questions. The core curriculum courses are: ENT 5021 - Insect Taxonomy and Phylogeny, ENT 5011 - Insect Structure and Function, and either ENT 5042 - Insect Ecology or ENT 5045 - Insect Population Dynamics.

Plan B students must take 6 credits of ENT 5910 - Special Problems in Entomology as part of the 20 credits of required entomology courses. For both plans: All courses are flexible and are determined in consultation with the adviser and other members of the student's advisory committee. Plan A is recommended for students contemplating a career in entomological research.

Requirements for the M.S., supplemental to general Graduate School requirements, include a minimum of 14 course credits in entomology including a core curriculum of fundamental entomology courses and 1 credit of graduate seminar. Additional requirements include 6 credits from other programs to make a total of at least 20 course credits for Plan A or at least 30 course credits for Plan B students (must take 6 credits of ENT 5910). These courses are flexible and are determined in consultation with the adviser and other members of the student's advisory committee. Plan A is recommended for students contemplating a career in entomological research.
Twin Cities Campus

Entomology Minor

Entomology

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Ave, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires a minimum of 6 credits in 4xxx, 5xxx, or 8xxx entomology courses. The doctoral minor requires a minimum of 12 credits in 4xxx, 5xxx, or 8xxx entomology courses.
Twin Cities Campus

Entomology Ph.D.

Entomology

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Entomology, 1980 Folwell Avenue, 219 Hodson Hall, St. Paul, MN 55108 (612-624-3636; fax: 612-625-5299)
Email: entodept@umn.edu
Website: http://www.entomology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 51
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Entomology centers on the study of insects and includes specializations in ecology, behavior, molecular biology, microbiology, neurobiology, physiology, population dynamics, systematics, and taxonomy. Specialized or applied areas include apiculture, biological control, cell culture, insect conservation, insect-vector relations, integrated pest management, and modeling. Research programs are active in aquatic systems, forest systems, crop and animal agriculture, human health, and natural and urban environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A 3.50 GPA (on a 4.00 scale) for prior graduate work is preferred for admission.

A bachelor's degree with a major in a biological science is a prerequisite. Preference is given to students with a broad background in the basic sciences. Admission depends primarily on applicant's undergraduate record, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements:
Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, and objectives. Three letters of recommendation are required from persons well acquainted with the student's academic record, and should be either uploaded or sent directly to the department.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 600
  - General Test - Quantitative Reasoning: 600

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
15 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must present two graduate seminars (ENT 8300) and must take Scientific Communication and Ethics (ENT 8061). Students also must pass three written examination questions (or a total of four if the student has received an M.S. degree in entomology from the U of MN). The core curriculum courses are: ENT 5021 - Insect Taxonomy and Phylogeny, ENT 5011 - Insect Structure and Function, and either ENT 5042 - Insect Ecology or ENT 5045 - Insect Population Dynamics.

Ph.D. requirements include a minimum of 15 course credits in entomology, including a core curriculum of fundamental entomology courses and 2 credits of graduate seminar. Additional requirements include 12 credits from other programs, and are determined in consultation with the adviser and other members of the student's advisory committee.
Twin Cities Campus
Food Science M.S.

College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/foodsciencegraduate/index.htm

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree, or its international equivalent, in any field.

The minimum requirements are general chemistry with laboratory, organic chemistry with laboratory, physics with laboratory, biology with laboratory, and calculus. If preparation appears inadequate, certain additional courses may be required after admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.
Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is equivalent to 120 hours of work or three full weeks of research and writing. It should consist of one of the following options, which are intended to familiarize the candidate with the tools of research or scholarship in the field and serve to demonstrate the ability to work independently: 1) The candidate may prepare one paper equivalent to 120 hours of work in one advanced course, over and above the normal course requirement as approved by the instructor in consultation with the adviser. This course must be from the major field of interest. 2) The candidate may prepare one paper equivalent to the requirement of 120 hours in some related field or course as approved in consultation with the instructor and the adviser. 3) The student may do an equivalent amount of library or laboratory research and write a research report to satisfy the requirement as approved by the adviser. This may take the form of a research proposal.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. offers both Plan A (with thesis) and Plan B (without thesis) options. Both options require at least 14 course credits in the major and 6 course credits in the minor or related field. Plan A also requires at least 10 thesis credits. Plan B also requires at least an additional 10 graduate credits in approved courses and a Plan B paper. The minor may be chosen from fields such as biochemistry, chemistry, chemical engineering, microbiology, nutrition, and statistics. All students also are expected to participate as teaching assistants during their graduate careers.
Twin Cities Campus
Food Science Minor
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/foodsciencegraduate/index.htm

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 10
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For a master's minor, the following courses must be taken: FSCN 4111 and 4121, and BAE 4744. The minor must be approved by the food science director of graduate studies.

For a Ph.D. minor, students must take FSCN 4111 and 4121, BAE 4744, and one additional food science graduate-level course totaling 12 credits. The minor must be approved by the food science director of graduate studies.
Twin Cities Campus
Food Science Ph.D.
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/foodsciencegraduate/index.htm

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants to the program need a bachelor’s degree in any field or its international equivalent along with demonstrated research ability such as a MS degree or publications.

The minimum requirements are general chemistry with laboratory, organic chemistry with laboratory, physics with laboratory, biology with laboratory, and calculus. If preparation appears inadequate, certain additional courses may be required after admission. Graduate Record Examination (GRE) General Test scores, and the TOEFL (for international students) are also required.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The number of credits required varies depending on preparation (such a M.S. in food science) and the research undertaken. Of these, at least 12 credits must be in the minor or related fields and 24 credits must be doctoral thesis credits. The student and the adviser, with the approval of the graduate studies committee, determine coursework in the major. All students also must participate as teaching assistants during their graduate career.
Land and Atmospheric Science M.S.

Contact Information:
Department of Soil, Water, and Climate, 439 Borlaug Hall, 191 Upper Buford Circle, St. Paul, MN 55108 (612-625-5251; fax: 612-625-2208)
Email: laas@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and Atmospheric Science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and Atmospheric Science Graduate Program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

B.S. degree in a related field of science, or a graduate or professional degree.

Basic Sciences
Students are expected to have taken a minimum of four of the following courses (or their equivalent).
- MATH 1271 - Calculus I [MATH] (4.0 cr)
  or MATH 1142 - Short Calculus [MATH] (4.0 cr)
- MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
- PHYS 1011 - Physical World (3.0 cr)
  or ESPM 3131 - Environmental Physics (3.0 cr)
- BIOL 1009 - General Biology [BIOL] (4.0 cr)
  or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

Environmental Sciences
Students are expected to have taken a minimum of two of the following (or similar) courses:
- ESPM 1425 - The Atmosphere [PHYS, ENV] (4.0 cr)
- SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
- ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
- ESPM 3612W - Soil and Environmental Biology [WI] (3.0 cr)
  or MICB 3301 - Biology of Microorganisms (5.0 cr)
- BIOL 3407 - Ecology (3.0 cr)
Student course admission prerequisites are as shown below. Students who are admitted with deficiencies would be provided with a list of courses they are required to take before the completion of their degree. This list would be developed by the directors of graduate studies in consultation with the student's faculty adviser.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language (TOEFL, IELTS, MELAB).

Program Requirements

**Plan A**: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B**: Plan B requires 20 major credits and 10 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project**: The Plan B project typically consists of a technical paper of a topic and length acceptable to the student's advisory committee.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

All M.S. students must complete a minimum of 30 credits: 14 credits in the major area, one seminar (1 cr) teaching experience, and a minimum of 6 credits in a minor or related field. Plan A students must take a minimum of 10 thesis credits; Plan B students must complete a Plan B paper and fulfill the 30-credit minimum by taking 10 credits of coursework or a special project to replace the 10 thesis credits.

Plan A students in the soil science concentration must take three out of the four core courses in soil science. Plan A students in the climatology concentration must take two or more courses in climatology or atmospheric sciences (approved by the student's advisory committee) and two of the four core courses in soil science.

Plan B students in the soil science concentration must take all four core courses in soil science. Plan B students in the climatology concentration must take three or more courses in climatology or atmospheric sciences (approved by the student's advisory committee) and two of the four core courses in soil science.

**Core Courses**

Take exactly 3 course(s) totaling exactly 5 credit(s) from the following:

- **LAAS 5050** - Integrated Topics in Land & Atmospheric Science (3.0 cr)
- **LAAS 8128** - Land and Atmospheric Science Seminar (1.5 cr)
- **SOIL 8123** - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
**Twin Cities Campus**

**Land and Atmospheric Science Minor**

**Soil, Water, & Climate**

**College of Food, Agricultural and Natural Resource Sciences**

Link to a list of faculty for this program.

**Contact Information:**

Email: laas@umn.edu

Website: [http://www.laas.umn.edu](http://www.laas.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and Atmospheric Science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and Atmospheric Science Graduate Program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

The minor in LAAS for doctoral students requires a minimum of 12 graduate-level credits of regular coursework (not special problems) in land and atmospheric science. The minor in LAAS for master's students requires a minimum of 9 graduate-level credits in LAAS.

All students seeking a minor in LAAS must take LAAS 5050 - Integrated Topics in Land and Atmospheric Science (3 cr). The remaining 9 or 6 credits for the doctoral or master's minor, respectively, must come from other graduate-level LAAS courses.

**Integrated Topics**
All students are required to take the following course.

Take 1 or more course(s) totaling exactly 3 credits(s) from the following:
- LAAS 5050 - Integrated Topics in Land & Atmospheric Science (3.0 cr)

**Other LAAS courses**
Take 6 credits for M.S. minor or 9 credits for Ph.D. minor from the following options, or others approved by the DGS and the LAAS graduate faculty member serving as the minor adviser.

LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)

or
LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)

or
LAAS 8128 - Land and Atmospheric Science Seminar (1.5 cr)

or
LAAS 5051 - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)

or
LAAS 5425 - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
Twin Cities Campus
Land and Atmospheric Science Ph.D.
Soil, Water, & Climate
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Email: laas@umn.edu
Website: http://www.laas.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 50
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Land and Atmospheric Science (LAAS) is a science-based interdisciplinary program focused on the fundamentals of Earth system processes related to land and atmosphere and their coupled interactions. Students have the option to develop a program based on one of the more traditional areas in atmospheric science or soil science or to design their own interdisciplinary course of study bridging the two disciplines. The Land and Atmospheric Science Graduate Program has no formal tracks or emphasis areas, but instead allows students to design a curriculum that addresses their interests within the scope of the program. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

Applicants to the LAAS Ph.D. program are expected to have an M.S. degree or equivalent in a related field of science.

Basic Sciences
Students are expected to have taken a minimum of four of the following courses (or their equivalent):
- MATH 1271 - Calculus I [MATH] (4.0 cr)
  or MATH 1142 - Short Calculus [MATH] (4.0 cr)
  or MATH 2243 - Linear Algebra and Differential Equations (4.0 cr)
  PHYS 1011 - Physical World (3.0 cr)
  or ESPM 3131 - Environmental Physics (3.0 cr)
- BIOL 1009 - General Biology [BIOL] (4.0 cr)
  or STAT 3011 - Introduction to Statistical Analysis [MATH] (4.0 cr)

Environmental Sciences
Students are expected to have taken a minimum of two of the following (or similar) courses:
Take 2 - 6 course(s) from the following:
- ESPM 1011 - Issues in the Environment [ENV] (3.0 cr)
- ESPM 1425 - The Atmosphere [PHYS, ENV] (4.0 cr)
- SOIL 2125 - Basic Soil Science [PHYS, ENV] (4.0 cr)
- ESCI 1001 - Earth and Its Environments [PHYS, ENV] (4.0 cr)
- ESPM 3612W - Soil and Environmental Biology [WI] (3.0 cr)
  or MICB 3301 - Biology of Microorganisms (5.0 cr)
- BIOL 3407 - Ecology (3.0 cr)
Students with a B.S. degree and outstanding scholarship can request direct admission to the LAAS Ph.D. program. Each request will be considered on a case-by-case basis by the Graduate Advisory Committee. Evidence of outstanding scholarship may include: peer-reviewed publications, a pre-doctoral fellowship, a National Science Foundation Ph.D. Fellowship, high GPA/GRE scores, or strong previous research experience. Current M.S. candidates who exhibit outstanding scholarship may request transfer to a Ph.D. degree program after completion of their first two semesters of coursework.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

16 credits are required in the major.
10 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must take two seminars (1 credit each), 2 credits of teaching experience, a minimum of 12 credits in a minor or supporting program, and 24 thesis credits. Students in the soil science concentration must take all four core area courses in soil science. Students in the climatology concentration must take a minimum of two courses in climatology or atmospheric sciences (approved by the student's advisory committee) and two of the four core area course in soil science.

**Core Courses**

Take exactly 5 course(s) totaling exactly 10 credits(s) from the following:

- **LAAS 5050** - Integrated Topics in Land & Atmospheric Science (3.0 cr)
- **LAAS 8128** - Land and Atmospheric Science Seminar (1.5 cr)
- **SOIL 8123** - Research Ethics in the Plant and Environmental Sciences (0.5 cr)
- **LAAS 5051** - Thesis Proposal Writing for Land & Atmospheric Science (2.0 cr)
- **GRAD 8101** - Teaching in Higher Education (3.0 cr)

**LAAS and Related Courses**

Choose courses relevant to particular area of research with consent of adviser.

Take 4 or more course(s) totaling 16 or more credits(s) from the following:

- **LAAS 5311** - Soil Chemistry and Mineralogy (3.0 cr)
- **LAAS 5425** - Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere (3.0 cr)
- **AGRO 5121** - Applied Experimental Design (4.0 cr)
- **AGRO 5321** - Ecology of Agricultural Systems (3.0 cr)
- **CE 4502** - Water and Wastewater Treatment (3.0 cr)
- **CE 4562** - Environmental Remediation Technology (3.0 cr)
- **CE 5180** - Special Topics (1.0 - 4.0 cr)
- **CE 5541** - Environmental Water Chemistry (3.0 cr)
- **CE 5542** - Experimental Methods in Environmental Engineering (3.0 cr)
or CE 8503 - Environmental Mass Transport (4.0 cr)
or CE 8506 - Stochastic Hydrology (4.0 cr)
or CE 8521 - The Atmospheric Boundary Layer (4.0 cr)
or CE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
or CE 8551 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
or CE 8552 - Analysis and Modeling of Aquatic Environments II (3.0 cr)
or EEB 4068 - Plant Physiological Ecology (3.0 cr)
or EEB 4611 - Biogeochemical Processes (3.0 cr)
or EEB 5053 - Ecology: Theory and Concepts (4.0 cr)
or EEB 5146 - Science and Policy of Global Environmental Change (3.0 cr)
or EEB 5601 - Limnology (3.0 cr)
or EEB 5605 - Limnology Laboratory (2.0 cr)
or ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences (3.0 cr)
or ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
or ESPM 5111 - Hydrology and Water Quality Field Methods (3.0 cr)
or ESPM 5402 - Biometeorology (3.0 cr)
or ESPM 5601 - Principles of Waste Management (3.0 cr)
or ESPM 5608 - Bioremediation (3.0 cr)
or FR 5262 - Remote Sensing of Natural Resources and Environment (3.0 cr)
or FW 8459 - Stream and River Ecology (3.0 cr)
or GEOG 5401 - Geography of Environmental Systems and Global Change (4.0 cr)
or GEOG 5421 - Introduction to Atmospheric Science (3.0 cr)
or GEOG 5423 - Climate Models and Modeling (3.0 cr)
or GEOG 5426 - Climatic Variations (3.0 cr)
or GEOG 8270 - Seminar: Climatology (3.0 cr)
or LAAS 5426 - Atmospheric Processes II: Radiation, Composition, and Climate (3.0 cr)
or LAAS 5515 - Soil Formation: Earth Surface Processes and Biogeochemistry (3.0 cr)
or ME 5115 - Air Quality and Air Pollution Control (4.0 cr)
or MICB 4111 - Microbial Physiology and Diversity (3.0 cr)
or PBIO 5412 - Plant Physiology (3.0 cr)
or PUBH 6100 - Topics: Environmental Health (0.5 - 4.0 cr)
or PUBH 6190 - Environmental Chemistry (3.0 cr)
or PUBH 6191 - Air Pollution (3.0 cr)
or SOIL 4505 - Soil Geography: Soil Variability on Planet Earth (2.0 cr)
or SOIL 5232 - Vadose Zone Hydrology (3.0 cr)
or SOIL 5555 - Wetland Soils (3.0 cr)
or SOIL 5611 - Soil Biology and Fertility (3.0 cr)
or SOIL 8252 - Advanced Soil Physics (2.0 cr)
or SOIL 8510 - Advanced Topics in Pedology (2.0 - 4.0 cr)
or SOIL 8541 - Aquatic and Soil Chemistry (3.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)
or STAT 5302 - Applied Regression Analysis (4.0 cr)
or STAT 5303 - Designing Experiments (4.0 cr)

**Thesis credits**

10 completions allowed; no grade associated; maximum 18 credits per semester or summer; 24 credits required.
Take 24 or more credits from the following:

- **LAAS 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)**
Twin Cities Campus
Natural Resources Science and Management M.S.
Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 105 Green Hall, 1530 Cleveland Avenue N., St. Paul MN 55108 (612-624-7683; fax: 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.


Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Most admitted students have earned degrees in natural resource-related majors. Applicants with exceptional academic records but no related background are eligible; if admitted, they may complete the prerequisites for advanced courses during the early stages of their graduate program. These prerequisites will vary depending upon the student's track and major adviser.

Applicants will not be admitted unless a member of the program faculty agrees to advise them ahead of time. This decision depends on admissibility (the applicant's overall credentials), mutual research interests, and the faculty member's ability to take on a new student. Some faculty members will not advise students unless they have funding for the student. Applicants are encouraged to review faculty profiles on the program website and begin making contacts prior to and during the application process.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 to 24 major credits and 6 to 16 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Plan B project(s) is(are) designed in consultation with the student's adviser and committee. It(They) must develop and demonstrate competence in the student’s track.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. is offered under Plan A (with thesis) and Plan B (without thesis). Plan A requires at least 20 coursework credits and Plan B requires at least 30 coursework credits. Plan A students must also register for 10 thesis credits. Plan A students usually design a program to support their specific thesis project. In consultation with faculty members, Plan B students design a program that develops competence in at least one track. Students present a seminar on the thesis or the Plan B project. Specific requirements vary by track; prospective students should contact the director of graduate studies or a prospective faculty adviser for specific information. Students must also receive training in the ethical conduct of research and present a formal seminar to faculty and peers. This presentation is separate from the final exam seminar.

**Joint- or Dual-degree Coursework:** Law, Health and the Life Sciences Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Assessment, Monitoring, and Geospatial Analysis**
Addresses measurements and related technology applications and resource analysis. Graduate students in this track may choose to specialize in topics such as: geographic information systems (GIS); remote sensing; geospatial analysis; survey design (including forest inventory and monitoring), measurement, modeling; and biometrics. Studies typically focus on landscape, region, or global levels.

**Economics, Policy, Management, and Society**
For students interested in focusing on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Graduate students in this track can specialize in areas such as: economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning. Studies might consider choices, impacts, and tradeoffs in protecting, restoring, developing, and allocating natural and environmental resources. The research conducted by students in this track may address a wide range of issues and problems from local to international in scope.

**Forest Hydrology and Watershed Management**
Brings together the integrally related areas of earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Graduate students in this track may specialize in areas such as: forest hydrology, water quality, and watershed management. Research would focus on forest, riparian, and wetland ecosystems.

**Forest Products**
For students who wish to specialize in areas such as: wood and fiber as raw materials; deterioration of wood; wood mechanics and structural design; wood moisture interactions and drying; processing and performance of composites; economics of manufacturing systems; technology and processing of solid wood products; marketing, design and production of housing components; and energy-efficient building construction.

**Forests: Biology, Ecology, Conservation, and Management**
Focuses on forest resources and allows students to choose from specializations in the following areas: forest biology, ecology, ecophysiology; genetics and tree improvement; tree physiology; reproductive biology and forest regeneration; forest growth and vegetation dynamics; timber harvesting, silviculture, and sustainable forest management; landscape ecology; restoration, and
management; conservation of biodiversity and wildlife habitat management; forest health; disturbance (including fire) ecology; urban and community forestry; and agroforestry. Research normally focuses on forest and related ecosystems.

**Paper Science and Engineering**
Specializes in areas such as: the chemistry and biotechnology of lignocellulosic materials; material science of paper and fiber products; paper recycling; energy and manufacturing efficiency in the pulp and paper-making process; novel and environmentally friendly pulping and bleaching, transport processes through porous media, surface and colloid science of papermaking; chemical engineering applications in pulp and paper processes; and statistical process control.

**Recreation Resources, Tourism, and Environmental Education**
Focuses on the use and management of natural resources for recreation and tourism. Graduate students in this track may specialize in areas such recreational land management, resource-based tourism, planning for recreation and tourism, and the human dimensions of natural resource uses. Additionally, students may focus on environmental education and leadership for effective communication with diverse publics about natural resources.

**Wildlife Ecology and Management**
For students interested in working with leaders in ecology, physiology, evolution, genetics, statistics, computer science, forestry, natural resource policy, and the social sciences as they relate to wildlife; ecology and management; and conservation biology.
Twin Cities Campus

Natural Resources Science and Management Minor
Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 105 Green Hall, 1530 Cleveland Avenue N., St. Paul MN 55108 (612-624-7683; fax 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.


Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students should contact the director of graduate studies. The selection of courses is influenced by the student's background and educational objective. Minor field competence is evaluated in the oral exam.
Twin Cities Campus
Natural Resources Science and Management Ph.D.
Bioproducts and Biosystems Engineering, Fisheries, Wildlife, and Conservation Biology, Forest Resources
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Forest Resources, 105 Green Hall, 1530 Cleveland Avenue N., St. Paul MN 55108 (612-624-7683; fax: 612-625-5212)
Email: nrsm@umn.edu
Website: http://www.nrsm.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 59 to 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.


Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Most admitted students have earned degrees in natural resource-related majors. Applicants with exceptional academic records but no related background are eligible; if admitted, they may complete the prerequisites for advanced courses during the early stages of their graduate program. These prerequisites will vary depending upon the student's chosen track and major adviser.

Applicants will not be admitted unless a member of the program faculty agrees to advise the student ahead of time. This decision depends on admissibility (the applicant's overall credentials), mutual research interests, and the faculty member's ability to take on a new student. Some faculty members will not advise students unless they have funding for the student. Applicants are encouraged to review faculty profiles on the program website and begin making contacts prior to and during the application process.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
23 to 33 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

Plan A: Plan A requires null major credits, null credits outside the major, and null thesis credits. The final exam is oral.

Plan B: Plan B requires null major credits and null credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The University of Minnesota requires at least 48 credits for a doctoral degree, 24 of which must be thesis credits. The NRSM graduate program will typically expect to see 40 to 50 course credits. If a student enters the program with a relevant master's degree, relevant credits from the prior degree can be transferred in to apply toward the doctoral degree pending adviser, committee, graduate program, and college approval. Normally, a student who enters the doctoral program with a master's degree will complete 20-30 additional credits in the major program. At least 12 semester credit hours are required in a related or minor field.

Course selection and thesis proposals are developed by each student in consultation with the faculty adviser and are approved by the Natural Resources Science and Management Graduate Studies Committee. Students must also receive training in the ethical conduct of research and present a formal seminar to faculty and peers. This presentation is separate from the final exam seminar.

Joint- or Dual-degree Coursework: Law, Health and the Life Sciences
Student may take a total of 12 credits in common among the academic programs.

Program Sub-plans
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

Assessment, Monitoring, and Geospatial Analysis
Addresses measurements and related technology applications and resource analysis. Graduate students in this track may choose to specialize in topics such as: geographic information systems (GIS); remote sensing; geospatial analysis; survey design (including forest inventory and monitoring), measurement, modeling; and biometrics. Studies typically focus on landscape, region, or global levels.

Economics, Policy, Management, and Society
For students interested in focusing on how society values and makes decisions about the use, management, and protection of natural and environmental resources. Graduate students in this track can specialize in areas such as: economics, policy, administration and management, planning, operations research, conflict resolution, human dimensions, and land use planning. Studies might consider choices, impacts, and tradeoffs in protecting, restoring, developing, and allocating natural and environmental resources. The research conducted by students in this track may address a wide range of issues and problems from local to international in scope.

Forest Hydrology and Watershed Management
Brings together the integrally related areas of earth sciences, soils, and water resources management with an applied focus on wildland ecosystems, which may include the interface of forests with grasslands, wetlands, and agriculture. Graduate students in this track may specialize in areas such as: forest hydrology, water quality, and watershed management. Research would focus on forest, riparian, and wetland ecosystems.

Forest Products
For students who wish to specialize in areas such as: wood and fiber as raw materials; deterioration of wood; wood mechanics and structural design; wood moisture interactions and drying; processing and performance of composites; economics of manufacturing systems; technology and processing of solid wood products; marketing, design and production of housing components; and energy-efficient building construction.
Forests: Biology, Ecology, Conservation, and Management
Focuses on forest resources and allows students to choose from specializations in the following areas: forest biology, ecology, ecophysiology; genetics and tree improvement; tree physiology; reproductive biology and forest regeneration; forest growth and vegetation dynamics; timber harvesting, silviculture, and sustainable forest management; landscape ecology, restoration, and management; conservation of biodiversity and wildlife habitat management; forest health; disturbance (including fire) ecology; urban and community forestry; and agroforestry. Research normally focuses on forest and related ecosystems.

Paper Science and Engineering
Specializes in areas such as: the chemistry and biotechnology of lignocellulosic materials; material science of paper and fiber products; paper recycling; energy and manufacturing efficiency in the pulp and paper-making process; novel and environmentally friendly pulping and bleaching, transport processes through porous media, surface and colloid science of papermaking; chemical engineering applications in pulp and paper processes; and statistical process control.

Recreation Resources, Tourism, and Environmental Education
Focuses on the use and management of natural resources for recreation and tourism. Graduate students in this track may specialize in areas such recreational land management, resource-based tourism, planning for recreation and tourism, and the human dimensions of natural resource uses. Additionally, students may focus on environmental education and leadership for effective communication with diverse publics about natural resources.

Wildlife Ecology and Management
For students interested in working with leaders in ecology, physiology, evolution, genetics, statistics, computer science, forestry, natural resource policy, and the social sciences as they relate to wildlife, ecology and management, and conservation biology.
Twin Cities Campus
Nutrition M.S.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/nutritiongraduate/index.htm

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, Minn.); and V.A. Medical Center and Park Nicollet Institute (Minneapolis, Minn.).

Three subspecialty areas are offered in the program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work can be conducted locally or internationally in the laboratory, clinic, or field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent.

A strong foundation in the biological and physical sciences is required. This background includes college mathematics, the equivalent of one semester of general chemistry, organic chemistry, general biology, biochemistry, physiology, and statistics. For the doctoral program, additional prerequisite courses include calculus and physics. If there is evidence that the applicant has a good background in the sciences, some of the prerequisites can be met after admission. The M.S. program also requires the following nutrition courses, or equivalent, which may be completed after the student's admission to the program: Principles of Nutrition (FSCN 1112), Life Cycle Nutrition (FSCN 3612), and Human Nutrition (FSCN 4612).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project is a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The graduate faculty, including the student’s adviser and DGS, specify both the nature and extent of the course and project work necessary to satisfy this requirement.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

The M.S. is offered under both Plan A (thesis) and Plan B (non-thesis). Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits, including a Plan B project.

General requirements include the graduate nutrition core series (four courses), an orientation and presentation skills class, graduate courses in physiology, and statistics, an advanced topics course, and presentation of the thesis or project work. All students also are expected to obtain teaching experience, subject to the policies of the adviser's department or division.

**Program Sub-plans**

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Nutrition Minor
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/nutritiongraduate/index.htm

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 13
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, Minn.); V.A. Medical Center and Park Nicollet Institute (Minneapolis, Minn.).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires a minimum of 6 course credits in nutrition, including NUTR 5625 and NUTR 5626. A doctoral minor may be completed by taking NUTR5624, 5625, 5626, 5622, and 8620.
Twin Cities Campus
Nutrition Ph.D.
Food Science & Nutrition
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Food Science and Nutrition, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-6753; fax: 612-625-5272)
Email: fsgrad@umn.edu
Website: http://fscn.cfans.umn.edu/education/foodsciencegraduate/index.htm

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Nutrition is the study of how nutrients, both essential and nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, Minn.); V.A. Medical Center and Park Nicollet Institute (Minneapolis, Minn.).

Three subspecialty areas are offered in the doctoral degree program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work may be conducted locally or internationally in the laboratory, clinic, or field.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants to the program need a bachelor's degree in any field or its international equivalent, along with demonstrated research ability such as a M.S. degree or publications.

A strong foundation in the biological and physical sciences is required. This background includes college mathematics, the equivalent of one semester of general chemistry, organic chemistry, general biology, biochemistry, physiology, and statistics. For the doctoral program, additional prerequisite courses include calculus and physics. If there is evidence that the applicant has a good background in the sciences, some of the prerequisites can be met after admission. The Ph.D. program also requires the following nutrition courses, or equivalents, which may be completed after admission to the program: Principles of Nutrition (FSCN 1112), Life Cycle Nutrition (FSCN 3612), and Human Nutrition (FSCN 4612).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. offers three areas of specialization: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work may be conducted in the laboratory, clinic, or field, either locally or internationally.

The Ph.D. requires the graduate nutrition core series (four courses), an orientation and presentation skills class, graduate level courses in physiology, and statistics and two advanced topics courses. All students also are expected to obtain teaching experience, subject to the policies of the adviser's department or division.
Twin Cities Campus

Plant Pathology M.S.

Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpathgp@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with many other fields including food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements for the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Master's degree applicants must have a sound college background in the basic biological and physical sciences and mathematics.

Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, students must correct them during the first year of the graduate program. These courses cannot be counted as part of the degree program. All students accepted into the department with a B.S. degree are admitted into the M.S. program. After a minimum of two semesters, students who qualify may elect to change their degree status to the Ph.D. program. Criteria for the change include scholastic standing, potential for success in completing a Ph.D., and writing competency.

Special Application Requirements:
GRE scores are required for all students and TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 10 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 148
  - General Test - Analytical Writing: 4.5

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B option also requires one to three projects totaling ca. 120 hours. The content and procedures for completing the project(s) are to be determined and approved by the student's major adviser and the director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Regular attendance at weekly plant pathology seminars is expected. Internships are encouraged as part of the graduate experience and financial support is available on a competitive basis for international or domestic internships.

### Required Coursework

- **PLPA 5480:** Principles of Plant Disease (3 cr) must be completed if student lacks an introductory Plant Pathology course.
- **PLPA 8105:** Plant Bacteriology (2.0 cr)
- **PLPA 8104:** Plant Virology (2.0 cr)
- **PLPA 8200:** Seminar (1.0 cr)
- **PLPA 8123:** Research Ethics in Plant and Environmental Sciences (0.5 cr)

Students must enroll in a seminar or workshop on teaching methods.

All students are required to enroll in a minimum of four of the following courses, chosen in consultation with the director of graduate studies, adviser, and graduate advisory committee.

- Take 4 or more course(s) from the following:
  - **PLPA 5003:** Diseases of Forest and Shade Trees (3.0 cr)
  - **PLPA 5444:** Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
  - **PLPA 8103:** Plant-Microbe Interactions (3.0 cr)
  - **PLPA 5202:** Field Plant Pathology (2.0 cr)
  - **PLPA 5203:** Introduction to Fungal Biology (3.0 cr)
  - **PLPA 5300:** Current Topics in Molecular Plant Pathology (1.0 - 2.0 cr)
  - **PLPA 5301:** Plant Genomics (3.0 cr)

### M.S. in Plant Pathology, Molecular Option (Plan A only)

**Molecular Option Requirements**

M.S. students wishing to emphasize molecular plant pathology must complete the following course requirements in addition to the Plan A master's program requirements:

- **BIOC 4125:** Laboratory in Molecular Biology and Biotechnology, or equivalent.
- **PLPA 8103:** Plant-Microbe Interactions (3.0 cr)

**Suggested courses for the 6 supporting field credits**

Note: Students who wish to complete a designated minor (which is certified on the transcript, unlike the related-fields option, which is not) must complete 6 or more credits in a single field. A designated minor must be approved by the director of graduate studies in the minor field.
Take 6 or more credits(s) from the following:

• **AGRO 8241** - Molecular and Cellular Genetics of Plant Improvement (3.0 cr)
• **BIOC 5361** - Microbial Genomics and Bioinformatics (3.0 cr)
• **EEB 5221** - Molecular Evolution (3.0 cr)
• **GCD 5036** - Molecular Cell Biology (3.0 cr)
Twin Cities Campus
Plant Pathology Minor
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpathgp@umn.edu
Website: http://plpa.cfans.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with many other fields including food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements for the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Plant Pathology Ph.D.
Plant Pathology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Plant Pathology Graduate Program, 495 Borlaug Hall, 1991 Buford Circle, Saint Paul, MN 55108 (612-625-8200)
Email: plpathgp@umn.edu
Website: http://plpa.cfans.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 53
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research involving biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, biobased products, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements of the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a sound college background in the basic biological and physical sciences and mathematics.

Ph.D. applicants must satisfy all the prerequisites for the master's degree program in plant pathology or have a master's degree in plant pathology or in a field of natural science.

Applicants must have completed 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, they must be corrected during the first year of the graduate program. Applicants should note that these courses cannot be counted as part of the degree program. All students accepted into the department with only a B.S. degree are admitted into the M.S. degree program. After a minimum of two semesters, students who qualify may elect to change their degree status to the Ph.D. program. Criteria for the change include scholastic standing, potential for success in completing a Ph.D., and writing competency.

Special Application Requirements:
GRE scores are required for all students and TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students. Students may apply at any time; however, submission of all application materials by December 10 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 148

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

17 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Course requirements include enrollment in a supervised teaching or extension teaching experience. Degree programs are determined by the student and the student's advisory committee, with approval of the director of graduate studies. Regular attendance at weekly plant pathology seminars is expected. Internships are encouraged as part of the graduate experience and financial support is available on a competitive basis for international or domestic internships.

A detailed overview of course offerings and requirements, including additional details on the molecular plant pathology emphasis, is available on the plant pathology program website.

Required Coursework

All Ph.D. students must take the following courses (if not taken previously):

- PLPA 5480 - Principles of Plant Pathology (3.0 cr)
- PLPA 8104 - Plant Virology (2.0 cr)
- PLPA 8105 - Plant Bacteriology (2.0 cr)
- PLPA 5444 - Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions (3.0 cr)
- PLPA 8103 - Plant-Microbe Interactions (3.0 cr)
- PLPA 8123 - Research Ethics in Plant and Environmental Sciences (0.5 cr)
- PLPA 8005 - Supervised Classroom or Extension Teaching Experience (2.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)

Two semesters of PLPA 8200 - Plant Pathology Seminar (2 credits total, in addition to any credits taken during M.S. program).

Ph.D. in Plant Pathology, Molecular Option

Molecular Option Requirements

Ph.D. students wishing to emphasize molecular plant pathology must complete the following course requirements in addition to the standard Ph.D. program requirements.

- BIOC 4125 - Laboratory in Molecular Biology and Biotechnology, or equivalent
- PLPA 5301 - Plant Genomics (3.0 cr)
- PLPA 8300 - Current Topics in Molecular Plant Pathology (two semesters required), 2 credits total.

Suggested courses for the 12 supporting field credits:

- AGRO 8241 - Molecular and Cellular Genetics of Plant Improvement (3.0 cr)
• ANSC 5200 - Statistical Genetics and Genomics (4.0 cr)
• BIOC 5361 - Microbial Genomics and Bioinformatics (3.0 cr)
• CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
• EEB 5221 - Molecular Evolution (3.0 cr)
• GCD 5036 - Molecular Cell Biology (3.0 cr)
• GCD 8131 - Advanced Genetics and Genomics (3.0 cr)
• MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)

Laboratory Rotations
With approval of the director of graduate studies, Ph.D. students pursuing the molecular emphasis may, in their first year of residence, spend 12 weeks in one research laboratory or a 6-week period in each of two laboratories. The effort will be the equivalent to a half-time research assistantship. The purpose is to broaden the students’ background in laboratory methods and research approaches before beginning Ph.D. thesis research.
Twin Cities Campus
Risk Analysis for Introduced Species and Genotypes Minor
Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Department of Fisheries, Wildlife, and Conservation Biology, 115 Northern Forest Station, 1992 Folwell Avenue, St. Paul, MN 55108-1034 (612-625-0890; fax: 612-626-7080)
Email: isgigert@umn.edu
Website: http://isg-igert.umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 13
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in risk analysis for introduced species and genotypes is available to master's (M.A. and M.S.) and doctoral students. The minor provides an interdisciplinary curriculum that addresses all phases of risk analysis pertaining to the introduction of exotic species and novel genotypes. The curriculum is based on collaborative learning and includes a survey course, discussions, a problem solving practicum, and a cooperative learning practicum. The minor complements major programs in applied economics; applied plant sciences; conservation biology; ecology, evolution, and behavior; entomology; natural resources science and management; plant biological sciences; and water resources science.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 graduate credits from the core curriculum; the doctoral minor requires 13 graduate credits. Master's students must take ISG 5010 (3 cr), ISG 5020 (1 cr), and ISG 8001 (1 cr; taken twice for credit).

The doctoral minor requires at least 13 credits, including the master's courses, plus ISG 8021 (3 cr), ISG 8031 (1 cr), and a 3-credit course in quantitative modeling or a decision analysis course offered by another program.
Twin Cities Campus
Sustainable Agriculture Systems Minor
Agronomy & Plant Genetics
College of Food, Agricultural and Natural Resource Sciences

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Sustainable Agriculture Systems Minor, 411 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108 (612-625-3754; fax:612-625-1268)
Email: jorda020@umn.edu
Website: http://www.misa.umn.edu/StudentPrograms/GraduateMinor/index.htm

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in sustainable agriculture systems offers master's (M.A. and M.S.) and doctoral students an interdisciplinary curriculum that considers the biological, sociological, and economic aspects of agriculture. The minor emphasizes a holistic perspective to designing farming and food systems and solving problems in agriculture. The importance of yield and profitability are balanced by considerations of the environment and the health and social well-being of producers, consumers, and communities. The minor complements major programs in ecology, conservation biology, forestry, sociology, geography, political science, and public affairs, as well as majors in the College of Food, Agricultural and Natural Resource Sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 graduate credits from the core curriculum; the doctoral minor requires 12 graduate credits. All students must take SAGR 8010 and 8020. The other core course is AGRO 5321 - Ecology of Agricultural Systems (cross listed with ENT 5321). A unique component of the minor is an on-site internship with growers, grassroots organizations, or public agencies working in sustainable agriculture.
Twin Cities Campus
American Studies M.A.
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The master's degree in American studies is not designed as a terminal degree; therefore, students are not admitted directly to the M.A. program. Students may apply for graduate study at the Ph.D. level only. A Ph.D. student may elect to pursue the M.A. All Ph.D. coursework is applicable. Current graduate students seeking to obtain the M.A. should review the information in the current Graduate Handbook on the website at http://americanstudies.umn.edu/grad/handbook.html.

American studies is an interdisciplinary, interdepartmental program. The American studies graduate faculty consists of American studies core faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate major in a field related to American studies or other preparation acceptable to the Admissions Committee for American studies is required.

Special Application Requirements:
American studies admits for graduate study at the Ph.D. level only. Ph.D. students may obtain a M.A. during the course of their studies; however no students are admitted for a terminal M.A. Students entering the Ph.D. program must hold at least a bachelor's level degree from a recognized institution of higher education. The deadline for application to the Department of American Studies is December 1 of the year prior to intended entry. Refer to the department website for application procedures and additional information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language

A minimum GPA of 3.50 is required for students to remain in good standing.

The master's degree is not designed as a terminal degree; therefore, students are not admitted directly to the M.A. program. A Ph.D. student may elect to pursue the M.A. All Ph.D. coursework is applicable. Current graduate students seeking to obtain the M.A. should review the information in the current Graduate Handbook on the program website at http://americanstudies.umn.edu/grad/handbook.html.
Twin Cities Campus

American Studies Minor
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

American studies is an interdisciplinary, interdepartmental program. The American studies graduate faculty consists of American studies core faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For a master's minor, students are expected to choose courses consistent with or complementary to their major. Students should complete either AMST 8201 or 8202 and two more courses in American studies.

For a doctoral minor, students must complete at least 12 credits of courses consistent with or complementary to their major, including four 5xxx or 8xxx courses in American studies, one of which must be AMST 8201 or AMST 8202.
Twin Cities Campus
American Studies Ph.D.
American Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of American Studies, 104 Scott Hall, 72 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4190; fax: 612-624-3858)
Email: amstdy@umn.edu
Website: http://americanstudies.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

American studies is an interdisciplinary, interdepartmental program. The American studies graduate faculty consists of American studies core faculty members and graduate faculty members drawn from a wide number of departments. Students develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
An undergraduate major in a field related to American studies or other preparation acceptable to the Admissions Committee for American studies is required.

Special Application Requirements:
American studies admits students for graduate study at the Ph.D. level only. (Ph.D. students may obtain a M.A. during the course of their studies, but students are not admitted for a terminal M.A.) Students entering the Ph.D. program must hold at least a bachelor’s level degree from a recognized institution of higher education. The deadline for application to the Department of American Studies is December 1 of the year prior to intended entry. Refer to the program website for application procedures and additional information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

Ph.D. students must complete the following course distributions: four core American studies courses (Introductory Seminars AMST 8201 and AMST 8202; AMST 8401 - Practicum in American Studies; and AMST 8801 - Dissertation Seminar); a minimum of three seminars, one of which must require original research; one comparative culture course covering international or non-U.S. topics; and seven adviser-approved courses, at least one of which must focus on American cultural diversity. With adviser approval, any or all of the above listed seminars (except the required core courses) may count toward these seven courses. Twenty-four thesis credits are also required. Ph.D. students may register for 0999 no more than two semesters total without approval from their adviser and the director of graduate studies.
Twin Cities Campus

Anthropology M.A.

Anthropology
College of Liberal Arts

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: anth@umn.edu
Website: http://anthropology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Department of Anthropology admits students for the master's degree only in cultural heritage management, although in some cases students admitted to the Ph.D. program complete a master's degree as they work toward the Ph.D.

The department offers graduate education in sociocultural anthropology, linguistic anthropology, anthropological archaeology, and biological anthropology. Major areas of faculty research and graduate student training in sociocultural anthropology include colonial and post-colonial studies, cultures of capitalism, cultural studies of science, economic anthropology, ethnographies of the state, gender/sexuality, globalization, medical anthropology, personality and culture, and urban anthropology, among other specialties. Regional specializations include Europe, Latin America, the Pacific, the Middle East, North America, Russia, and South Asia.

The program in linguistic anthropology offers training and research opportunities in language, culture, and power; theory in sociolinguistics and the semantics of interaction; paralinguistic and nonlinguistic semiotics; and the anthropology of language styles. Regional specializations include the Middle East and the urban United States.

The program in biological anthropology offers training and research opportunities in two main areas: paleoanthropology and behavioral biology. The paleoanthropology specialty combines biological anthropologists and Paleolithic archaeologists in the reconstruction of hominin evolution and behavior through the application of evolutionary theory to the analysis of skeletal morphology, faunal remains, site taphonomy, and lithic technology. The behavioral biology specialty combines the department's biological anthropologists as well as primatologists in the Jane Goodall Institute's Center for Primate Studies in the study of non-human primates, human foragers, evolutionary ecology, and evolutionary theory. Regional specializations include Africa, Southwest Asia, Central Asia, and Europe.

The program in anthropological archaeology offers training and research opportunities in the use of sociocultural theories and interpretive strategies in the reconstruction of historic and prehistoric pasts, the application of faunal and lithic analysis to questions in paleoecology and evolutionary theory, and cultural heritage management through the M.A. program. Regional specializations include Europe, Southwest Asia, Central Asia, and North America.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For the master's program in cultural heritage management, students with a background in anthropology or archaeology are preferred because of the two-year nature of the program and the demanding final oral examination. Likewise, students with field and/or laboratory experience are preferred because of the nature of the competencies that structure the program. Nonetheless, all applicants to the cultural heritage management program are considered and students with little or no background in anthropology or archaeology are accepted depending on interest and training. These students may be required to make up specified deficiencies during their program.

Special Application Requirements:
Three letters of recommendation and scores from the General test of the GRE should be sent to the director of graduate studies.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Students are admitted for fall semester only; the deadline for all materials is December 1.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is a demonstration of familiarity with the tools of research or scholarship in the graduate student's area of study, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project, though advisers may require as many as three such projects. The norm in anthropology is two to three projects. Master's-level projects are often the result of work carried out in a seminar or course (e.g., a paper), and are generally polished in a directed reading or research course. Plan B project(s) should involve a combined total of approximately 120 hours of work. With the approval of their advisers, graduate students have considerable flexibility in defining the nature of their Plan B project(s).

Cultural Heritage Management is a two-year, no-thesis Plan B master's program designed for individuals interested in becoming principal investigators in a non-academic cultural heritage positions.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Students should consult the Graduate Student Handbook for special requirements for sociocultural anthropology, linguistic anthropology, archaeology, and biological anthropology.


Twin Cities Campus

Anthropology Minor

Anthropology

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: anth@umn.edu
Website: http://anthropology.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor program in anthropology is individually designed by each student in consultation with a faculty advisor at both the master's and Ph.D. level. Consult the director of graduate studies about selecting an adviser.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's and doctoral minor programs are both individually designed by the student and a faculty adviser. For the master's minor, students must complete a minimum of 6 credits in anthropology. For the doctoral minor, students must complete a minimum of 12 credits in anthropology, with at least one 8xxx course. Course choices are subject to the approval of the director of graduate studies.
Twin Cities Campus
Anthropology Ph.D.

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Anthropology, 395 Hubert H. Humphrey Center, 301 19th Avenue South, Minneapolis, MN 55455 (612-625-3400; fax: 612-625-3095)
Email: anth@umn.edu
Website: http://anthropology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Anthropology offers graduate education in sociocultural anthropology, linguistic anthropology, anthropological archaeology, and biological anthropology. With the exception of the master's in cultural heritage management, the program admits students only for the Ph.D., although some students do earn a master's degree as part of their Ph.D. program. Major areas of faculty research and graduate student training in sociocultural anthropology include colonial and post-colonial studies, cultures of capitalism, cultural studies of science, economic anthropology, ethnographies of the state, gender/sexuality, globalization, medical anthropology, personality and culture, and urban anthropology, among other specialties. Regional specializations include Europe, Latin America, the Pacific, the Middle East, North America, Russia, and South Asia.

The program in linguistic anthropology offers training and research opportunities in language, culture, and power; theory in sociolinguistics and the semantics of interaction; paralinguistic and nonlinguistic semiotics; and the anthropology of language styles. Regional specializations include the Middle East and the urban United States.

The program in biological anthropology offers training and research opportunities in two main areas: paleoanthropology and behavioral biology. The paleoanthropology specialty combines biological anthropologists and Paleolithic archaeologists in the reconstruction of hominin evolution and behavior through the application of evolutionary theory to the analysis of skeletal morphology, faunal remains, site taphonomy, and lithic technology. The behavioral biology specialty combines the department's biological anthropologists as well as primatologists in the Jane Goodall Institute's Center for Primate Studies in the study of non-human primates, human foragers, evolutionary ecology, and evolutionary theory. Regional specializations include Africa, Southwest Asia, Central Asia, and Europe.

The program in anthropological archaeology offers training and research opportunities in the use of sociocultural theories and interpretive strategies in the reconstruction of historic and prehistoric pasts, the application of faunal and lithic analysis to questions in paleoecology and evolutionary theory, and cultural heritage management through the M.A. program in cultural heritage management. Regional specializations include Europe, Southwest Asia, Central Asia, and North America.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A B.A. degree or equivalent is required for admission.

Graduate students who enter the Ph.D. program with an M.A. degree in anthropology or a closely related field from another institution will generally enter the program at the second-year level. Should second-year requirements (e.g., the research paper, preparation for the bibliography) prove overly challenging for the graduate student, in most cases the student will be required to continue their second year activities into their third year. In addition, they may be asked to take courses in areas of perceived weakness.

Special Application Requirements:
Three letters of recommendation and scores from the General test of the GRE should be sent to the director of graduate studies. Admission is for fall semester only; the deadline for all materials is December 1.
Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

During the first year, students are required to take at least one graduate-level (8xxx) seminar in the Ph.D. program each semester. Students should consult the Graduate Student Handbook for special requirements for sociocultural anthropology, linguistic anthropology, archaeology, and biological anthropology. Language requirements depend upon student's special area of research.
Twin Cities Campus
Art History M.A.
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, University of Minnesota, 338 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: http://www.arthist.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of specialization in the art history master's degree program include: American art and architecture; Baroque art and architecture; early modern art; East Asian art and Bronze Age archaeology; Greek and Roman art and archaeology; Islamic art and architecture; late Gothic and northern Renaissance art; modern art and theory, including film and photography studies as well as 19th- through 21st-century art; Latin American art and architecture; and South Asian art and architecture.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For the M.A. program, a bachelor's degree is required, preferably in art history or a closely related field. Ability and scholarly promise must be demonstrated by a past record of academic excellence.

Special Application Requirements:
For the M.A. program, results from the GRE General Test, at least one substantial research paper preferably in art history, and three letters of recommendation from persons well acquainted with the applicant's research and writing skills are required. In addition, M.A. applicants must provide a detailed statement describing previous experience and academic training as related to the projected course of study and academic goals.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 21 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: The Plan B capstone project requires two Plan B papers demonstrating the student's mastery of the essential skills of scholarship. One paper is written on a subject in the area of the student's primary concentration. This paper is supervised by the student's academic adviser. The second paper is written on a subject in the area of the student's secondary concentration and is supervised by someone other than the academic adviser. Term papers or seminar reports may serve as the basis for the Plan B papers, or the topic may be the result of independent study. The student and the project supervisor should decide upon a suitable length for an adequate treatment of the chosen topic. The projects will be evaluated and approved by two art history graduate faculty, one of whom is the project supervisor. Both are required to sign the title page of the paper. Upon completion of the Plan B papers, they should be submitted to the graduate studies secretary.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Reading proficiency in a second language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A minimum of 36 course credits (about 12 courses) is required, including at least two 8xxx seminars in art history (in addition to ARTH 8001, and excluding ARTH 8975). A minimum of 21 credits must be comprised of art history in content and be drawn from courses in at least three of the following areas: American, ancient, early modern, East Asian, Islamic, medieval, modern and contemporary, Latin American, or South Asian. Of these, three courses must be in an area of primary concentration, two courses in an area of secondary concentration, and one course in a third area. Students focusing on Asian/Islamic art must take at least one course in Western art. Students focusing on Western art must take at least one course in Asian/Islamic art. In addition, students must take 6 credits in courses that do not focus on art history in content. The remaining 9 credits may be either in art history or outside the discipline; these are chosen in consultation with the adviser and the director of graduate studies.
Twin Cities Campus
Art History Minor
Art History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, 338 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: http://www.arthist.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 11
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of specialization in the art history program include: American art and architecture; Baroque art and architecture; early modern art; East Asian art and Bronze Age archaeology; Greek and Roman art and archaeology; Islamic art and architecture; late Gothic and northern Renaissance art; modern art and theory, including film and photography studies as well as 19th- through 21st-century art; Latin American art and architecture, and South Asian art and architecture.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum of 11 graduate credits in art history is required for a master's minor. For the Ph.D., a minimum of 12 art history credits of 5xxx or higher coursework is required.
Twin Cities Campus
Art History Ph.D.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art History, 338 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-4500; fax: 612-626-8679)
Email: arthist@umn.edu
Website: http://www.arthist.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The art history program does not admit students directly to the Ph.D. All art history graduate students begin in the M.A. program and are expected to continue on toward the Ph.D.

Areas of specialization in the art history program include: American art and architecture; Baroque art and architecture; early modern art; Greek and Roman art and archaeology; Islamic art and architecture; late Gothic and northern Renaissance art; modern art and theory, including film and photography studies as well as 19th- through 21st-century art; Latin American art and architecture, and South Asian art and architecture.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Note: The program does not admit students directly to the Ph.D. All graduate students in art history begin in the M.A. program and are expected to continue on toward the Ph.D. Graduate students who join the program already having completed a master's degree or graduate-level coursework at another institution may be allowed to transfer credits. See the department website for more information or contact the director of graduate studies.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
18 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in two foreign languages.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A minimum of 54 course credits (about 18 courses), inclusive of credits earned for the M.A. degree, is required. At least 18 credits (about 6 courses) must be in an area of primary concentration within art history, while a minimum of 9 credits (about 3 courses) must be in an area of secondary concentration in art history. In addition, at least 6 credits (about 2 courses) must be outside the field of art history in the minor or supporting program beyond work done at the M.A. level. A minimum of 12 credits in a minor or supporting field is required.
Twin Cities Campus
Art M.F.A.
Art
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art, E201 Regis Center for Art, 405 21st Avenue South, Minneapolis, MN 55455 (612-625-8096; fax: 612-625-7881)
Email: artdept@umn.edu
Website: http://www.art.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of fine arts program places major emphasis on creative artistic work of high quality. It promotes not only the conceptual and technical education of the professional artist in their artistic practice, encouraging critical inquiry, excellence, and an understanding of the history of art, but also an experimental approach toward each media. The following areas of concentration are available: ceramics, drawing and painting, photography, printmaking, sculpture, and experimental and media arts. The M.F.A. is considered the terminal degree in the field of fine arts and is typically the degree required to teach at the college or university level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Admission to the M.F.A. program is highly competitive. In addition to meeting Graduate School application requirements, students applying to the program must demonstrate a high degree of capability and commitment in their artistic portfolio and must submit all of the following to the director of graduate studies: a one page statement of artistic and academic intent, the Department of Art Supplementary Application form, transcripts of all coursework, and three letters of recommendation. Students are admitted for fall semester only.

Ceramics, painting, and sculpture applicants must submit a digital portfolio with 10 to 20 images of work completed in their chosen medium. Printmaking applicants must submit a minimum of 4 original prints in addition to the digital portfolio. Experimental and media arts applicants must submit a portfolio in the medium appropriate to the work being submitted for review. Photography applicants may submit 10 to 20 digital images or a minimum of 10 finished prints. Instructions for submitting the portfolio may be found at the department's website: www.art.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 51 major credits and 9 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: At the end of the thesis year, candidates demonstrate their visual research accomplishments through a solo, creative thesis exhibition on campus, and a supporting paper.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.F.A. program requires a total of 60 credits. It is typically a three-year program and studio space is provided for a maximum of three consecutive years for the pursuit of appropriate artistic research. The program recommends that coursework be completed before the final year of creative thesis registration. Candidates must plan programs with their advisers to include the graduate seminars ARTS 8400 (taken in the first term) and ARTS 8410 (taken in the second year) and up to 18 credits of creative thesis coursework. The related field requirement of 9 credits includes a minimum of one course in the history of art and two courses from other academic departments pertinent to the student's program. Candidates must be reviewed annually for progress through the program. At the end of the thesis year, candidates demonstrate their artistic research accomplishments through a solo, creative thesis exhibition on campus, a supporting paper, and a final oral exam.
Twin Cities Campus

Art Minor

Art

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Art, E201 Regis Center for Art, 405 21st Avenue South, Minneapolis, MN 55455 (612-625-8096; fax: 612-625-7881)
Email: artdept@umn.edu
Website: http://www.art.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor program in art places major emphasis on creative artistic work of high quality. It promotes not only the conceptual and technical education of the professional artist in their artistic practice, encouraging critical inquiry, excellence, and an understanding of the history of art, but also an experimental approach toward each media. The following media areas are available: ceramics, drawing and painting, photography, printmaking, sculpture, and experimental and media arts.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minor in art may be obtained by candidates in a master's program by completing 9 credits of graduate-level coursework chosen in consultation with the director of graduate studies in art. Candidates in a Ph.D. program must complete 12 credits. The minor must include ARTS 8400 - Theoretical Constructions in Contemporary Art.
Twin Cities Campus

Asian Literatures, Cultures, and Media M.A.
Asian Languages and Literatures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Asian Languages and Literatures, 220 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-6534; fax: 612-624-5513)
Email: all@umn.edu
Website: http://all.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Asian Languages and Literatures Department does not admit students directly to the M.A. degree. It considers applications only from students seeking the Ph.D. degree. The M.A. is offered only as an exit degree or interim credential.

The Asian literatures, cultures, and media (ALCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their ALCM program application form. Currently, students may select Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate studies. For details, see the graduate program website at www.all.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Only applications from students seeking the Ph.D. degree are considered, although applicants are not required to have taken graduate coursework before entering the program. The M.A. is offered as an exit degree or interim credential. A bachelor's degree from an accredited U.S. institution (or its foreign equivalent) is required for admission. Students entering with an M.A. in a related field will have the appropriate number of credits and courses applied to their program of study (as determined by the director of graduate studies). Applicants are expected to have a strong academic record from a relevant humanities or social science discipline and at least three years of college-level study in the proposed language of concentration, or a demonstration of comparable linguistic proficiency.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Advanced knowledge in the chosen language.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.A. is offered only under Plan B, which requires 30 credits. A Ph.D. qualifying exam, normally given at the end of the student's second year in the program, also serves as the M.A. exam. Students entering the program with an M.A. in a related field can take this qualifying exam after one year of study, with approval of the director of graduate studies.

The final exam consists of the following: 1) written language exam(s), typically an in-room reading/translation exam on materials directly related to study and research interests; 2) oral presentation and interview (conducted in the language of concentration) discussing the materials that were part of the written exam; 3) submission of two Plan B research papers for evaluation (normally papers from two different classes, revised for submission); and 4) oral exam (in English) by the above committee, based on the submitted papers.
Asian Literatures, Cultures, and Media Minor
Asian Languages and Literatures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Asian Languages and Literatures, 220 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-6534; fax: 612-624-5513)
Email: all@umn.edu
Website: http://all.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Asian literatures, cultures, and media (ALCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their ALCM program application form. Currently, students may select Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate studies. For details, see the graduate program website at www.all.umn.edu

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

For the doctoral minor, students are expected to take a minimum of 15 credits in graduate courses offered in the Department of Asian Languages and Literatures, 8 of which must be at the 8xxx level; the student must also pass the reading language exam that is part of the Ph.D. qualifying exam for ALCM (see above). The director of graduate studies acts as the student's adviser and approves a course of study.
Twin Cities Campus
Asian Literatures, Cultures, and Media Ph.D.
Asian Languages and Literatures
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Asian Languages and Literatures, 220 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-6534; fax: 612-624-5513)
Email: al@umn.edu
Website: http://al.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 77
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Asian literatures, cultures, and media (ALCM) program enables students to pursue the study of Asian texts and media, broadly understood. The program encourages work that questions the boundaries of traditional area studies, demands proficiency in the language(s) of concentration, and provides opportunities for students to design a flexible program of study. Students must designate a language of concentration on their ALCM program application form. Currently, students may select Chinese, Japanese, Korean, or Hindi/Urdu for their language of concentration. However, it is possible to select another South Asian language with permission of the director of graduate studies. For details, see the graduate program website at www.al.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Only applications from students seeking the Ph.D. degree are considered, although applicants are not required to have taken graduate coursework before entering the program. (The M.A. is offered as an exit degree or interim credential.) A bachelor's degree from an accredited U.S. institution (or its foreign equivalent) is required for admission. Students entering with an M.A. in a related field will have the appropriate number of credits and courses applied to their program of study (as determined by the director of graduate studies). Applicants are expected to have a strong academic record from a relevant humanities or social science discipline and at least three years of college-level study in the proposed language of concentration, or a demonstration of comparable linguistic proficiency.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
41 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Reading and speaking competence in the language.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

The student must also pass the reading language exam that is part of the Ph.D. qualifying exam for ALCM.
Twin Cities Campus
Audiology Au.D.
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhs@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 94
- This program requires summer semesters for timely completion.
- Degree: Doctor of Audiology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The emphases in the Au.D. program focus on meeting the standards for certification as an audiologist by the American Speech-Language-Hearing Association. The program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development.

Accreditation
This program is accredited by the American Speech-Language-Hearing Association (ASHA).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Prerequisite coursework for the Au.D. program includes transcript credit in statistics, social science, and scientific method/inquiry.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
86 credits are required in the major.
8 credits are required outside the major.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The Au.D. is a four-year plan of study for students entering with a background in speech-language-hearing sciences. Students without such a background should expect an additional year of study. In addition to study in the major field, the degree requires 8 related-fields credits. Students may complete a M.A. degree before their final year of study. During the final year, students complete a clinical externship. Summative evaluations will include a written comprehensive examination followed by an oral exam, and a written capstone project that includes an oral presentation and an oral defense of the project.

Joint- or Dual-degree Coursework: Au.D. and Ph.D. Student may take a total of 9 credits in common among the academic programs.
Twin Cities Campus
Classical and Near Eastern Studies M.A.

Classical & Near Eastern Studies
College of Liberal Arts

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnes@umn.edu
Website: http://cnes.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and near eastern studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various M.A. and Ph.D. tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching. Students entering the Ph.D. program with an M.A. can usually receive credit for some earlier coursework, subject to the approval of the graduate faculty and graduate school requirements. Related special facilities include the Center for Medieval Studies, the Center for Jewish Studies, and the Center for Modern Greek Studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

For the major track in classics, students should have sufficient knowledge to begin graduate reading courses in either Greek or Latin and at least intermediate ability in the other language.

In addition to the online Graduate School application, applicants must complete the Department of Classical and Near Eastern Studies application on the ApplyYourself site (also available for download on the department website); other supporting materials, including recommendations and a writing sample, can be uploaded directly into the Graduate School's online application. For non-native speakers of English, a copy of TOEFL results is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Two research papers from departmental seminars (numbered 8190 or 8910) as long as the paper receives a grade of B+ or higher and makes substantive use of at least one modern scholarly language other than English. Once approved, each paper must be submitted to the DGS for placement in the student's official file. Only minor revisions are allowed. The two papers, which should ordinarily total at least 40 pages, are consulted by members of the student's exam committee in advance of the final oral exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Translation proficiency exams offered 1x semester.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Ancient and Medieval Art and Archaeology

Note: This sub-plan is inactive. CNES is currently not accepting applications for this program.

This sub-plan allows concentrations ranging broadly over the ancient and medieval periods, with an emphasis on art historical and archaeological approaches. Work in an appropriate ancient language is encouraged.

Language Requirements: Reading knowledge of one modern foreign language appropriate to the student's program is required (normally German, French, or Italian).

Final Exam: The final exams are written and oral.

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 9 credits in graduate art/archaeology courses with a CNES designator.

Classics

This sub-plan provides broad training in the literature of ancient Greece and Rome in its cultural context. Work in Greek and Latin is supplemented by courses in a related field or area of interest.

The program requires nearly equal emphasis on courses and seminars in Greek and in Latin, as well as supporting work in a related field or area of interest. The minimum requirement for Plan A is 44 credits (including 10 thesis credits), and for Plan B, 34 credits.

Language Requirements: One modern research language as appropriate (normally French, German, or Italian) and reading proficiency in both Greek and Latin as certified by a department exam based on a set reading list is required.

Final Exam: The final exams are written (Greek and Latin reading proficiency) and oral (general).

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 6 credits in graduate-level Latin courses (excluding LAT 8120) and 6 credits in graduate-level Greek courses (excluding GRK 8120).

Greek

A core of advanced work in Greek is supplemented by a minor or supporting program in a related field or area of interest. The minimum requirement for Plan A is 41 credits (including 10 thesis credits), and for Plan B, 31 credits.

Language Requirements: One modern research language as appropriate, preferably French, German, or Italian, and reading...
proficiency in Greek as demonstrated by a department exam based on a set reading list is required.

Final Exam: The final exams are written (Greek reading proficiency) and oral (general).

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 9 graduate credits of Greek (excluding GRK 8120).

Latin
A core of advanced work in Latin is supplemented by a minor or supporting program in a related field or area of interest. The minimum requirement for Plan A is 41 credits (including 10 thesis credits), and for Plan B, 31 credits.

Language Requirements: One modern research language as appropriate, preferably German, French, or Italian, and reading proficiency in Latin as demonstrated by a department exam based on a set reading list is required.

Final Exam: The final exams are written (Latin reading proficiency) and oral (general).

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 9 graduate credits of Latin (excluding LAT 8120).

Religions in Antiquity
The religions in antiquity track is comparative in both method and content. Although students may focus on a particular religious tradition, they will nonetheless study several ancient religions. Plan A requires 28 credits in the major, 6 credits in a related field, plus 10 thesis credits. Plan B requires 28 credits in the major plus 6 credits in a related field.

Language Requirements: Proficiency in one modern language (normally German) and master's-level proficiency in classical Hebrew, Greek, or Latin as demonstrated by a department exam based on a set reading list is required.

Final Exam: The final exams are written (ancient language reading proficiency) and oral (general).
Twin Cities Campus
Classical and Near Eastern Studies Minor
Classical & Near Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnes@umn.edu
Website: http://cnes.cla.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 10 to 13
- Length of program in credits (Doctorate): 15 to 17
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and near eastern studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various M.A. and Ph.D. tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in either Greek or Latin.
Twin Cities Campus
Classical and Near Eastern Studies Ph.D.
Classical & Near Eastern Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Classical and Near Eastern Studies, 245 Nicholson Hall, 216 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-625-5353; fax: 612-624-4894)
Email: cnes@umn.edu
Website: http://cnes.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Classical and near eastern studies (CNES) is an interdisciplinary department that brings together faculty and graduate students who might in other settings be dispersed among a wide range of programs. CNES is dedicated to rigorous philological and literary training and to the conviction that the ancient Mediterranean world is best studied as a diverse but richly integrated cultural whole. The various M.A. and Ph.D. tracks allow students to concentrate in the area and period that most appeal to them, but students are strongly encouraged to take courses across the entire range of the department's offerings and to develop a broad, multidisciplinary approach to research and teaching. Students entering the Ph.D. program with an M.A. can usually receive credit for some earlier coursework, subject to the approval of the graduate faculty and graduate school requirements. Related special facilities include the Center for Medieval Studies, the Center for Jewish Studies, and the Center for Modern Greek Studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

In addition to the online Graduate School application, applicants must complete the Department of Classical and Near Eastern Studies application on the ApplyYourself site (also available for download on the department website); other supporting materials, including recommendations and a writing sample, can be uploaded directly into the Graduate School's online application. For nonnative speakers of English, a copy of TOEFL results is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: German and a second modern research language.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Ancient and Medieval Art and Archaeology**

Note: This sub-plan is currently inactive. CNES is currently not accepting applications for this program.

This sub-plan allows concentrations ranging broadly over the ancient and medieval periods, with an emphasis on art historical and archaeological approaches. Graduate-level ability in an appropriate ancient language is required for graduation.

Students who continue from the M.A. program may apply those credits toward the Ph.D., with the exception of Plan A thesis credits or Plan B paper credits. A typical Ph.D. program is at least 60 credits, including at least 21 credits in the major, 12 in a supporting program, and 24 thesis credits.

Language Requirements: Reading proficiency in German and in a second modern research language as appropriate (usually French), and research knowledge of an ancient language are required.

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 12 credits in graduate art/archaeology courses with a CNES designator.

**Classics**

This sup-plan requires extensive advanced work in both Latin and Greek, together with some study in a related field or area of interest.

The program requires nearly equal emphasis on courses and seminars in Greek and in Latin. Students must take at least three seminars in the major, a graduate level course in archaeology, and a two-semester sequence in ancient history, in addition to fulfilling all course requirements specified for the M.A. Students who continue from the M.A. program may apply those credits toward the degree, with the exception of Plan A thesis credits or Plan B paper credits. A typical Ph.D. program is at least 71 credits, including at least 35 credits in the major, 12 in the supporting program, and 24 thesis credits.

Language Requirements: German, plus another modern language, preferably French or Italian, and reading proficiency in Greek and Latin as demonstrated by a department exam based on a set reading list is required.

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 9 graduate credits of Greek or Latin (excluding GRK/LAT 8120) and 6 graduate credits in the other language (excluding LAT 8120).

**Greek**

A core of advanced work in Greek is supplemented by a minor or a supporting program in a related field or area of interest. Students must take at least three seminars in the major, a graduate level course in archaeology, and a two-semester sequence of ancient history in addition to completing all courses required for the M.A. Students who continue from the M.A. program may apply those credits toward the degree, with the exception of Plan A thesis credits or Plan B paper credits. A typical Ph.D. program is at least 70 credits, including at least 15 credits in Greek, 15 credits in the supporting program, and 24 thesis credits.

Language Requirements: German and a second modern language, preferably French or Italian, and reading proficiency in ancient Greek as demonstrated by a department exam based on a set reading list is required.

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794, as well as 15 graduate credits in Greek (excluding GRK 8120).
Latin
A core of advanced work in Latin is supplemented by a minor or supporting program in a related field or area of interest. Students must take at least three seminars in the major, a graduate-level course in archaeology, and a two-semester sequence in ancient history, in addition to completing all M.A. course requirements. Students who continue from the M.A. program may apply those credits towards the degree, with the exception of Plan A thesis credits or Plan B paper credits. A typical Ph.D. program is at least 70 credits, including at least 15 credits in Latin, 15 credits in the supporting program, and 24 thesis credits.

Language Requirements: German and a second modern research language, normally French or Italian, and reading proficiency in Latin as demonstrated by a department exam based on a set reading list is required.

Minor Requirements for Students Majoring in Other Fields: Students must complete CNES 5794 and 15 graduate credits of Latin (excluding LAT 8120).
Twin Cities Campus
Cognitive Science Minor
College of Liberal Arts - Adm
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3570; fax: 612-626-7253)
Email: cogsci@umn.edu
Website: http://www.cogsci.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 11
- Length of program in credits (Doctorate): 23
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Cognitive science is broadly concerned with integrating contemporary approaches to the study of mind/brain, and with the systems and processes underlying the acquisition and use of knowledge. The coherence of the program lies in its intellectual focus on cognition. This program spans cellular, behavioral, and psychological levels of scientific analysis in the study of cognition in a single unified graduate program. It integrates the diverse content, methods, and perspectives of a number of different disciplines (e.g., anthropology, biology, artificial intelligence, linguistics, neuroscience, philosophy, and psychology), which are concerned with or in some sense inform our understanding of cognition.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor Requirements for Students Majoring in Other Fields: The minor in cognitive science is available to master's (M.A. and M.S.) and doctoral students. Both master's and doctoral minors require the following courses outside the student's major department: CGSC 8001 Proseminar in Cognitive Science and a broad introduction to cognitive sciences, such as one of the following: IDSC 8711 - Cognitive Science; CGSC 8000 - Philosophy of Cognitive Science; PSY 5015 - Cognition, Computation, and Brain; CGSC 8040 - Cognitive Neuroscience.

The master's minor requires a minimum of 8 graduate credits (including the required courses listed above) and 3 credits of additional relevant elective courses.

The doctoral minor requires a minimum of 14 graduate credits (including the required courses listed above) and 9 credits of additional relevant elective courses. Substitutions for required courses are permitted only with prior permission from the director of graduate studies for cognitive science. Elected courses must be taught by faculty in the minor program or be approved in advance by the director of graduate studies for cognitive science. Courses in the student's major department do not count toward the minor.
**Twin Cities Campus**

**Cognitive Science Ph.D.**

College of Liberal Arts - Adm

College of Liberal Arts

Link to a [list of faculty](#) for this program.

**Contact Information:**
Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-626-3570; fax: 612-626-7253)
Email: cogsci@umn.edu
Website: [http://www.cogsci.umn.edu](http://www.cogsci.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Cognitive science is broadly concerned with integrating contemporary approaches to the study of mind/brain, and with the systems and processes underlying the acquisition and use of knowledge. The coherence of the program lies in its intellectual focus on cognition. This program spans cellular, behavioral, and psychological levels of scientific analysis in the study of cognition in a single unified graduate program. It integrates the diverse content, methods, and perspectives of a number of different disciplines (e.g., anthropology, biology, artificial intelligence, linguistics, neuroscience, philosophy, and psychology), which are concerned with or in some sense inform our understanding of cognition. The Ph.D. program trains cognitive scientists to conduct research integrating methodologies and content knowledge from a variety of approaches. In order to ensure an interdisciplinary approach, each student has two coadvisers from the cognitive science graduate faculty, each representing a different discipline from within the cognitive sciences.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

**Special Application Requirements:**
Applicants must apply through the Graduate School's Apply Now interface. They must submit a completed Graduate School Application, scores from the GRE, and three letters of recommendation. Applicants wishing to be considered for financial support should apply no later than January 1 of the preceding academic year. Entry is usually in fall semester but may be permitted in other semesters in exceptional cases.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to [test abbreviations](#)(TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements

34 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The Ph.D. program requires a minimum of 46 credits, in addition to 24 thesis credits. Students are required to take two core courses with a CGSC designator, as well as 9 credits of independent study related to research. Responsible Conduct of Research training is required and is integrated into the two core courses taken by all students. Other course requirements are distributed among component disciplines and fields. Courses are intended to provide a foundation for the student's research program. Students are expected to conduct two research projects prior to taking their preliminary written exams. A report on the first-year research project should be concluded by the first term of the second year. A report on the second-year research project should be completed by the second term of the third year. The preliminary written exams will typically be (but are not necessarily) expansions of the first- and second-year research projects. The two Ph.D. written preliminary projects are expected to be of near publishable quality. As entry into the Ph.D. program assumes no previous graduate work, students who enter the program with an M.A. or other graduate coursework in a cognitive science-related discipline may apply credits from their previous graduate work towards the required 46 credits.
**Twin Cities Campus**

**Communication Studies M.A.**

**Communication Studies**

**College of Liberal Arts**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Communication Studies, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN  55455 (612-624-5800; fax: 612-624-6544)

Website: [http://www.comm.umn.edu](http://www.comm.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Communication studies focuses on the study of communicative dimensions of human experience using humanistic and social scientific methods. This program prepares students to become researchers and teachers, offering three concentrations: interpersonal communication, rhetorical studies, and critical media studies.

Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended.

Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics.

Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes electronic media studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, and media regulation and industries. Coursework outside the department is usually in the fields of American studies, political science, cultural studies, mass communication, or women's studies.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.50.

All applicants must have completed at least 15 undergraduate credits in speech or communication courses related to their proposed area of emphasis in the department. A brochure detailing prerequisite requirements is available from the department or from the department website. All prerequisites must be completed before admission.

**Special Application Requirements:**

Applicants must submit scores from the GRE General Test, transcripts of all post-secondary academic work, and a written statement of academic and occupational objectives. Three letters of recommendation and a writing sample are required of all applicants for assistantships or fellowships.

Applicants must submit their test score(s) from the following:

- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 5
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 21 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: A publishable, article-length paper consisting of the student's original research.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

Inclusion of 4xxx courses on Degree Program Forms is subject to adviser and director of graduate studies approval. Such courses must be taught by graduate faculty and usually no more than one 4xxx course is allowed on a Degree Program Form.

The degree is offered under Plan A (thesis) and Plan B (without thesis). Plan A requires a minimum of 15 course credits in communication studies, including 3 course credits from a 5xxx or 8xxx course in one of the concentrations other than the student's own, a minimum of 6 course credits in a minor or related fields, and 10 thesis credits. Plan B requires a minimum of 21 course credits in communication studies, including 3 course credits from a 5xxx or 8xxx course in one of the concentrations other than the student's own, a minimum of 6 course credits in a minor or related field, an additional 6 credits in the field of student's choice, and a paper.
Twin Cities Campus

Communication Studies Minor

Communication Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Communication Studies, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455
(612-624-5800; fax: 612-624-6544)
Website: http://www.comm.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Communication studies focuses on the study of communicative dimensions of human experience using humanistic and social scientific methods. This program prepares students to become researchers and teachers, offering three concentrations: interpersonal communication, rhetorical studies, and critical media studies.

Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended.

Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics.

Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes electronic media studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, and media regulation and industries. Coursework outside the department is usually in the fields of American studies, political science, cultural studies, mass communication, or women's studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 credits. The doctoral minor requires 12 credits.
Communication studies focuses on the study of communicative dimensions of human experience using humanistic and social scientific methods. This program prepares students to become researchers and teachers, offering three concentrations: interpersonal communication, rhetorical studies, and critical media studies.

Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended.

Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics.

Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes electronic media studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, and media regulation and industries. Coursework outside the department is usually in the fields of American studies, political science, cultural studies, mass communication, or women's studies.

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

All applicants must have completed at least 15 undergraduate credits in speech or communication courses related to their proposed area of emphasis in the department. A brochure detailing prerequisite requirements is available from the department or from the department website. All prerequisites must be completed before admission.

Applicants must submit scores from the GRE General Test, transcripts of all postsecondary academic work, and a written statement of academic and occupational objectives. Three letters of recommendation and a writing sample are required of all applicants for assistantships or fellowships.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- **IELTS**
  - Total Score: 6.5

- **MELAB**
  - Final score: 80

Key to [test abbreviations](#) (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

Students must submit programs consisting of at least 42 course credits (which may include 12 credits from the M.A. and an additional 30 credits of doctoral coursework; at least 12 credits must be obtained from a related field or official graduate school minor; 6 course credits from a 5xxx or 8xxx course from each of the other concentrations other than the student's own); 24 thesis credits are required.

The program should include 12 credits in research methods relevant for completing the degree and continuing a scholarly career. Under certain circumstances, foreign language courses may be used to satisfy this requirement.
Comparative Literature M.A.
Cultural Studies & Comparative Literature
College of Liberal Arts

Twin Cities Campus

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-8099; fax: 612-626-0288)
Email: complit@umn.edu
Website: http://complit.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students normally are not admitted directly to the M.A. program. Ph.D students who decide not to finish the Ph.D., and who are in good standing may apply for a terminal M.A.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, the University focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary inquiry, directing much of its energies toward emergent literatures, within both First- and Third-World cultures, as well as toward related problems ranging from narrative to post-colonial studies. A major portion of coursework for degrees in comparative literature is cross-listed with the literature and language departments. Approval may also be given to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, and sociology. In all cases, students should consult with an adviser concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
  - Speaking test score: 0

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 20 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.
Capstone Project: One Plan B paper is required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

Students normally are not admitted to work toward the M.A. degree, but in the event that they are in good standing and decide not to finish the Ph.D., they may apply for a terminal M.A. Twenty-nine credits of coursework, including 6 credits of the basic seminar (CL 8001-8002), 3 credits of CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, 2 credits of CL 8902 - Methodologies Colloquium, 9 additional CL credits, 6 credits in courses in related fields outside comparative literature or in a formal minor in another program, and 3 credits either in CL courses or in the related minor field are required.
Twin Cities Campus

Comparative Literature Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-8099; fax: 612-626-0288)
Email: complit@umn.edu
Website: http://complit.cla.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, the University focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary inquiry, directing much of its energies toward emergent literatures, within both First- and Third-World cultures, as well as toward related problems ranging from narrative to postcolonial studies. A major portion of coursework for degrees in comparative literature is cross-listed with the literature and language departments. Approval may also be given to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, and sociology. In all cases, students should consult with an adviser concerning course selections.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor Requirements for Students Majoring in Other Fields: A minimum of 12 credits are required for a master's minor, which must include CL 8001 and 8002. A minimum of 12 credits is required for the doctoral minor and also must include CL 8001 and 8002.
Twin Cities Campus
Comparative Literature Ph.D.

Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN (612-624-8099; fax: 612-626-0228)
Email: complit@umn.edu
Website: http://complit.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Comparative literature is the oldest field of literary criticism, dating back to the seventeenth century. Among the wide range of studies currently conducted in comparative literature nationally and internationally, the University focuses on theories of literary criticism and its explanatory bases; indeed the program is seen as one of the principal initiators of such fields of study. This program is likewise engaged in pushing the bounds of critical inquiry in related domains of literary inquiry, directing much of its energies toward emergent literatures, within both First- and Third-World cultures, as well as toward related problems ranging from narrative to postcolonial studies. A major portion of coursework for degrees in comparative literature is cross-listed with the literature and language departments. Approval may also be given to take graduate courses in such areas as anthropology, art, architecture, history, music, philosophy, and sociology. In all cases, students should consult with an adviser concerning course selections.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in three languages.

A minimum GPA of 3.50 is required for students to remain in good standing.

The Ph.D. requires 47 credits as follows: 6 credits of the basic seminar (CL 8001-8002), 3 credits of CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, 2 credits of CL 8902 - Methodologies Colloquium, 24 credits in CL courses (with approval of the adviser and the director of graduate studies, up to 3 credits of the 24-credit requirement may be taken in the field of the minor or supporting program), and 12 credits in coursework that constitutes a supporting program. A supporting program may be a formal Graduate School minor, or it may be a program designed by students in consultation with their advisers. Overall, the degree should include 12 credits of 8xxx courses (exclusive of CL 8001-8002 and 8901). 24 thesis credits are also required.
Twin Cities Campus

Comparative Studies in Discourse and Society M.A.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-8099; fax: 612-626-0228)
Email: csds@umn.edu
Website: http://csds.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 29
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students normally are not admitted to work toward the M.A. In the event that a Ph.D. student decides not to finish the Ph.D. and is in good standing, that student may apply for a terminal M.A.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester research seminar that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Many courses are nonrecurring and closely relate to current faculty research. In all cases, students should consult their advisers and the director of graduate studies concerning course selections. Apart from the basic research seminar, each entering graduate student enrolls in CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, which focuses on developing skills and experience in teaching and other professional concerns, and CSDS 8902 - Methodologies Colloquium, which introduces students to the research interests and approaches of the core faculty.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan B:** Plan B requires 20 major credits and 6 credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Reading knowledge of one foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

M.A. Plan B Degree Requirements: Students normally are not admitted to work toward the M.A. degree. In the event that a Ph.D. student decides not to finish the Ph.D. and is in good standing, that student may apply for a terminal M.A. Twenty-nine credits of coursework are required, including 6 credits of the basic seminar (CL 8001-8002), 3 credits of CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, 2 credits of CSDS 8902 - Methodologies Colloquium, 9 additional CSDS credits, 6 credits in courses in related fields outside comparative studies in discourse and society or in a formal minor in another program, and 3 credits either in CSDS courses or in the related minor field are required. One Plan B paper is required.
Twin Cities Campus
Comparative Studies in Discourse and Society Minor
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-8099; fax: 612-626-0288)
Email: csds@umn.edu
Website: http://csds.cla.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester research seminar that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Many courses are nonrecurring and closely relate to current faculty research. In all cases, students should consult their advisers and the director of graduate studies concerning course selections. Apart from the basic research seminar, each entering graduate student enrolls in CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, which focuses on developing skills and experience in teaching and other professional concerns, and CSDS 8902 - Methodologies Colloquium, which introduces students to the research interests and approaches of the core faculty.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor Requirements for Students Majoring in Other Fields: A minimum of 12 credits is required for a master's minor, which must include CSDS 8001 and 8002. A minimum of 12 is required for a Ph.D. minor and must include CSDS 8001 and 8002.
Twin Cities Campus
Comparative Studies in Discourse and Society Ph.D.
Cultural Studies & Comparative Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 235 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-8099; fax: 612-626-0228)
Email: csds@umn.edu
Website: http://csds.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While most traditional humanistic disciplines tend to focus either on a given mode of discourse (e.g., art history, musicology) or a specific cultural context (e.g., American studies, European languages and literatures), this program engages a broader problematic—how discourse and cultural production both shape and are shaped by life in time, space, matter, and society. Drawing on a variety of theoretical positions, close attention is paid to various types of discourse, such as music, film, myth, ritual, architecture, landscape and urban design, painting, sculpture, and literature in elite, popular, folk, and mass culture, understanding these as both a site and an instrument of contestation and negotiation among social forces. More generally, the program seeks to re-associate intellectual and cultural history with social and political history, to set discourse of various sorts within a social context, and to consider specific social formations within the ongoing historical process. In all this, the program encourages work that is interdisciplinary (at times, even anti-disciplinary) as well as cross-cultural. The curriculum emphasizes seminars and directed research. The core requirement is a two-semester research seminar that develops critical and analytic skills and introduces current theoretical perspectives with the study of historical problems. Many courses are nonrecurring and closely relate to current faculty research. In all cases, students should consult their advisers and the director of graduate studies concerning course selections. Apart from the basic research seminar, each entering graduate student enrolls in CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, which focuses on developing skills and experience in teaching and other professional concerns, and CSDS 8902 - Methodologies Colloquium, which introduces students to the research interests and approaches of the core faculty.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

The Ph.D. requires 47 graduate credits of coursework as follows: 6 credits of basic seminar (CSDS 8001-8002), 2 credits of CSDS 8902 - Methodologies Colloquium, 3 credits of CSDS 8901 - Pedagogy of Cultural Studies and Comparative Literature, 24 credits in CSDS courses (with approval of the adviser and the director of graduate studies, up to 3 credits of the 24-credit requirement may be taken in the field of the minor or supporting program), and 12 credits (or more, as necessary) to complete a formal minor in another Graduate School program, excluding comparative literature. If a minor is not pursued in another program, the student must complete 12 credits in coursework outside of CSDS, CSCL, or CL courses in a coherent and complementary program to be approved by the adviser and the director of graduate studies. Overall, the degree should include 12 credits of 8xxx courses (exclusive of CSDS 8001-8002 and 8901). 24 thesis credits are also required.
Twin Cities Campus
Creative Writing M.F.A.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English, 222 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-6366; fax: 612-624-8228)
Email: creawrit@umn.edu
Website: http://creativewriting.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Creative Writing Program in the Department of English offers the master of fine arts degree for students committed to pursuing the writing life. This three-year degree provides advanced, graduate-level coursework in writing, language, and literature, as well as study in a related field. The third year of the program focuses on the final development of a book-length manuscript suitable for publication. At the heart of the program are writing workshops in poetry, fiction, and literary nonfiction, and courses in the Reading as Writers and Topics in Advanced Writing series, which enable writers to explore a variety of issues relating to contemporary themes in American and world literature. The program encourages experimentation across genres, fostering the discovery of new and varied forms for a developing voice. Students also have the opportunity to work editorially on dislocate, the graduate literary magazine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program does not require a graduate degree for admission.

Special Application Requirements:
The M.F.A. in creative writing does not require undergraduate work in English literature or an undergraduate degree in literature. Students come from a variety of educational backgrounds and life experiences. Applicants should be aware, however, that graduate coursework in literature and language is required once admitted to the program.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 45 major credits and 12 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone project is a publishable thesis manuscript of poetry, fiction, or creative nonfiction. The final exam is an oral defense of the thesis manuscript and literary essay.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.F.A. requires 45 credits distributed over a three-year period, culminating in a book-length manuscript, M.F.A. literary essay, and an M.F.A. defense.

Required coursework includes ENGW 8101, ENGW 8140/50/60 (4 cr); four writing workshops (16 cr), three of which must be in the student's genre of choice and include one 8xxx course, and one of which must be outside the student's primary genre; language and literature courses (7 cr); coursework in a related field (6 cr); and a creative project in the form of a book-length manuscript suitable for publication (12 cr, 8 of which are for thesis seminar and 4 for thesis credit registration).
Twin Cities Campus

Early Modern Studies Minor

History
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1030 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-625-6303; fax: 612-624-9813)
Email: emsdbgs@umn.edu
Website: http://www.cemh.umn.edu/minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The early modern studies (EMS) minor is available to master's (M.A. and M.F.A.) and doctoral students. The program encourages inquiry into the early modern period, roughly 1300 to 1800 A.C.E., using insights and perspectives from multiple disciplines. The minor provides graduate students with solid grounding in the theories and multi-disciplinary methods used by scholars studying the early modern period, particularly through the required core seminar (EMS 8250 - Seminar in EMS: Current Research and Methodologies), which is co-taught by professors from two distinct departments.

The minor also offers an opportunity to interact with the current research of visiting scholars and University of Minnesota faculty and graduate students through EMS 8100 - Workshop in Early Modern Studies, in which students share written responses to workshops and lectures on campus. Finally, the minor draws electives from existing courses in departments across the College of Liberal Arts, as well as those in the History of Science, Technology, and Medicine. The University of Minnesota has numerous library collections and research centers which include a focus on the early modern period. For more information on the minor, visit www.cemh.umn.edu/minor.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 7 graduate credits: EMS 8520 - Seminar in EMS: Current Research and Methodologies (3 cr), EMS 8100 - Workshop in EMS: Workshop in Early Modern Studies (1 cr), and one graduate-level elective course (3 cr) outside of the student's major department.

The doctoral minor requires 12 graduate credits: EMS 8520 - Seminar in EMS: Current Research and Methodologies (3 cr), EMS 8100 - Workshop in EMS: Workshop in Early Modern Studies (1 cr), and two graduate-level elective courses (3 cr) outside of the student's major department.
Twin Cities Campus
Economics M.A.
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econdgs@umn.edu
Website: http://www.econ.umn.edu/graduate/index.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only for the Ph.D. in economics; the M.A. is an optional part of the Ph.D. program.

The economics graduate program offers degree work in both theoretical and applied fields of economics. It is possible to pursue thesis research in microeconomic or macroeconomic theory. In addition, the following fields of specialization are offered: econometrics, economic growth and development, financial economics, game theory, industrial organization, international economics, labor economics, mathematical economics, monetary economics, and public economics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: Two Plan B projects consisting of research papers or literature reviews are required; the Ph.D. written preliminary exams required in two fields outside of economic theory ("field exams") may be used to satisfy either or both of the Plan B projects. Because the standards used to judge whether a preliminary exam has satisfied the requirement for the M.A. are less rigorous than those for the Ph.D., students may qualify for the master's Plan B without having satisfied all requirements for the Ph.D. written preliminary exams.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.20 is required for students to remain in good standing.
Twin Cities Campus
Economics Minor
Economics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econdgs@umn.edu
Website: http://www.econ.umn.edu/graduate/index.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The economics graduate program offers degree work in both theoretical and applied fields of economics. It is possible to pursue thesis research in microeconomic or macroeconomic theory. In addition, the following fields of specialization are offered: econometrics, economic growth and development, financial economics, game theory, industrial organization, international economics, labor economics, mathematical economics, monetary economics, and public economics.

Students are admitted only for the Ph.D.; the M.A. is an optional part of the Ph.D. program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor consists of 6 credits in 4xxx, 5xxx, or 8xxx economics courses, all taken A-F and completed with grades of B or better (one 8xxx course may carry a grade of C). The 6 credits must include two courses in either the 4161-4164 sequence or the 4165-4168 sequence, or more advanced courses in economic theory.

The economic theory requirement may be waived if, in the judgment of the director of graduate studies, the student's previous work in economics has included courses equivalent to 4xxx economic theory courses, though the requirement to complete 6 credits would still stand.

Requirements for a doctoral minor include five or more from among the following courses: ECON 8001-8004 or 8101-8104, and 8105-8108; plus completion of at least two 8xxx courses in economics other than those listed above. All courses must be taken A-F, with no grade lower than C and no more than two course grades of C.

In addition, students must pass the microeconomics preliminary exam for minors or majors and either the macroeconomics preliminary exam for minors or majors, or a preliminary exam for majors in one of the fields listed under the program description above.
Twin Cities Campus
Economics Ph.D.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Economics, 4-101 Hanson Hall, 1925 4th Street South, Minneapolis MN 55455 (612-625-6833; fax: 612-624-0209)
Email: econphd@umn.edu
Website: http://www.econ.umn.edu/graduate/index.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The economics graduate program offers degree work in both theoretical and applied fields of economics. It is possible to pursue thesis research in microeconomic or macroeconomic theory. In addition, the following fields of specialization are offered: econometrics, economic growth and development, financial economics, game theory, industrial organization, international economics, labor economics, mathematical economics, monetary economics, and public economics.

Students are admitted only for the Ph.D.; the M.A. is an optional part of the Ph.D. program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Special Application Requirements:
Coursework in linear algebra and multivariate calculus is required for admission to the Ph.D. program.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Quantitative Reasoning: 158

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 84

Key to test abbreviations(GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.20 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Emphasis in all aspects of the program is on careful development of the theoretical basis for the work, whether the work is theoretical or applied, and whether the relevant theory is drawn from economics, econometrics, mathematics, statistics, or other related disciplines.

Before undertaking research for a doctoral thesis, the student must pass written preliminary exams in micro- and macroeconomic theory, plus in two of the fields listed under the curriculum section above. The program does not specify a minimum number of courses for the major; rather, the courses taken to help prepare for the preliminary exams constitute the major program. In addition, students must complete 12 credits outside the major for a supporting program, which may include economics courses not included in the major.
Twin Cities Campus

English as a Second Language M.A.
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 NCCE 0093A, 315 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-4802; fax: 612-624-4579)
Email: slsinfo@umn.edu
Website: http://www.sls.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 32
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Admission to the M.A. program in English as a Second Language (ESL) has been temporarily suspended and applications are not being accepted at this time. Please contact the program at (slsinfo@umn.edu) for additional information.

The program in second language studies offers a course of study leading to an M.A. Degree holders are qualified to teach ESL to adults at the college or university level. The program emphasizes research and practice in language analysis, second language acquisition, teaching methodology, and language assessment. Students are expected to do independent and creative work in one or two of these areas with the aim of developing a more complete understanding of the issues facing professionals in the field of teaching ESL today.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

An introductory linguistics course is a prerequisite for master's-level ESL coursework. If this prerequisite is not met prior to matriculation, students must take LING 5001 in their first semester in the program.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Speaking Score: 25

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 23 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 23 major credits and 9 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is a paper of publishable quality based on ESL master's coursework, coursework in another program, or personal interest. Two Plan B papers are required; one may be a Teaching Portfolio, prepared according to specific program guidelines.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Proficiency in one language not native to student.

A minimum GPA of 3.20 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.A. program in ESL normally takes two years to complete. Plan A requires a thesis demonstrating original work in areas related to the field, familiarity with research methodology, and knowledge of the effective presentation of investigative study results. Plan B requires two qualifying papers, usually consisting of course papers which have been rewritten under the supervision of a faculty member.

Plan A and Plan B students must complete 23 credits in required coursework (SLS 5401, 5402, 5721, 5722, 5724, 5805) and 6 credits of elective coursework in related fields. Plan A students must complete an additional 10 thesis credits for a total of 39 credits and Plan B students must complete an additional 3 credits in elective coursework for a total of 32 credits. Elective and related field courses must be chosen with the help of an adviser to ensure the relevance of courses to students' goals.
Twin Cities Campus
English as a Second Language Minor
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 214 NCCE 0093A, 315 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-4802; fax: 612-624-4579)
Email: slsinfo@umn.edu
Website: http://www.sls.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 11
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in second language studies offers a course of study leading to an M.A. The program emphasizes research and practice in language analysis, second language acquisition, teaching methodology, and language assessment. Students are expected to do independent and creative work in one or two of these areas with the aim of developing a more complete understanding of the issues facing professionals in the field of teaching ESL today. Degree holders are qualified to teach ESL to adults at the college or university level.

The ESL minor consists of three required master's-level ESL courses: SLS 5401, 5402, and 5721, for a total of 11 credits.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

For a graduate minor in ESL, students must take SLS 5721, 5401, and 5402, for a total of 11 credits.
Twin Cities Campus

English M.A.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228)
Email: gradeng@umn.edu
Website: http://english.cla.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now composes not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the discipline--the traditional study of the literatures and languages in English--as well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to re-imagine its future shape.

The department offers a master of arts in English language and literature. The M.A. offers training in the areas of literary history, literary theory and interpretation, language, linguistics, rhetoric, and composition. Students in the M.A. can develop specific concentrations through consultation with the director of graduate studies.

Course requirements for the M.A. program are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A minimum of four courses in English, three of which must be at the upper-division level, is required for degree program admission. The courses should be widely distributed.

Special Application Requirements:
Required admission materials include three letters of recommendation; scores from the General Test of the GRE; a short essay explaining scholarly, professional, and personal goals and reason(s) for choosing the University of Minnesota; and a writing sample, such as a course paper. Candidates for all degrees are admitted fall semester only; all materials must be received by December 1st.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 164

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 105
- Paper Based - Total Score: 620
• IELTS
  - Total Score: 7.5
• MELAB
  - Final score: 88

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is made up of three Plan B papers. Each is a tightly argued essay of about 5,000 words, usually a reworking of a paper done originally for a course.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: A reading knowledge of one language.

A minimum GPA of 3.00 is required for students to remain in good standing.

The minimum requirement for the M.A. is 30 credits. Coursework must include at least 21 credits in English and 6 credits in related fields outside of English or in a minor field. All M.A. students must complete the introductory course ENGL 5001, introduction to literary theory and literary study, and three Plan B papers.
Twin Cities Campus

English Minor

English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, 207 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228)
Email: gradeng@umn.edu
Website: http://english.cla.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the discipline--the traditional study of the literatures and languages in English--as well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to reimagine its future shape.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor consists of 9 credits in English. Course selection is determined in consultation with the director of graduate studies.

The Ph.D. minor consists of 12 credits in English. Course selection is determined in consultation with the director of graduate studies.
Twin Cities Campus
English Ph.D.
English Language & Literature
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of English Language and Literature, 207 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax: 612-624-8228)
Email: gradeng@umn.edu
Website: http://english.cla.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Over the past 20 years, the field of English studies has changed dramatically from a discipline concerned with studying the literary works produced by English speakers in Britain and the United States to encompass writings in English from around the globe. The concerns of literary scholars have broadened to include not only textual analyses but also cultural, social, political, and economic contexts. The field of literature itself now encompasses not only the traditional genres of poetry, prose (fiction and belles-lettres), and drama, but also extra-literary discourses: popular culture, film, television, legal documents, conduct books, and manifestos. The Department of English has been in the forefront of interdisciplinary projects, thanks to the efforts of a faculty committed to research in American studies, medieval studies, feminist studies, film studies, and cultural studies. At the same time, the department maintains the core concerns of the discipline—the traditional study of the literatures and languages in English—as well as develops writers for the present and future through the master of fine arts in creative writing degree. The department is engaged in two simultaneous projects: to preserve the core curriculum and to re-imagine its future shape.

Course requirements for the Ph.D. program are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A minimum of four courses in English, three of which must be at the upper division level, is required. The courses should be widely distributed.

Special Application Requirements:
Students with a bachelor's degree may apply either to the master's program or the doctoral program. An M.A. degree, but not an M.F.A. degree, can be gained en route to the Ph.D. degree. M.A. candidates who wish to continue their studies must formally apply for admission to the Ph.D. program. Required application materials include three letters of recommendation; a short essay explaining scholarly, professional, and personal goals and reason(s) for choosing the University of Minnesota; and a writing sample, such as a course paper. Candidates for all degrees are admitted fall semester only; all materials must be received by December 1.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 164

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 105
- Paper Based - Total Score: 620
  • IELTS
    - Total Score: 7.5
  • MELAB
    - Final score: 88

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
27 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of two languages.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

A minimum of 39 course credits, and 24 thesis credits, is required. Course requirements for the Ph.D. program are broadly defined, allowing students to shape a personal program of study. The following courses are required: ENGL 5001 and 5800, preferably during the first year of doctoral study (6 cr); three English courses distributed among broad areas (minimum of 9 cr); four additional English courses in a focused area of emphasis (minimum of 12 cr); 12 credits in a supporting program, with a minimum of two courses outside the department. Students are encouraged to enroll in additional courses as appropriate.
Twin Cities Campus
Feminist and Critical Sexuality Studies Minor
Gender, Women and Sexuality
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-626-0332; fax: 612-624-3573)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Doctorate): 15
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor program in feminist and critical sexuality studies is located in the Department of Gender, Women, and Sexuality Studies (GWSS). The feminist and critical sexuality studies minor is a supplementary program for graduate students already admitted to the University of Minnesota and enrolled in another degree program in the Graduate School. The minor is designed for students with widely flexible interests and academic aims looking for advanced graduate academic training in feminist and critical sexuality studies. The program is also designed to provide an interdisciplinary graduate program in GLBTQ studies. Students must apply for special admission through the feminist studies director of graduate studies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

To complete a Ph.D. minor, students must complete GWSS 8108 and 8109 and three graduate-level electives (9 cr), including at least one 5xxx or 8xxx course in feminist studies (GWSS 8xxx or GWSS 5xxx) and, at most, one feminist studies-approved graduate course from their home department. Students must apply for admission into the graduate minor program.
**Twin Cities Campus**

**Feminist Studies M.A.**
*Gender, Women and Sexuality*

**College of Liberal Arts**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-626-0332; fax: 612-624-3573)
Email: gwss@umn.edu
Website: [http://www.gwss.umn.edu](http://www.gwss.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 52
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Note: The M.A. is available only to students admitted to the feminist studies Ph.D. program who wish to secure a Plan B M.A. along the way to obtaining a Ph.D. This credential is helpful for ABD employment purposes or for students who must exit the program. It is similar to the Ph.D. milestones but does not require a dissertation.

The Ph.D. program in feminist studies is designed to help students develop a high level of competence in feminist theories, research methods, interdisciplinarity, and pedagogies. The program is especially strong on feminist theory and issues related to women's diversity, nationally and globally. To guarantee a high level of interdisciplinary exchange, the program is designed to bring feminist studies doctoral students together with graduate minor students who are pursuing a disciplinary specialty in their own home department. The program's interdisciplinary curriculum emphasizes the interaction of social conditions such as class, ethnicity, race, sexualities, and national identity with gender. These interactions and their effects are examined in cultural productions such as media representations or colonialist paradigms in social systems and relations of power; in aspects of science such as genetics and new technologies; in epistemologies and philosophy; in professional areas such as health care to public policy; and in social, political, and environmental justice studies.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to [test abbreviations](#)(TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
Plan B: Plan B requires 16 major credits and 36 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is made available to students who file a separate Program of Study form in addition to a Ph.D. Program of Study form. The program of study is the same for both degrees. A Plan B M.A. is conferred upon successful completion of the written and oral preliminary exams.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.
Twin Cities Campus
Feminist Studies Ph.D.
Gender, Women and Sexuality
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Gender, Women, and Sexuality Studies, 425 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-626-0332; fax: 612-624-3573)
Email: gwss@umn.edu
Website: http://www.gwss.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 52
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. program in feminist studies is designed to help students develop a high level of competence in feminist theories, research methods, interdisciplinarity, and pedagogies. The program is especially strong on feminist theory and issues related to women's diversity, nationally and globally. To guarantee a high level of interdisciplinary exchange, the program is designed to bring feminist studies doctoral students together with graduate minor students who are pursuing a disciplinary specialty in their own home department. The program's interdisciplinary curriculum emphasizes the interaction of social conditions such as class, ethnicity, race, sexualities, and national identity with gender. These interactions and their effects are examined in cultural productions such as media representations or colonialist paradigms in social systems and relations of power, in aspects of science such as genetics and new technologies; in epistemologies and philosophy; in professional areas such as health care to public policy; and in social, political, and environmental justice studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

An M.A. in gender, women, and/or sexuality studies or a related field will be considered important, but is not required.

Preference is given to students with academic training or an undergraduate degree in gender, women, and/or sexuality studies or a related field. Extensive political work in these areas will also be considered important but not required.

Required core courses include GWSS 5103 - Feminist Pedagogies, GWSS 8108 and 8109 - Feminist Theories and Methods, GWSS 8997 - Feminist Research and Writing, GWSS 8996 - Feminist Studies Colloquia.

Special Application Requirements:
Applicants for the Ph.D. program must submit scores from the General (Aptitude) Test of the GRE, three letters of recommendation, a writing sample, a current curriculum vitae, and a clearly written statement of career interests, goals, and objectives by electronic application through the Graduate Office (Apply Yourself). Graduate study in the program begins in the fall semester following admission. The application deadline is December 1; all applications are evaluated once each year in December.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The course and credit requirements for the Ph.D. fall into roughly two categories: interdisciplinary courses satisfying core requirements, and courses constituting or enhancing a concentration. Students take 28 credits in required courses, including two elective courses that satisfy core requirements in cultural diversity and two courses that satisfy core requirements in research tools and methods. The remaining coursework includes 12 credits in an area of concentration and 12 credits in the minor field or supporting program (related to the concentration). Students are also expected to register for 1 credit of GWSS 8996 for each of 4 semesters and to participate in the department colloquium series of faculty, student, and guest lecturer presentations. In addition, students are expected to register for 24 thesis credits while writing the dissertation.

Because some courses may fall into more than one category (e.g., courses in the concentration may also satisfy core course requirements), students are permitted to double count credits in the major program in consultation with the director of graduate studies. This means that a student can graduate with fewer than 52 credits when double counting is approved. Students entering the Ph.D. program with a master's degree may transfer credits from that degree and apply them to the Ph.D. requirements in consultation with the director of graduate studies. All students, however, must take GWSS 8108 and 8109.
Twin Cities Campus
French M.A.
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-0418, fax: 612-624-6021)
Email: dgsfren@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The French program, which offers M.A. and Ph.D. degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, and Francophone studies.

Program Delivery
This program is available:
  • via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, a sample of their academic writing, an audio sample of their spoken French, and a written statement of research interests and goals. International student applicants should also submit scores for the TOEFL or equivalent English proficiency testing program. The program offers funding packages of five years for those admitted at the M.A. level. Submission of all application materials by December 20 ensures consideration for Graduate School Fellowships; submission by January 10 ensures consideration for other fellowships and graduate instructorships for the next academic year. New teaching assistants and fellowship recipients are only admitted for fall semester; others may be admitted in mid-year.

Special Application Requirements:
A B.A. in French (or equivalent), with a literary emphasis, is required for the M.A. programs. Applicants have generally completed at least 18 credits in French literature and culture. Prospective students whose undergraduate degree is in another field, but who have taken substantial coursework in French and are strongly motivated to pursue literary studies, are invited to contact the director of graduate studies in French.

International applicants must submit score(s) from one of the following tests:
  • TOEFL
    - Internet Based - Total Score: 79
    - Internet Based - Writing Score: 21
    - Internet Based - Reading Score: 19
    - Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 18 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in one foreign language.
Twin Cities Campus

French Minor
French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Email: dgsfren@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The French program, which offers M.A. and Ph.D. degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, and francophone studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires 9 credits. The doctoral minor requires 12 credits.
Twin Cities Campus

French Ph.D.

French & Italian
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-0418; fax: 612-624-6021)
Email: dgsfren@umn.edu
Website: http://www.frit.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2011
• Length of program in credits: 81
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The French program, which offers M.A. and Ph.D. degrees, covers all areas of French literature and culture from the Middle Ages to the present. Traditional areas of study and scholarship are inflected by the faculty's interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, and francophone studies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For the Ph.D. program, an M.A. in French (or equivalent) is required.

A B.A. in French (or equivalent), with a literary emphasis, is required for the M.A. programs. Applicants have generally completed at least 18 credits in French literature and culture. Prospective students whose undergraduate degree is in another field, but who have taken substantial coursework in French and are strongly motivated to pursue literary studies, are invited to contact the director of graduate studies in French.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, a sample of their academic writing, an audio sample of their spoken French, and a written statement of research interests and goals. International student applicants should also submit scores for the TOEFL or equivalent English proficiency testing program. The program offers funding packages of five years for those admitted at the M.A. level. Submission of all application materials by December 20 ensures consideration for Graduate School Fellowships; submission by January 10 ensures consideration for other fellowships and graduate instructorships for the next academic year. New teaching assistants and fellowship recipients are only admitted for fall semester; others may be admitted in mid-year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

45 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Proficiency in one foreign language.

The Ph.D. requires at least 57 course credits and 24 thesis credits. Coursework involves at least 45 credits in the major and at least 12 credits (usually four courses) in related fields or, in a minor, the number of credits required by the major program (usually 12 cr). Detailed information is available through program office.
**Twin Cities Campus**

**French Studies Postbaccalaureate Certificate**

*French & Italian*

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**
Department of French and Italian, 314 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Email: frit@umn.edu
Website: http://www.frit.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: French Studies PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This 15-credit graduate program is primarily for secondary teachers of French, but welcomes any prospective students wishing to enhance their knowledge of diverse areas of French and francophone studies, including linguistics, culture, literature, and film. Consisting of coursework only, the certificate provides the opportunity to explore in depth aspects of French and Francophone literature, culture, and language while also sharpening language skills. An additional benefit is the potential for professional advancement.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a B.A. in French or equivalent (B.A./B.S. in another field, but relevant professional experience or academic preparation in French language and culture) with a preferred GPA of 3.0.

**Special Application Requirements:**
Applicants must submit the following materials: transcripts, a personal statement (in English) explaining how this certificate meets their personal or professional goals, a writing sample in French (a 500-1,000 word essay on applicant's topic of choice), and two letters of recommendation from individuals who can comment knowledgeably on applicant's interest and abilities in French studies. Applications must be received by April 15 for fall semester and by October 15 for spring semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The certificate consists of five courses (15 cr) selected according to the following formula: one course (3 cr) in French linguistics, one course (3 cr) in French or francophone literature or culture, and three elective courses (9 cr) in French/francophone language, linguistics, literature, or culture. One of the three electives may be taken in a related area outside French studies, subject to approval by the student’s adviser. At least 60 percent of credits must from 5xxx and 8xxx courses; no more than two courses (6 cr) may be 4xxx courses. No courses taken as part of an undergraduate program may be applied, but up to 40 percent of the work on the certificate program can be transfer credits, consistent with the Graduate School’s transfer policy. Program must be completed within four years of the date of admission.
Twin Cities Campus

Geographic Information Science M.G.I.S.

Geography
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-1498; fax: 612-624-1044)
Email: mgis@umn.edu
Website: http://www.mgis.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 35 to 41
- This program does not require summer semesters for timely completion.
- Degree: Master of Geographic Information Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The professional master of geographic information science (M.G.I.S.), administered by the Department of Geography, provides graduate-level work in the theory, applications, and technology of geographic information science (GIS). Courses for the program are divided into three broad categories. Core courses provide the conceptual and theoretical underpinnings for a comprehensive, well-rounded knowledge of GIS, including an introductory seminar for entering students (GIS 8501). A set of technology courses focuses on specific software and techniques of GIS. Elective courses provide additional breadth to the program by allowing students to take courses related to their area of interest.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

Special Application Requirements:
Applicants must submit an application form; a M.G.I.S. supplemental application form; transcripts; a clearly written personal statement of career interests and goals; and three letters of recommendation from persons familiar with their academic and/or employment background. The GRE is not required. All materials must be submitted by January 30 for fall semester entrance and by September 1 for spring semester entrance.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7.5
- MELAB
  - Final score: 84

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 35 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The degree is offered under Plan C (coursework only) and requires 35 credits of coursework. All students must have at least 35 credits, with a minimum of 18 credits in core and technology courses (12 credits of core courses and 6 credits of technology courses). All students are required to take GEOG 5561, GEOG 5563, GIS 5571, GIS 5572, an approved 8290 geography seminar, and GIS 8501. At least 6 credits must be taken outside of the geography department (GEOG and GIS designators) but may include core GIS courses (e.g., FR and ESPM designators). Students must also complete a professional portfolio, and a set of concluding experiences including a public presentation, portfolio synthesis, and an exit survey.
Twin Cities Campus

Geographic Information Science Minor

Geography
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-1498; fax: 612-624-1044)
Email: mgis@umn.edu
Website: http://www.mgis.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of geographic information science (M.G.I.S.), administered by the Department of Geography, provides graduate-level work in the theory, applications, and technology of geographic information science (GIS). Courses for the program are divided into three broad categories. Core courses provide the conceptual and theoretical underpinnings for a comprehensive, well-rounded knowledge of GIS, including an introductory seminar for entering students (GIS 8501). A set of technology courses focuses on specific software and techniques of GIS. Elective courses provide additional breadth to the program by allowing students to take courses related to their area of interest.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor is developed in consultation with the M.G.I.S. director of graduate studies. The minor requires at least 9 credits (three courses).
**Twin Cities Campus**

**Geography M.A.**

**Geography**

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: willi046@umn.edu
Website: [http://www.geog.umn.edu](http://www.geog.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at the University of Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 600
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 102
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 610
- IELTS
  - Total Score: 7.5
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 25 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Three Plan B papers are required. These papers have the quality but not the scope of a master's thesis, and usually are enhanced versions of research papers done in connection with coursework and seminars.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Competency in a foreign language.

A minimum GPA of 2.80 is required for students to remain in good standing.

Each student is required to take GEOG 8001, 8002, and 8405, plus two additional GEOG 81xx and/or GEOG 82xx courses. GEOG 8970 and 8980 may be used for GEOG 81xx or 82xx coursework with permission of the adviser.
Twin Cities Campus
Geography Minor
Geography
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: willi046@umn.edu
Website: http://www.geog.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 9
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minor must be developed in consultation with a faculty adviser. Consult the director of graduate studies about selecting an adviser.
Twin Cities Campus
Geography Ph.D.

Contact Information:
Department of Geography, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax: 612-624-1044)
Email: willi046@umn.edu
Website: http://www.geog.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 52
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Undergraduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Graduate degrees need not be from a program in geography. However, students whose previous work is not in geography may be asked to complete specific courses that do not provide graduate credit.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 600
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 102
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Paper Based - Total Score: 610
- IELTS
  - Total Score: 7.5
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must receive certification of expertise in the language(s) or techniques(s) or both as necessary for the proposed program. The advising committee sets the requirements, and certifies that they are met before the final Ph.D. examination is scheduled.

Each student is required to take GEOG 8001, 8002, and 8405, preferably within the first year. Students must also complete three additional GEOG 81xx and/or GEOG 82xx courses, with at least one of the three a GEOG 82xx course. The choice of courses should be made in consultation with the student's adviser. GEOG 8970 and GEOG 8980 courses may be used for GEOG 81xx or GEOG 82xx coursework with permission of the adviser.
Twin Cities Campus
Germanic Studies M.A.
German, Scandinavian, & Dutch
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Scandinavian & Dutch, 320 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)
Email: gradgsd@umn.edu
Website: http://gsd.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic studies program in the Department of German, Scandinavian, and Dutch (GSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration. GSD faculty represent all historical areas of specialization from the medieval to the contemporary periods.

The program offers both M.A. and Ph.D. degrees, with specialization in German, Germanic medieval studies, Scandinavian studies (M.A. only), teaching (M.A. only), and German and Scandinavian studies (Ph.D. only). Each track defines an area of scholarly concentration while allowing students to tailor their programs to their individual needs and interdisciplinary interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

B.A. or equivalent in German, Scandinavian, or related field (depending on the track). German track and the Germanic medieval studies track students are usually admitted to the Ph.D. program, but the M.A. must be completed first. Students interested in the German and Scandinavian studies track must first be admitted to the German track M.A. or the Scandinavian studies track M.A.

Special Application Requirements:
In addition to the Graduate School's application requirements, the department requires the following: the department's Supplemental Application Information form (download from the department's website); a copy of one or more papers representative of the applicant's level of scholarly development (not to exceed 25 total pages); three letters of recommendation; the General (Aptitude) Test of the GRE (master's program applicants; optional for applicants whose native language is not English). Students are admitted for fall semester only. All application materials may be uploaded into the online application and must be submitted by December 15.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27
- Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 27 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B paper is usually an improved, reworked seminar paper written for a specific course in the major.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The final exam for the German track and teaching track is oral. For the Scandinavian studies track and the Germanic medieval studies track there is both a written and oral final exam.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

German
This track offers students the opportunity to do advanced work in German studies and prepares them with the theoretical and practical tools to enter a Ph.D. program.

The German track M.A. includes four core courses in literature and theory; a Germanic medieval studies course; three electives in German literature/culture; a pedagogy course; at least two courses in related fields or a designated minor; and demonstration of oral and written proficiency in German.

Germanic Medieval Studies
This track offers students the opportunity to do advanced work in Germanic medieval studies and prepares them with the theoretical and practical tools to enter the Ph.D. program.

The Germanic medieval studies M.A. includes two introductory courses in literature and theory, and four courses chosen from two of three groups: 1) Middle High German; 2) Old Norse; 3) Old English, Middle English, Old High German, Gothic, Old Saxon, Middle Dutch, Early Modern Dutch, Old Frisian. In addition, two courses in Germanic medieval studies, a pedagogy course, at least two courses in related fields or a designated minor, and demonstrated oral and written proficiency in German are required.

Scandinavian Studies
This track offers students the opportunity to do advanced work and prepares them with the theoretical and practical tools to enter the Ph.D. track in German and Scandinavian at the University of Minnesota, to enter a Ph.D. program in Scandinavian at another university, or to embark on a career that requires specialized knowledge of Scandinavia. Students enrolled in the M.A. in the Scandinavian track emphasize one of the three Scandinavian languages and literatures while acquiring a general knowledge of the other two.

The Scandinavian studies track M.A. includes two introductory courses in literature and theory; five courses in different periods of Scandinavian literature/culture; a course in Old Norse or Scandinavian linguistics; a pedagogy course; and at least two courses in related fields or a designated minor.
Teaching
This track combines a disciplinary focus in Germanic studies with a concentration in foreign language teaching and second language acquisition. The track does not lead to teacher licensure. Students interested in teacher licensure should contact the College of Education and Human Development.

The teaching track M.A. includes a pedagogy course; three courses on the history and structure of the German language; LING 5505 - Introduction to Second Language Acquisition; CI 5662 - Issues in Second Language Curriculum Design; two German literature and culture courses; two or more courses in language teaching, curriculum and instruction, or teaching English as a second language or linguistics; one elective; and demonstration of oral and written proficiency in German.
Twin Cities Campus

Germanic Studies Minor
German, Scandinavian, & Dutch
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Scandinavian & Dutch, 320 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)
Email: gradgsd@umn.edu
Website: http://gsd.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic studies program in the Department of German, Scandinavian, and Dutch (GSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration. GSD faculty represent all historical areas of specialization from the medieval to the contemporary periods.

The program offers both M.A. and Ph.D. degrees, with specializations in German, Germanic medieval studies, Scandinavian studies (M.A. only), teaching (M.A. only), and German and Scandinavian studies (Ph.D. only). Each track defines an area of scholarly concentration while allowing students to tailor their programs to their individual needs and interdisciplinary interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

M.A. minors are required to take GSD 8001 - Approaches to Textual Analysis and two other courses, for at least 9 credits. Ph.D. minors who have not completed GSD 8001 at the M.A. level must fulfill this requirement at the Ph.D. level. In addition, Ph.D. minors must complete at least four other courses for a total of at least 15 credits (usually five courses).
Twin Cities Campus

Germanic Studies Ph.D.

German, Scandinavian, & Dutch

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of German, Scandinavian & Dutch, 320 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-2080; fax: 612-624-8297)
Email: gradgsd@umn.edu
Website: http://gsd.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Germanic Studies program in the Department of German, Scandinavian, and Dutch (GSD) is distinguished for its interdisciplinary approach to the study of literature and culture. The program equips students to be creative scholars and skillful teachers through research and teaching programs covering the literature and culture of German-speaking and Nordic countries. Students work closely with faculty dedicated to scholarly innovation, teaching excellence, and interdisciplinary collaboration. GSD faculty represent all historical areas of specialization from the medieval to the contemporary periods.

The program offers both M.A. and Ph.D. degrees, with specializations in German, Germanic medieval studies, Scandinavian studies (M.A. only), teaching (M.A. only), and German and Scandinavian studies (Ph.D. only). Each track defines an area of scholarly concentration while allowing students to tailor their programs to their individual needs and interdisciplinary interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

M.A. or equivalent from another institution in German, Scandinavian, or related field (depending on the track).

B.A. or equivalent in German, Scandinavian, or related field (depending on the track). German track and the Germanic medieval studies track students are usually admitted to the Ph.D. program, but the M.A. must be completed first.

Applicants to the Germanic medieval studies Ph.D. should have a strong command of German; knowledge of another Germanic language and/or a reading knowledge of Latin is preferred. Applicants to the German and Scandinavian studies Ph.D. must have fluency in German plus an advanced level of proficiency in a Scandinavian language or near-native fluency in a Scandinavian language plus an advanced level of proficiency in German.

Special Application Requirements:
In addition to the Graduate School's application requirements, the department requires the following: the department's Supplemental Application Information form (download from the department's website); a copy of one or more papers representative of the applicant's level of scholarly development (not to exceed 25 total pages); three letters of recommendation; the General (Aptitude) Test of the GRE (master's program applicants; optional for applicants whose native language is not English). Students are admitted in the fall semester only. All application materials may be uploaded into the online application and must be submitted by December 15.

For an online application or for more information about graduate education admissions, see the General Information section of this website.
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 27
- **Paper Based** - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

### Program Requirements

18 to 30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Dependent upon the student's chosen track.

A minimum GPA of 3.00 is required for students to remain in good standing.

### Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

#### German
This track offers students the opportunity to do advanced work in German studies and prepares them with theoretical and practical tools to serve as researchers, scholars, and teachers.

The German track Ph.D. requires at least 30 credits, including four courses in German literature/culture beyond the M.A.; a course in Germanic medieval studies; a dissertation seminar; and four courses outside the German track. A pedagogy course and three core courses are also required if they have not been taken for the Germanic studies M.A.

Language requirement: reading competence in at least two languages or a high degree of proficiency in one language other than German or English.

#### Germanic Medieval Studies
The Ph.D. offers students the opportunity to do advanced work in Germanic medieval studies and prepares them with theoretical and practical tools to serve as researchers, scholars, and teachers.

The Ph.D. requires at least 33 credits, including four courses in Germanic medieval studies, two courses in a third medieval Germanic language (supplementing the two languages for the M.A.), a dissertation seminar, and four courses in a designated minor or supporting field. A pedagogy course and GSD 8001 - Approaches to Textual Analysis are also required if they have not been taken for the M.A.

Language requirement: reading competence in Latin and one modern Germanic language other than German or English (e.g., Dutch or one of the Scandinavian languages).
German and Scandinavian Studies
The Ph.D. offers students the opportunity to do advanced work in German and Scandinavian studies and prepares students with theoretical and practical tools to serve as researchers, scholars, and teachers in either German or Scandinavian studies, with a basic foundation in the other field as well.

The Ph.D. requires at least 36 credits. Students choose to emphasize either German or Scandinavian. The German emphasis requires at least four GER 8xxx literature or theory courses and three Scandinavian courses: one Old Norse course, one 19th-century Scandinavian literature course, and one 20th-century Scandinavian literature course. The Scandinavian emphasis requires one Old Norse course, one 19th-century Scandinavian literature course and one 20th-century Scandinavian literature course plus an additional Scandinavian course and three GER 8xxx literature or theory courses. Students in both emphases are required to take a dissertation seminar and 4 courses in a designated minor or supporting program. Also required if not already taken for the M.A.: a pedagogy course and GSD 8001 - Approaches to Textual Analysis.

Language requirement: reading competence in one language other than German, English, or a Scandinavian language.
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics M.A.
Spanish & Portuguese
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, Minnesota, 55455 (612-625-5858; fax: 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's degree in Hispanic and Lusophone literatures, cultures, and linguistics is a free-standing, two-year degree with three formal tracks: Hispanic literatures and cultures, Lusophone literatures and cultures, and Hispanic linguistics. The M.A. is designed as a preparatory degree for students planning to obtain a Ph.D. in the field. The M.A. program is built around 11 core classes taught by graduate faculty and designed to give the student a solid intellectual and professional preparation upon which they can build further in a Ph.D. program in the field or in a related career. The M.A. program also features professional training in the field, including a methodology class that focuses on the teaching of foreign languages and cultures. Students are encouraged to pursue deeper knowledge of related fields through courses taken with graduate faculty outside of the department. In addition to the 11 core courses, 2 courses in a field outside of the major program are required.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Prospective students generally have completed an undergraduate degree or substantial coursework in the fields of Hispanic literatures and cultures, Lusophone literatures and cultures, or Hispanic linguistics, although individuals with other backgrounds may be admitted.

Students admitted to the program are required to be fluent in Spanish or Portuguese. The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.

Special Application Requirements:
All application materials must be submitted electronically through the ApplyYourself application system by December 15. Applicants are accepted for admission for fall semester only. Please refer to the Application Checklist for important details. The following is required for the application: the Departmental Application; a personal statement; a writing sample representative of the applicant's level of scholarly development; three letters of recommendation; five-minute voice sample; a Curriculum Vitae; GRE or TOEFL test scores; and transcripts.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements

Plan A: Plan A requires 21 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge of a foreign language.

A minimum GPA of 3.50 is required for students to remain in good standing.

For the master's degree, students must have a reading knowledge of a foreign language outside of their principal area of study. Competence in both Spanish and Portuguese satisfies this requirement. Students who wish to continue to the Ph.D. after the M.A. are strongly encouraged to begin their study of Portuguese immediately so as to be prepared for the Ph.D. requirement of two Portuguese courses.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Hispanic Linguistics
This track is centered on the relation between language and its context of use, encompassing social, pragmatic, and discourse factors. It provides students with a strong background in the following areas of Hispanic linguistics: phonetics, phonology, syntax, pragmatics and discourse, historical linguistics, language variation, and second language acquisition.

Hispanic Literature and Cultures
Students receive a solid intellectual and professional preparation in Iberian and Latin American literatures and cultures. Works and intellectual movements are studied in their historical, social, and cultural contexts, combining the approaches of literary and cultural criticism with those of intellectual history, sociology, gender and sexuality studies, among others.

Lusophone Literatures and Cultures
This track prepares students in Portuguese studies, understood as an interdisciplinary critical formation through which the cultures and literatures of Portugal, Brazil, and Lusophone Africa are approached. Students are trained in the main historical periods, cultural movements, and social issues pertaining to the Portuguese-speaking world, both nationally and transnationally, within relevant comparative frameworks.
Hispanic and Lusophone Literatures, Cultures, and Linguistics Minor

Spanish & Portuguese

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, Minnesota, 55455 (612-625-5858; fax: 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 18
- Length of program in credits (Doctorate): 18
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in Hispanic and Lusophone literatures, cultures, and linguistics allows students in related fields to pursue research with graduate faculty in the department. Faculty have specialties in a variety of fields such as cultural studies, linguistics, political science, law, textual analysis, etc., and research contacts and visibility in Latin America and Europe.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The graduate minor requires at least 18 credits of 5xxx or 8xxx courses (six courses), to be determined in consultation with the director of graduate studies.
Twin Cities Campus
Hispanic and Lusophone Literatures, Cultures, and Linguistics Ph.D.

Spanish & Portuguese
College of Liberal Arts

Contact Information:
Department of Spanish and Portuguese Studies, 214 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN, 55455 (612-625-5858; fax 612-625-3549)
Email: spptgrad@umn.edu
Website: http://spanport.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2011
• Length of program in credits: 75
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. program in Hispanic and Lusophone literatures, cultures, and languages is a four-year program (post M.A.) that provides students with a focused and rigorous formation in the literatures, languages, and cultures of Spain and Latin America. Ph.D. students choose one of four areas of emphasis: Iberian (peninsular), Latin America, Lusophone literatures and cultures, and Hispanic linguistics. In addition to establishing a specialization in one or more areas of Hispanic studies, the program allows and encourages students to pursue comparative or interdisciplinary work. Students complement their work in the department with coursework in other disciplines such as history; cultural studies and comparative literature; gender, women, and sexuality studies; medieval and early modern studies; and linguistics, among others. In addition to the requirements for the M.A. degree, Ph.D. students must complete additional coursework. For students in the literature and culture tracks, six additional 5xxx and 8xxx courses in related or major fields are required in order to strengthen and further define the student's area of concentration. The final make-up of the program is decided by the student with the consent of his/her academic adviser. Ph.D. students in Hispanic linguistics are required to take three courses outside the department relating to linguistics, and three 5xxx or 8xxx courses in order to strengthen and further define the student's area of concentration.

The department's faculty is committed to preparing students and giving them the tools to become scholars and teachers of the highest quality. The department has a strong tradition of fostering socio-historical perspectives on literatures, languages, and cultures. The graduate faculty is committed to comparative and interdisciplinary research and engages a variety of contemporary theoretical approaches, with strengths in postcolonial theory, social justice and human rights, memory studies, critical race theory, diasporic studies, and gender and sexuality studies. Members of the Hispanic linguistics faculty are specialists in the fields of sociolinguistics, second language acquisition, syntax, pragmatics, and phonology.

The department offers students in the program faculty mentoring, a seminar, and workshops on professional development, including publishing, teaching, and interviewing. In addition, graduate student workshops in both literatures and cultures and in linguistics foster student-faculty relations and allow graduate students to ready themselves for conference participation. Travel funds are available through the department to allow students to present their papers at conferences in the U.S. or abroad.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must first apply to, or hold, a master of arts degree (or its equivalent) before applying to the Ph.D. program. A graduate GPA of 3.50 is preferred.

Prospective students generally have completed an undergraduate degree or substantial coursework in the fields of Hispanic literatures and cultures, Lusophone literatures and cultures, or Hispanic linguistics, although individuals with other backgrounds may be admitted.

The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.
Special Application Requirements:
Students admitted to the program are required to be fluent in Spanish or Portuguese. The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.

All application materials must be submitted electronically through the ApplyYourself application system by December 15. Applicants are accepted for admission for fall semester only. Please refer to the Application Checklist for important details. The following is required for the application: the Departmental Application; a personal statement; a writing sample representative of the applicant's level of scholarly development; three letters of recommendation; a five-minute voice sample; a Curriculum Vitae; GRE or TOEFL test scores; and transcripts. For more information see the Department of Spanish and Portuguese Studies Apply page: http://spanport.umn.edu/grad/applying.html.

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
39 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Fluency in Spanish and/or Portuguese.

A minimum GPA of 3.50 is required for students to remain in good standing.

The Ph.D. requires a minimum of 54 course credits (17 courses) beyond the B.A., including a required teaching methodology course, 39 credits in the major field, and 12 credits in either a minor or related field, depending on the requirements of the minor program. The program also requires 24 thesis credits. Students entering the program with an M.A. from other institutions must take a minimum of seven courses in this department.
Twin Cities Campus

History M.A.

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840; fax: 612-624-7096)
Email: histdgs@umn.edu
Website: http://www.hist.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30 to 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Department of History does not currently admit students to the terminal master's degree; however, Ph.D. students often earn their M.A. on the way to the doctoral degree.

Areas of concentration in the history degree include Africa; ancient history; East and South Asia; comparative women's history; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, and Institute for Advanced Study.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The Department of History does not currently admit terminal master's students; however, Ph.D. students often earn their M.A. on the way to the doctoral degree.

For Ph.D. admissions, the average GPA is approximately A-/B+, with more weight placed on history classes, where students are expected to have earned mostly A or A- grades. The program accepted approximately 9 percent of applicants in the past year, although in better economic times, 20-25 percent might be accepted.

Special Application Requirements:
We prefer GRE scores above the 90% percentile in verbal (usually over 600).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project requires students to substitute three expanded seminar papers for the thesis.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading knowledge in one foreign language

A minimum GPA of 3.00 is required for students to remain in good standing.

Students are only admitted to the Ph.D. program. They may complete an M.A. while studying for the Ph.D. The M.A. is offered under Plan A and Plan B.

Plan A requires six history courses (including HIST 8015), two non-history courses, 10 M.A. thesis credits, and submission of a defendable thesis. Plan B requires eight history courses (including HIST 8015), two non-history courses, and three Plan B papers (see department website for details).
**Twin Cities Campus**  
**History Minor**  
**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**  
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840; fax: (612-624-7096)  
Email: histdgs@umn.edu  
Website: [http://www.grad.hist.umn.edu](http://www.grad.hist.umn.edu)

- Program Type: Graduate minor related to major  
- Requirements for this program are current for Fall 2011  
- Length of program in credits (Masters): 6  
- Length of program in credits (Doctorate): 12  
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](http://www.grad.hist.umn.edu) section of the catalog website for requirements that apply to all major fields.

Areas of concentration in the history minor include Africa; ancient history; East and South Asia; comparative women's history; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, and Institute for Advanced Study.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**  
Use of 4xxx courses towards program requirements is not permitted.

The M.A. minor requires a minimum of two related courses in history (at least 6 credits) and a thesis with a historical dimension.

The Ph.D. minor requires a minimum of 4 history courses (at least 12 credits), HIST 8015, and a written examination or a substantial written project.

The M.A. minor in history typically involves a concentration in a single sub-area of history and the completion of a minimum of three graduate courses in history (6-credit minimum). Normally, there is a representative from the history department on the student's oral examining committee. The Ph.D. minor in history typically involves four to five history courses (including HIST 8015), and a written examination or substantial written project. The topic chosen must be logically related to the student's major work (must prepare for a written examination or substantial written project either in one general area and an associated sub area, or in two sub areas). One or two representatives from the history faculty must serve on the student's preliminary oral examining and thesis committees. The preliminary oral exam also serves as the exam for the minor.
Twin Cities Campus
History Ph.D.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-624-5840; fax: 612-624-7096)
Email: histdgs@umn.edu
Website: http://www.grad.hist.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Areas of concentration in the history Ph.D. program include Africa; ancient history; East and South Asia; comparative women's history; medieval, early modern, and modern Europe; the early modern world; Middle East; Latin America; and the United States and its colonial background. Scholarly resources include Center for Austrian Studies, Center for German and European Studies, Center for Medieval Studies, Immigration History Research Center, Minnesota Population Center, Modern Greek Studies, Center for Early Modern History, and Institute for Advanced Study.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
About half of incoming students have master's degrees.

Special Application Requirements:
The average GPA of incoming students is approximately A-/B+, with more weight placed on history classes, where students are expected to have earned mostly A or A- grades. The program accepted approximately 9 percent of applicants in the past year, although in better economic times, 20-25 percent might be accepted.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 600

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in two non-English languages

A minimum GPA of 3.50 is required for students to remain in good standing.

Ph.D. candidates are required to complete 10 history courses (30 cr); HIST 8015 - Scope and Methods of Historical Studies; 9 additional courses in history, which must include 2 courses in a comparative area; 4 supporting program courses (12 cr); and 24 thesis credits. The language requirement of reading knowledge in 2 foreign languages is required before admission to the preliminary oral examination. Some concentration areas may require additional foreign languages. In some cases, competence in quantitative methods may replace one of the foreign languages.

Courses used to satisfy M.A. requirements can be counted in these totals. After completion of the preliminary oral examinations, the student focuses on writing the Ph.D. thesis. Upon completion of the thesis, a final oral defense is scheduled.
Twin Cities Campus
Human Rights Minor
Institute for Global Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute for Global Studies, 232 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-626-1879; fax: 612-626-2242)
Email: hrminor@umn.edu
Website: http://www.hrp.cla.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The human rights minor, available to master's (M.A. and M.S.) and doctoral students, provides an interdisciplinary foundation in human rights studies and practical experience in human rights work. To satisfy the core requirements, students must complete two of the four core courses, each of which is 3 credits (LAW 6886 - International Human Rights Law, POL 8660 - Theoretical Approaches to Human Rights, POL 5485 - Human Rights and Democracy in the World, and GLOS 5900/LAW 6058 - Topics in Global Studies), and one 200-hour internship. M.A. and M.S. students must complete one additional elective course (3 cr), while doctoral and law students select at least two additional electives (totaling 6 cr) outside their major field from a designated course list. Other courses may be taken with the approval of the program director. Qualifying courses taken prior to approval of the minor will be applied retroactively.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor in human rights requires 9 credits: two core courses, at least one elective course taken from a designated course list, and one six-week internship approved by the program director.

A doctoral minor requires 12 credits: two core courses, at least two elective courses, and one six-week internship approved by the program director.
Twin Cities Campus

Italian Studies Minor

French & Italian

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of French and Italian, 260 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax: 612-624-6021)
Website: http://frit.umn.edu/grad/italianminor.php

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

A minor in Italian studies is available for Graduate School students enrolled in master's and doctoral programs in such relevant fields as art history, architecture, French, comparative literature, history, English, and music. The graduate minor in Italian studies is under the general direction of the graduate faculty in Italian studies, all of whom hold membership in other fields of study within the University of Minnesota Graduate School. The minor program is shaped to suit the particular research needs and interests of the student. Courses are selected in consultation with the director of graduate studies from a list of existing 4xxx and 5xxx courses, as well as appropriate 8xxx courses. Students may also elect to do a directed readings course with faculty affiliated with Italian studies to satisfy minor program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

M.A. students must complete at least 6 graduate credits in approved courses or directed readings. Ph.D. students must complete at least 12 graduate credits in approved courses or directed readings. One of these may be a 4xxx course with the approval of the director of graduate studies; one may be a directed readings course. Coursework from the major field may not be applied to satisfy minor field requirements.

Certification of proficiency in Italian language is required. Proficiency can be demonstrated in one of the following ways: by successfully completing an undergraduate literature/culture course in Italian, by having an undergraduate major or minor in Italian, or through a translation examination devised, administered, and assessed by the director of graduate studies. The proficiency requirement will be monitored by the director of graduate studies.
Twin Cities Campus
Linguistics M.A.
Institute of Linguistics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331; fax: 612-624-4579)
Email: iles@umn.edu
Website: http://www.linguistics.umn.edu/grad/index.htm

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 32
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, and semantics/pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
There are no specific prerequisites for admission. Students admitted normally have a broad undergraduate background that includes some linguistics courses.

Special Application Requirements:
Applicants must submit a completed Graduate School application; scores from the GRE; three letters of recommendation; and a supplementary questionnaire detailing background, interests, and accomplishments. Applicants wishing to be considered for financial support should apply no later than January 15 of the preceding academic year. Entry is usually fall semester but may be permitted in other semesters in exceptional cases.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 26 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 26 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: The Plan B project is an original paper usually a revision of a course project.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The requirements for the M.A. degree (both Plan A and Plan B) include eight required courses in the major: five courses covering core areas of language structure (phonology, syntax, semantics/pragmatics); one course in field methods; one research paper course; and one elective. The total number of credits, assuming no prior coursework in linguistics, is 32 (26 credits in the major and 6 credits in related fields). Subject to approval by the director of graduate studies, students who have already taken required courses or their equivalents as undergraduates (or as graduates in another program), may be able to substitute electives in the major or in related fields, in accordance with M.A. requirements set by the Graduate School. In addition to course requirements, Plan A requires a thesis and thesis credits; Plan B requires a Plan B paper.
Twin Cities Campus

Linguistics Minor

Institute of Linguistics

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331; fax: 612-624-4579)
Email: iles@umn.edu
Website: http://www.iles.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, and semantics/pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Courses required for a master's minor in linguistics are LING 5001 (4 cr), 4002 (3 cr), and either 5201 (3 cr) or 5302 (4 cr). Students who have had these courses or their equivalents as undergraduates can substitute other linguistics courses. The master's minor requires at least 9 credits. The doctoral minor requires at least 15 credits (five courses). Students who have had no prior coursework in linguistics must take six courses approved by the director of graduate studies, including the three courses required for the M.A. minor: LING 5001, 4002, and either 5201 or 5302. Students who have taken 5001 or its equivalent as undergraduates do not have to substitute another course.
Twin Cities Campus
Linguistics Ph.D.
Institute of Linguistics
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Institute of Linguistics, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-3331; fax: 612-624-4579)
Email: iles@umn.edu
Website: http://www.linguistics.umn.edu/grad/index.htm

• Program Type: Doctorate
• Requirements for this program are current for Fall 2011
• Length of program in credits: 51
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Linguistics is the scientific study of human language. Investigation in phonology, syntax, and semantics/pragmatics seeks to determine general principles governing the structure and use of human language and the parameters that determine degree and manner of variation across languages. These core areas constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, computational linguistics, and neurolinguistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations(TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
15 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Knowledge of two languages not native to student.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. program focuses on theoretical issues in core areas of language structure (phonology, syntax, semantics/pragmatics), language processing (cognitive processes that underlie language use), and language acquisition. The program especially emphasizes research that integrates core areas of theoretical linguistics with language processing or acquisition.
For the Ph.D., no minimum number of credits is required besides the 12 credits in related fields and 24 thesis credits. However, all Ph.D. students are expected to have completed M.A. course requirements (26 credits or less, depending on prior coursework in linguistics), a second-semester course in field methods (3 credits), and an individualized plan of study (including at least three 8xxx courses) to be determined in consultation with the student’s committee. Upon completion of required coursework, students must pass a preliminary written exam in phonology, syntax, and their primary and secondary areas of concentration. Two research papers judged to be of near publishable quality by the student's committee can be substituted for exam questions in any of these areas. The preliminary oral exam is a presentation and defense of a research-paper-length dissertation prospectus, which introduces and motivates the student's dissertation topic and provides a detailed plan for completion of the dissertation.
Twin Cities Campus

Literacy and Rhetorical Studies Minor

Writing Studies

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Center for Writing, 10 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-7583; fax: 612-626-7580)
Email: writing@umn.edu
Website: http://www.writing.umn.edu/lrs/index.htm

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in literacy and rhetorical studies (LRS) was created to provide a forum for students and faculty interested in various facets of writing and communication. By crafting an individualized program of study including literacy theory and practice, research methods, and historical inquiry, students can complement their disciplinary degree and thereby open up new perspectives for their teaching and research. Students develop an interdisciplinary program of study in consultation with their major adviser, the director of graduate studies in their major, and the director of graduate studies in LRS.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires three graduate courses or seminars (9 credits minimum), one from each of the following categories: 1) literacy theory or practice, including pedagogy; 2) research methods and practices in one of the areas of the minor; and 3) a historical topic (e.g., history of the book), of rhetoric, or of literacy. Students must also write a substantial paper that emerges from one of the three courses.

In order to make the minor interdisciplinary, no more than one of the three courses at the master's level may be from the student's home department.

A doctoral minor requires four graduate courses or seminars (12 credits minimum). Three courses must be in each of the categories enumerated above. The fourth course must be a capstone writing seminar specifically offered for the minor or a seminar that involves a substantial term paper or a completed dissertation chapter on a topic related to the minor.

In order to make the minor interdisciplinary, no more than two of the four courses at the doctoral level may be from the student's home department.
Twin Cities Campus
Mass Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis, MN  55455
(612-625-9624; fax: 612-625-9525)
Email: sjmcgrad@umn.edu
Website: http://sjmc.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 37
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.A. degree in mass communication emphasizes the theoretical study of mass communication and analysis of media systems and effects. The degree is intended for those who wish to pursue Ph.D. degrees or teaching and research careers, as well as those who seek communication-related positions. The general M.A. program is not designed to provide professional skills training in journalism.

Individuals who have extensive professional experience in mass communication or a B.A. degree in journalism are encouraged to enter the M.A. program. Individuals with strong social science or liberal arts backgrounds in areas such as political science, psychology, sociology, history, and English also are encouraged to apply.

The program is suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students whose native language is not English are required to submit scores from the TOEFL or IELTS (academic). In addition, such students seeking teaching assistantships are required to pass the SPEAK test of spoken-English proficiency prior to appointment. Admission is considered for fall semester only; the application deadline is December 15.

The mass communication M.A. and Ph.D. programs offer a joint degree with the Law School. Applicants to either joint degree—either the M.A./J.D. or the Ph.D./J.D.—are reviewed separately by the Law School and the mass communication programs for admission, but are asked to identify themselves as seeking the joint degree option in their statement of intent for the mass communication application. For more information, contact sjmcgrad@umn.edu.

Special Application Requirements:
Applicants must submit a department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; a resume or curriculum vita; and scores from the General Test of the GRE.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 158
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 94
  - Internet Based - Listening Score: 22
- Internet Based - Writing Score: 24
- Internet Based - Reading Score: 22
- Internet Based - Speaking Score: 26
- Paper Based - Total Score: 550

- IELTS
  - Total Score: 7
  - Listening Score: 7
  - Reading Score: 7
  - Writing Score: 7
  - Speaking Score: 7

- MELAB
  - Final score: 83

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 18 to 27 major credits, 1 to 9 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A minimum of 27 course credits and 10 thesis credits are required. Coursework must include 12 credits in required core courses and 15 other credits (6-9 credits in other journalism and mass communication seminars or courses, and 6-9 credits in other departments). All coursework must be taken A-F.

**Joint- or Dual-degree Coursework:** M.A. in Mass Communication and J.D. in Law (dual degree). Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Music M.A.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The master of arts in music offers emphases in musicology/ethnomusicology (Plan A and Plan B), theory (Plan B only), composition (Plan B only), and music education/therapy (Plan B only).

Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy. Those applying to the M.A. in music education also generally hold an appropriate teaching license. Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Special Application Requirements:
The M.A. in theory requires submission of original papers (one tonal and one post-tonal analysis) for admission.
The M.A. in composition requires submissions of original scores and recordings (2-4 scores of varying genres) for admission.
The M.A. in musicology/ethnomusicology requires the submission of original papers for admission.
The M.A. in music education/music therapy requires documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience. An interview is also required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Language requirements: A reading knowledge of French, German, or Italian is required for all M.A. degree emphases except those in the education/therapy field. For the emphasis in composition, reading knowledge of a foreign language or, with approval, an equivalent research tool.

The master of arts in music offers emphases in musicology/ethnomusicology (Plan A and Plan B), theory (Plan B only), composition (Plan B only), and music education/therapy (Plan B only).

The M.A. in music with emphasis in musicology/ethnomusicology requires 35 credits (25 course credits and 10 thesis credits) for Plan A and 31 course credits for Plan B; the emphasis in composition (Plan B only) requires 41 course credits, and the emphasis in music theory (Plan B only) requires 30 course credits. The credit totals for these emphases include 6 credits required for courses outside the major field. The M.A. in music with an emphasis in education/therapy requires 30 credits: 12 credits in music education/therapy for the major; 10 credits in music; 3 credits of elective from professional education, music, and music education/therapy; and a 5-credit research project.

Final Exams: For the emphasis in musicology/ethnomusicology, the final exams are written and oral. For the emphases in theory, composition, and education/therapy, the final exams are oral.

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Music Education

This sub-plan is limited to students completing the program under Plan B.

The M.A. in music with an emphasis in education requires 30 credits: 12 credits in music education for the major; 10 credits in music; 3 credits of elective from professional education, music and music education; and a 5-credit research project.
Twin Cities Campus
Mass Communication Minor
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-9824; fax: 612-625-9525)
Email: sjmcgrad@umn.edu
Website: http://sjmc.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mass communication program emphasizes the theoretical study of mass communication and analysis of media systems and effects. The program is not designed to provide professional skills training in journalism.

Areas of specialization include media processes, influences, and effects (including health communication, advertising, and political communication); media law, ethics, history; and media management. All programs are suffused with the study of new communication technologies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor programs are planned in consultation with the director of graduate studies or another member of the mass communication graduate faculty. The master's minor consists of a minimum of 9 credits in a coherent area, with at least 6 credits at 8xxx. A Ph.D. minor program consists of a minimum of 14 credits in a coherent disciplinary area. Students completing a minor in mass communication are required to take a preliminary written exam covering their coursework.
Twin Cities Campus

Mass Communication Ph.D.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Journalism and Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-9824; fax: 612-625-9525)
Email: sjmcgrad@umn.edu
Website: http://sjmc.umn.edu/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 75
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. offers training for academic careers primarily in communication instruction, research, or policy. Areas of specialization include media processes, influences, and effects (including health communication, advertising, and political communication); media law, ethics, history; and media management. The program is suffused with the study of new communication technologies.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students whose native language is not English are required to submit scores from the TOEFL or IELTS (academic). In addition, such students seeking teaching assistantships are required to pass the SPEAK test of spoken-English proficiency prior to appointment. Admission is considered for fall semester only; the application deadline is December 15.

The mass communication M.A. and Ph.D. programs offer a joint degree with the Law School. Applicants to either joint degree--either the M.A./J.D. or the Ph.D./J.D.--are reviewed separately by the Law School and the mass communication programs for admission, but are asked to identify themselves as seeking the joint degree option in their statement of intent for the mass communication application. For more information, contact sjmcgrad@umn.edu.

Special Application Requirements:
Applicants must submit a department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; a resume or curriculum vita; and scores from the General Test of the GRE.

Applicants must submit their test score(s) from the following:
• GRE
   - General Test - Verbal Reasoning: 158
   - General Test - Quantitative Reasoning: 158
   - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:
• TOEFL
   - Internet Based - Total Score: 94
   - Internet Based - Listening Score: 22
   - Internet Based - Writing Score: 24
   - Internet Based - Reading Score: 22
   - Internet Based - Speaking Score: 26
   - Paper Based - Total Score: 550
• IELTS
- Total Score: 7
- Listening Score: 7
- Reading Score: 7
- Writing Score: 7
- Speaking Score: 7

**MELAB**
- Final score: 83

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

18 to 36 credits are required in the major.
1 to 18 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

A minimum of 54 course credits and 24 thesis credits are required. Coursework must include 12 credits in required core courses, and at least 42 other graduate credits. Of these credits, at least 21 credits must come from SJMC courses and at least 18 credits from outside the SJMC. All courses included on the Ph.D. Degree Program Form must be graduate level (5xxx or 8xxx) and taken A-F.
Medieval Studies Minor
Center for Medieval Studies
College of Liberal Arts

Twin Cities Campus

Link to a list of faculty for this program.

Contact Information:
Department of Center for Medieval Studies, 1110 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455 (612-626-0805)
Email: cmedst@umn.edu
Website: http://cmedst.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The medieval studies minor is available to master’s (M.A. and M.F.A.) and doctoral students. The Center for Medieval Studies (CMS) encourages collegial interaction and scholarly collaboration among faculty and students in all areas of medieval studies. CMS seeks to provide an opportunity for scholars of all disciplines and at all levels to focus intensively on historical, literary, anthropological, social, economic, religious, artistic, cultural, and methodological inquiries into the medieval period, which may fall within the chronology of roughly 300 to 1,500 A.D. The program emphasizes an interdisciplinary and cross-cultural approach to medieval culture including the study of medieval texts in original languages. Departments associated with the minor include: history; art history; theatre arts; music; English; French and Italian; German, Scandinavian, and Dutch; Spanish and Portuguese studies; Classical and Near Eastern studies; Asian languages and literatures; and others.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires 6 graduate credits: two courses in medieval studies outside the student's major department, including a course which demonstrates command of Latin texts, normally LATN 51xx or higher or other Latin course by permission of the DGS, and one additional course in MEST or on a medieval topic.

The doctoral minor requires 12 graduate credits: four courses in medieval studies outside the student's major department, including a course which demonstrates command of Latin texts, normally LATN 51xx or higher or other Latin course by permission of the DGS; a second Latin course 51xx or above, or a course 5xxx or above in Arabic, Greek, Hebrew, classical Chinese, or a medieval vernacular; and two additional courses in MEST or on medieval topics.
Twin Cities Campus

Moving Image Studies Minor

Cultural Studies & Comparative Literature

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Cultural Studies and Comparative Literature, 216 Pillsbury Drive S.E., 235 Nicholson Hall, Minneapolis, MN 55455 (612-624-8099)
Email: cscl@umn.edu
Website: http://www.cscl.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The moving image increasingly permeates the fabric of contemporary culture and society. From cinema theaters and home televisions to installation art, portable electronic devices, medical technologies, and science laboratories, and in public spaces from airport terminals to building façades, the moving image is nearly ubiquitous.

The graduate minor in moving image studies trains students from a variety of disciplinary fields in the critical analysis of the moving image in its disparate yet interrelated forms. Drawing from the faculty's extensive research interests and expertise, the curriculum brings together discourses ranging from film theory to media studies, from the philosophy of the image to the history of technology, and beyond.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Doctoral Minor (minimum 15 credits)
Three core courses (9 credits)
MIMS 8001 - Theories of the Moving Image (3 cr)
MIMS 8003 - Historiography of the Moving Image (3 cr)
MIMS/SCMC 5002 - Advanced Film Analysis (3 cr)
Two electives (minimum 6 credits)
8xxx Topics Course (3 cr) chosen from a list of courses offered in a given year by film/media faculty in various departments.
One additional 5xxx or 8xxx course (3 cr) including, as a recommended option, a production-based course.

Master's Minor (minimum 9 credits)
Three core courses (9 credits)
MIMS 8001 - Theories of the Moving Image (3 cr)
MIMS 8003 - Historiography of the Moving Image (3 cr)
MIMS/SCMC - 5002 Advanced Film Analysis (3 cr)
**Twin Cities Campus**

**Music D.M.A.**

**School of Music**

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 85 to 91
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Musical Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree’s program requirements.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy.

The performance degree (D.M.A.) requires an audition for admission.

The conducting degree (D.M.A.) requires a preliminary DVD, an audition, and interview for admission.

**Special Application Requirements:**
For some areas of performance, a preliminary DVD may be required prior to scheduling an audition.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 21
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
78 credits are required in the major.
9 credits are required outside the major.
4 thesis credits are required.

This program may not be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The doctor of musical arts offers emphases in piano, organ, voice, violin, viola, cello, flute, oboe, clarinet, saxophone, bassoon, trumpet, trombone, percussion, guitar, collaborative piano/coaching, conducting, and woodwind performance. Credit requirements are as follows: 89 credits for piano and voice; 85 credits for instrumental performance, guitar, and conducting; 87 credits for organ and woodwinds; and 91 credits for collaborative piano/coaching.
Twin Cities Campus
Music M.A.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

• Program Type: Master's
• Requirements for this program are current for Spring 2013
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The master of arts in music offers emphases in musicology/ethnomusicology (Plan A and Plan B), theory (Plan B only), composition (Plan B only), and music education/therapy (Plan B only).

Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy. Those applying to the M.A. in music education also generally hold an appropriate teaching license. Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Special Application Requirements:
The M.A. in theory requires submission of original papers (one tonal and one post-tonal analysis) for admission.
The M.A. in composition requires submissions of original scores and recordings (2-4 scores of varying genres) for admission.
The M.A. in musicology/ethnomusicology requires the submission of original papers for admission.
The M.A. in music education/music therapy requires documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience. An interview is also required.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Language requirements: A reading knowledge of French, German, or Italian is required for all M.A. degree emphases except those in the education/therapy field. For the emphasis in composition, reading knowledge of a foreign language or, with approval, an equivalent research tool.

The master of arts in music offers emphases in musicology/ethnomusicology (Plan A and Plan B), theory (Plan B only), composition (Plan B only), and music education/therapy (Plan B only).

The M.A. in music with emphasis in musicology/ethnomusicology requires 35 credits (25 course credits and 10 thesis credits) for Plan A and 31 course credits for Plan B; the emphasis in composition (Plan B only) requires 41 course credits, and the emphasis in music theory (Plan B only) requires 30 course credits. The credit totals for these emphases include 6 credits required for courses outside the major field. The M.A. in music with an emphasis in education/therapy requires 30 credits: 12 credits in music education/therapy for the major; 10 credits in music; 3 credits of elective from professional education, music, and music education/therapy; and a 5-credit research project.

Final Exams: For the emphasis in musicology/ethnomusicology, the final exams are written and oral. For the emphases in theory, composition, and education/therapy, the final exams are oral.

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Music Education**

This sub-plan is limited to students completing the program under Plan B.

The M.A. in music with an emphasis in education requires 30 credits: 12 credits in music education for the major; 10 credits in music; 3 credits of elective from professional education, music and music education; and a 5 credit research project.
Twin Cities Campus
Music M.M.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Music

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Applicants must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy.

The collaborative piano/coaching M.M. requires an audition for admission.

The M.M. in choral conducting, orchestral conducting, and wind ensemble/band conducting degrees all required a preliminary DVD, audition, and interview for admission.

The performance M.M. requires an audition for admission.

Special Application Requirements:
For some areas of performance, a preliminary DVD may be required prior to scheduling an audition.

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The master of music degree offers emphases in piano, organ, voice, violin, viola, cello, double bass, violin performance and Suzuki pedagogy, flute, oboe, clarinet, saxophone, bassoon, French horn, trumpet, trombone, euphonium, tuba, percussion, harp, guitar, collaborative piano/coaching, orchestral conducting, wind ensemble/band conducting, and choral conducting.

The M.M. requires credit distribution among the following for each emphasis: applied music, study directly related to the emphasis (literature, pedagogy, performance practice, conducting, secondary instrument, chamber music, etc.), ensemble, and musicology/ethnomusicology and theory/composition. One recital is required for all emphases except collaborative piano/coaching, which requires two.

The minimum credit requirement for each emphasis is as follows: 30 credits are required for piano, instrumental performance, guitar, piano pedagogy, orchestral conducting, wind ensemble/band conducting, and choral conducting; 33 credits for organ and voice; 37 credits for violin performance and Suzuki pedagogy; 39 credits for collaborative piano/coaching.
Twin Cities Campus

Music Minor
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus

Music Ph.D.
School of Music
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Music, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-5093; fax: 612-624-8001)
Email: mnmusic@umn.edu
Website: http://www.music.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 87
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's program requirements.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study. For the Ph.D. in music education/therapy, applicants must also have documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience.

Special Application Requirements:
The theory Ph.D. requires original papers (one tonal and one post-tonal analysis) for admission.
The composition Ph.D. requires original scores and recordings (2-4 scores of varying genres) for admission.
The musicology/ethnomusicology Ph.D. requires original papers for admission.
The music education/music therapy Ph.D. requires original papers (e.g. research or professional papers) and documentation of at least 3 years of teaching experience or at least 3,500 hours of clinical experience. An interview is also required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
51 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: Varies according to field.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The language requirement for musicology and ethnomusicology includes two languages chosen from French, German, and Italian. Substitution may be made when a different language is needed for the thesis.

For composition, the language requirement includes reading knowledge of two foreign languages; with approval, an equivalent research tool may be substituted for a foreign language.

For theory, the language requirement includes German and either French or Italian. Substitution may be made when a different language is needed for the thesis; with approval, the second language may also be replaced by a collateral field of knowledge or a special research technique.

There is no language requirement for the education/therapy degree.
**Twin Cities Campus**

Philosophy M.A.

*Philosophy*  
*College of Liberal Arts*

Link to a [list of faculty](#) for this program.

**Contact Information:**  
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-625-6563; fax: 612-626-8380)  
Email: umphil@umn.edu  
Website: [http://www.philosophy.umn.edu](http://www.philosophy.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2011  
- Length of program in credits: 30  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Note: The Department of Philosophy offers both Ph.D. and M.A. degrees. However, students are generally admitted to the Ph.D. program, while admission to the M.A. is generally intended for those with professional goals in other fields, and is limited (0-2 candidates per year). The department's M.A. program is not preparation as a laddering program into the Ph.D. program at the University of Minnesota or any other institution. Most Ph.D. candidates obtain the M.A. Plan B en route to the Ph.D.

Philosophy is noteworthy for its emphasis on the individual student's research interests. With the help of an adviser, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor. The minor or supporting program, drawn at least in part from a department or departments other than philosophy, complements the student's research focus. Students gain a broad base of knowledge through required coursework. Terminal M.A. students are required to take two history courses; one in ancient philosophy and one in modern.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
Recognizing that evidence of ability to pursue graduate study in philosophy is diverse, the department does not specify prerequisites for admission. Normally, those admitted have a broad undergraduate background that includes some courses in philosophy.

**Special Application Requirements:**  
Students must apply to both the Graduate School and the Department of Philosophy. The Graduate School application is available online from the Graduate School website. The department application for admission and aid is available from the Admissions and Aid Committee at the address listed above, or may be downloaded from the philosophy website at [www.philosophy.umn.edu](http://www.philosophy.umn.edu). All application materials may be uploaded to Apply Yourself at the Graduate School website. Department materials required include a completed application form, personal statement, transcripts, scores from the GRE General Test, three letters of recommendation, and a writing sample. Students interested in DOVE or MacArthur Fellowships should include a statement expressing their interest. Students interested in the MacArthur Fellowship should also contact the MacArthur Program, through the Interdisciplinary Center for the Study of Global Change. Applications, together with all supporting materials, must be received by December 31. The philosophy department reviews applications once a year, and admits students for entry in the fall semester only.

Applicants must submit their test score(s) from the following:  
- GRE

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19

---

© 2005 by the Regents of the University of Minnesota  
The University of Minnesota is an equal opportunity educator and employer.  
Information current as of October 01, 2012
- Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The project is three Plan B papers. For details see Philosophy Department Degree Program: M.A., available as a PDF on the philosophy website at www.philosophy.umn.edu.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.
Twin Cities Campus

Philosophy Minor

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN 55455-0310 (612-625-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Philosophy offers both Ph.D. and M.A. degrees. Students are generally admitted to the Ph.D. program, while admission to the M.A. is generally intended for those with professional goals in other fields. Minor requirements for students majoring in other fields: A master's minor requires 6 course credits in philosophy approved by the Director of Graduate Studies in Philosophy. Programs are tailored to meet the interests and needs of the student. A doctoral minor requires 12 course credits in philosophy approved by the Director of Graduate Studies in Philosophy. Programs are tailored to meet the interests and needs of the student.

Philosophy is noteworthy for its emphasis on the individual student's research interests. With the help of an adviser, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor. The minor or supporting program, drawn at least in part from a department or departments other than philosophy, complements the student's research focus. Students gain a broad base of knowledge through required coursework. Ph.D. candidates take courses in four main areas: history of philosophy, logic, ELMS (epistemology, philosophy of language, metaphysics, philosophy of science), and value theory. These areas provide a firm foundation for research and teaching beyond the Ph.D. program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires 6 course credits in philosophy approved by the director of graduate studies in philosophy. Programs are tailored to meet the interests and needs of the student. A doctoral minor requires 12 course credits in philosophy approved by the director of graduate studies in philosophy. Programs are tailored to meet the interests and needs of the student. For graduate-level credit, 4xxx courses must include the accompanying one-credit workshop.
Twin Cities Campus
Philosophy Ph.D.
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Philosophy, 271 19th Avenue South, 831 Heller Hall, Minneapolis, MN  55455-0310 (612-624-6563; fax: 612-626-8380)
Email: umphil@umn.edu
Website: http://www.philosophy.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2011
• Length of program in credits: 62 to 68
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Philosophy offers both Ph.D. and M.A. degrees. Students are generally admitted to the Ph.D. program, while admission to the M.A. is intended for those with professional goals in other fields and disciplines. The stand-alone M.A. program is not considered a laddering program into the Ph.D. program at the University of Minnesota or any other institution. Students admitted to the Ph.D. program usually choose to complete an M.A. Plan B en route to the Ph.D. unless they already hold a master's degree in philosophy from another institution.

Philosophy is noteworthy for its emphasis on the individual student's research interests. With the help of an adviser, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor. The minor or supporting program, drawn at least in part from a department or departments other than philosophy, complements the student's research focus. Students gain a broad base of knowledge through required coursework. Ph.D. students take courses in four main areas: history of philosophy, logic, ELMS (epistemology, philosophy of language, metaphysics, philosophy of science), and value theory. These areas provide a firm foundation for research and teaching beyond the Ph.D. program.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Recognizing that evidence of ability to pursue graduate study in philosophy is diverse, the department does not specify prerequisites for admission. Normally, those admitted have a broad undergraduate background that includes some courses in philosophy.

Special Application Requirements:
Students must apply to both the Graduate School and the Department of Philosophy. The Graduate School application is available online from the Graduate School website. The department application for admissions and aid is available from the Admissions and Aid Committee at the address listed above or may be downloaded from the philosophy website at www.philosophy.umn.edu. Application materials may be uploaded to Apply Yourself at the Graduate School website. Department materials required include a completed application form, personal statement, transcripts, scores from the GRE general test, three academic letters of recommendation, and a philosophical writing sample that does not exceed 25 pages. Students interested in DOVE or MacArthur Fellowships should include a statement expressing their interest. Students interested in the MacArthur Fellowship should also contact the MacArthur Program, through the Interdisciplinary Center for the Study of Global Change. Applications, together with all supporting materials, must be received by December 31 for full consideration. The philosophy department reviews applications once a year, and only admits students for fall semester.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  • IELTS
  - Total Score: 6.5
  • MELAB

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
26 to 28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

No minimum credits are required for the Ph.D., though specific philosophy courses are required that total 26-28 credits; 12 supporting program credits (6 of which may be in an area outside of the area of specialization in philosophy) and 24 thesis credits are also required. Successful second-year department review includes completion of coursework with specified requirements which constitutes passing the preliminary written examination. Successful third-year department review includes passing a three-paper examination, Stage 1 and Stage 2 review constitutes passing the preliminary oral examination. Students then write and defend a dissertation proposal and later defend a dissertation at the final oral examination. For details see the Philosophy Department Degree Program Policy, which is available as a PDF on the philosophy website: www.philosophy.umn.edu.
Twin Cities Campus
Political Psychology Minor
School of Journalism & Mass Communication, Political Science, Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455-0410 (612-626-7489; fax: 612-626-7599)
Email: ppcenter@umn.edu
Website: http://www.polisci.umn.edu/cspp/minor.php

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 22
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This minor is available to doctoral students only.

Political psychology is a rapidly advancing field of scientific inquiry concerned with psychological aspects of political behavior. It encompasses a variety of interdisciplinary research perspectives, drawing on the theories and methods of core disciplines such as psychology, political science, law, and sociology, as well as interdisciplinary fields such as mass communication and decision sciences. The minor’s structured curriculum provides a foundation in basic areas of political psychology: social attitudes and cognition, judgment and decision making, group relations, personality and leadership, mass communication, public opinion, mass political behavior, and political socialization. In addition to providing a background in political psychology, the program trains students in the theory and methods useful to this field, such as content analysis, survey analysis, and experimental design. The faculty is drawn from 10 programs within the Graduate School and Law School.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Graduate students may be accepted from any doctoral program within the Graduate School at the University of Minnesota so long as they are in good standing in their major department or program. Admission is limited only by permission of the director of graduate studies (DGS) in political psychology. To receive a minor in political psychology, a student must satisfy the following five requirements:

1) Enrollment in and completion of a minimum of two semesters of the political psychology proseminar (POL 8307/8308 or PSY 8211/8212). Students are encouraged to participate in the seminar beyond this requirement.
2) Completion of the Political Science Department's graduate class on Political Psychology (POL 8311).
3) Completion of the Psychology Department's graduate class on Social Cognition (PSY 8201).
4) Completion of two or more methodology courses. Examples include EPSY 5621, 5262; POL 8106, 8123; PSY 8814, 8815; STAT 5021, 5302. Courses from political science or other departments may be acceptable; students should consult with the DGS prior to enrolling in a course to confirm it satisfied this requirement. (Note that it is acceptable to use these courses to fulfill other requirements in one's degree program, if allowed by the student's department.)
5) Completion of two or more elective courses (equal to 6 credits) in a department other than one’s own. The classes may be from the same department (e.g. two electives from the mass communication department for a psychology student).

Course Group 0
Note that it is acceptable to use these courses to fulfill other requirements in one's degree program, if allowed by the student's department. Contact the DGS for a list of previously approved elective courses.

** Students with sufficient background and previous courses experience equivalent to one or more courses within the curriculum may apply for a waiver of the appropriate requirements and replace waived courses with additional electives to meet the 6-credit minimum.
Twin Cities Campus
Political Science M.A.
Political Science
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4144; fax: 612-626-7599)
Email: polisci@umn.edu
Website: http://www.polisci.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 34
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The political science program only admits students into the Ph.D. program. However, students admitted to the Ph.D. program may earn a master's degree (Plan B) while pursuing their doctorate.

The political science curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 28 major credits and 6 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The M.A. degree, Plan B (without thesis), requires 34 credits, distributed between major courses and minor or related field courses; three research papers, usually written in connection with coursework, are also required.
Twin Cities Campus
Political Science Ph.D.
Political Science
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Political Science, 1414 Social Sciences, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4144; fax: 612-626-7599)
Email: phelp@umn.edu
Website: http://www.polisci.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The political science curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
All students are admitted directly into the Ph.D. program. The following should be sent directly to the department: department application form; GRE scores; a complete set of transcripts in addition to that required by the Graduate School; a brief statement expressing the applicant's purpose and goals in pursuing graduate work (in addition to and separate from the statement required as part of the Graduate School application form); three letters of recommendation from professors who know the applicant's academic work, particularly in political science; samples of the applicant's written work (papers written for political science courses preferred); and a curriculum vitae. Send photocopies of written work; the department cannot guarantee that materials will be returned.

Graduate study in the Ph.D. program must begin in fall semester; the application deadline is December 15.

The department and the Humphrey Institute of Public Affairs jointly offer a program that leads to an M.A. in public affairs and a Ph.D. in political science. To be eligible, students must be admitted separately by political science and public affairs. Normally, students begin their study in public affairs and later apply to the Ph.D. program in political science. However, students may begin in either program, so it is possible to apply initially to either program or both. Students interested in this joint degree program should contact the director of graduate studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Language Requirement: Varies. See below.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must demonstrate one of the following: a) high proficiency in one foreign language; b) high proficiency in research methodology; c) low proficiency in two foreign languages; d) low proficiency in one foreign language and low proficiency in research methodology. Students who concentrate in comparative politics must have appropriate language competence in their area(s) of specialization.

The program is divided into five subfields: American politics, comparative politics, political theory, international relations, and formal models and methodology. A joint M.A.-Ph.D. program, which leads to an M.A. in public affairs from the Hubert H. Humphrey Institute of Public Affairs and a Ph.D. in political science, is also available.

Students concentrate in two of the five subfields and take a minimum of nine political science seminars, including POL 8101 and the core seminars in each of their subfields (POL 8120, 8201, 8301, 8401, 8601). In addition, they take three advanced seminars in their first subfield and three in their second, or four advanced seminars in their first subfield and two in their second subfield (formal models and methodology can be used only as a second subfield).
Twin Cities Campus
Population Studies Minor
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: popstudies@pop.umn.edu
Website: http://www.pop.umn.edu/training/population-minor

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Population studies is a multidisciplinary research area at the intersection of the mathematical sciences, the health and social sciences, and public policy. The curriculum provides solid grounding in the theories and methods of demography, with additional specialized training across five interdisciplinary subject areas: historical demography, population geography, economic demography, public health demography, and family and life course demography.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor in population studies is available to master's and doctoral students. Both a master's and doctoral minor require the core course, PA 5301 - Population Methods and Issues for the United States and Third World or SOC 5090 - World Population Issues. In addition to the core course, master's students take at least three credits and doctoral students take at least 9 credits from the list of approved courses at www.pop.umn.edu/training/population-minor/curriculum. All courses should be from the same subject area and may not be in the student's major field. A total of 6 credits at the master's level and 12 credits at the doctoral level is required for the minor. Students must register for all courses A-F; courses taken on a pass/fail basis may not count toward the minor (with the exception of PUBH 5628, which is currently offered only S-N).
Twin Cities Campus
Psychology M.A.
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax: 612-626-2079)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are admitted only for the Ph.D. degree.

Doctoral program specialties are offered in biological psychopathology; clinical science and psychopathology research; cognitive and brain sciences; counseling psychology; industrial/organizational psychology; personality, individual differences, and behavior genetics; quantitative/psychometric methods; school psychology; and social psychology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Plan B requires one to three review papers in lieu of a thesis, and a minimum of 30 course credits, of which 14 credits must be in psychology and 6 credits in one or more related fields.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

If the student and adviser elect to satisfy the requirements for the master's degree, each student's program is planned in consultation with an adviser. Plan A requires a minimum of 14 credits in psychology and 6 credits in a minor/related field, a minimum of 10 thesis credits, and a research thesis. Plan B requires one to three review papers in lieu of a thesis, and a minimum of 30 course credits, of which 14 credits must be in psychology and 6 credits in one or more related fields. For Plan A, the final exam is oral; for Plan B, it may be written, oral, or both.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Counsel
Twin Cities Campus
Psychology Minor

Communication Studies, Political Science, Psychology
College of Liberal Arts

Link to a link to a list of faculty for this program.

Contact Information:
Department of Psychology, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax: 612-626-2079)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students are admitted only for the Ph.D. degree. Doctoral program specialties are offered in biological psychopathology, clinical science and psychopathology research, cognitive and brain sciences, counseling psychology, industrial/organizational psychology, personality, individual differences, and behavior genetics, quantitative/psychometric methods, school psychology, and social psychology.

Program Delivery
This program is available:

- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires 6 credits. The doctoral minor requires 12 credits.
Twin Cities Campus
Psychology Ph.D.
Psychology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Psychology, S246 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax: 612-626-2079)
Email: psyapply@umn.edu
Website: http://psych.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students are admitted only for the Ph.D. degree. Doctoral program specialties are offered in biological psychopathology; clinical science and psychopathology research; cognitive and brain sciences; counseling psychology; industrial/organizational psychology; personality, individual differences, and behavior genetics; quantitative/psychometric methods; school psychology; and social psychology.

Accreditation
This program is accredited by Committee on Accreditation of the Amer. Psychological Assoc (for Clinical & Counseling specialities)

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Although there are no specific minimums for GPA and GRE scores, the range of scores for those admitted in previous years are available from the psychology website at psych.umn.edu.

Recommended academic preparation includes a minimum of 12 credits (three to four courses) of psychology coursework beyond introductory psychology, including one course in statistics or psychological measurement. Applicants to the clinical science program must have completed a course in abnormal psychology. An undergraduate major in psychology is desirable, but not required.

Special Application Requirements:
Applications are accepted for fall admission only; the deadline is December 1. A department application; a statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with the applicant's scholarship and research potential; and scores from the GRE General Test are required. The GRE Subject Test in psychology is not required, but highly recommended. Applicants whose native language is not English must submit the results of the TOEFL iBT. Applications are submitted electronically through the ApplyYourself application system. For more information about the application procedures, see the psychology website at psych.umn.edu.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
• IELTS
  - Total Score: 6.5
• MELAB
  - Speaking test score: 8
The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 to 36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.50 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must satisfy the general area distribution requirement using selected courses in four areas outside their specialization. There are no other general departmental course requirements. Each student's program is individually planned in consultation with an adviser to meet both the individual's goals and the specialty requirements. The programs in clinical psychology and counseling psychology include specific requirements for applied coursework and practicum and internship experience. Each specialization also requires completion of a series of Ph.D. seminars covering scholarship and research skills. Students also complete 12-15 credits in a minor or supporting program.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

School Psychology
Twin Cities Campus
Public Art Minor
Art
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Public Art Program, Weisman Art Museum, University of Minnesota, 333 East River Road, Minneapolis, MN 55455 (612-625-9686; fax: 612-625-9630)

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in public art (PArt) is an interdisciplinary program designed to expose students to the history of public art, contemporary issues, and current practices. The minor provides students the opportunity to work with instructors and other students with backgrounds in studio arts, design, architecture, landscape architecture, urban design, and public policy to learn collaborative methods essential to public art making and public art administration. Specifically, the minor provides students with a theoretical basis to both understand and produce public art projects. The minor includes a set of core courses in public art history, current issues and criticisms, and public engagement.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Master's and doctoral students take Issues and Ideas in Contemporary Public Art and History of Public Art as well as a practicum in Public Engagement. Doctoral students must also complete an internship.
Twin Cities Campus

Religious Studies Minor

History

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of History, 245 Nicholson Hall, 216 Pillsbury Avenue S.E., Minneapolis, MN 55455 (612-625-5353)
Email: rels@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g149.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in religious studies is available to master's (M.A. and M.S.) and doctoral students in relevant fields such as history, classics, English, anthropology, philosophy, and American studies, and is under the general direction of members of the graduate faculty who represent a broad spectrum of disciplines.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minor requires 9 credits for an M.A. and 12 credits for the Ph.D. All minors will have at least one of the religious studies graduate faculty as a member of their examination committees. All students enrolled in the minor take RELA 5001 - Theory and Method in the Study of Religion, and choose two (M.A.) or three (Ph.D.) courses in consultation with the director of graduate studies. For appropriate courses, see www.religiousstudies.umn.edu/courses.
Twin Cities Campus
Rhetoric, Scientific and Technical Communication M.A.
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive, S.E., Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://www.writingstudies.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 39
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.A. in rhetoric and scientific and technical communication prepares students to address complex issues in language, science, and technology. The programs are flexible enough to allow students to approach their studies from a variety of perspectives and research methods. These programs prepare students for teaching at a university and conducting research in rhetoric and scientific and technical communication. The programs can also prepare students for specialist positions in industry and government that require the analysis and design of human communication systems. Required courses include theory, research, and practice in rhetoric and scientific and technical communication; analysis of scientific or technical discourse; and coursework in a minor or related field.

All M.A. applicants must meet the admission requirements of the Graduate School. M.A. applicants should have a strong interest in language and rhetorical theory or communication theory. A background in a science, Internet studies, environmental studies, or pedagogy and technology is helpful.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Undergraduate degree in a related discipline.

Special Application Requirements:
Scores from the General Test of the GRE that are less than five years old are required of students with baccalaureate degrees from U.S. institutions. International students are encouraged to take the General Test of the GRE and to have those results forwarded to the Graduate School. Nonnative speakers of English are required to take the TOEFL with satisfactory scores. All applicants must submit three letters of recommendation, two writing samples, and a professional objective statement. All M.A. and Ph.D. applicants begin in the fall semester and should apply by the January 1 application deadline.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 33 major credits and 6 credits outside the major. The final exam is written.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus

Rhetoric, Scientific and Technical Communication Minor
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive, S.E., Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://www.writingstudies.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.A. and Ph.D. in rhetoric and scientific and technical communication prepare students to address complex issues in language, science, and technology. The programs are flexible enough to allow students to approach their studies from a variety of perspectives and research methods. These programs prepare students for teaching at a university and conducting research in rhetoric and scientific and technical communication. The programs can also prepare students for specialist positions in industry and government that require the analysis and design of human communication systems. Required courses include theory, research, and practice in rhetoric and scientific and technical communication; analysis of scientific or technical discourse; and coursework in a minor or related field.

All M.A. and Ph.D. applicants must meet the admission requirements of the Graduate School. M.A. and Ph.D. applicants should have a strong interest in language and rhetorical theory or communication theory. A background in a science, Internet studies, environmental studies, or pedagogy and technology is helpful.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For master's degree students, the minor requires 6 credits in 5xxx and 8xxx WRIT courses. The minor for Ph.D. students requires 12 credits of 5xxx and 8xxx WRIT courses with one course being in rhetorical theory and criticism. Students may choose the remaining courses from any of writing studies graduate courses.
Twin Cities Campus

Rhetoric, Scientific and Technical Communication Ph.D.
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive, S.E., Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://www.writingstudies.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 57
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Applicants for the Ph.D. must have a master's degree either completed, or in progress with plans to complete it before the start of the Ph.D. program. As part of their application, graduate students are asked to discuss their interests and explain their master's program and how the Ph.D. will build upon it.

The primary purpose of the Ph.D. program is to prepare graduate students to do research in areas related writing, broadly construed, and to publish the results of that research.

Working in collaboration with faculty mentors, other students, and material resources such as the library and the internet, graduate students will become expert in a specialized field of knowledge, developing the scholarly and research skills needed to make a new and original contribution to research in rhetoric, composition, writing studies, literacy, or technical/scientific communication. Graduate students build their expertise and skills in the core areas of rhetoric and technical communication, then develop and refine knowledge and skills through departmental seminars and a supporting program of courses outside the department. The dissertation—an original, systematic, and significant program of research—will allow graduate students to join scholarly conversations and contribute to knowledge and theory within the field. This project, and the mentoring students receive as they complete the project, will stand students in good stead to continue to make important research contributions in their academic careers as they unfold.

Preparing graduate students to teach first-year writing, scientific and technical communication, and other courses related to their expertise is also an important part of the program because of the expectation is that graduates will teach at the college level. While most of graduate students have entered college teaching, a few have preferred to work in industry in scientific and technical communication.

The Ph.D. consists of 42 course credits and 24 thesis credits, preliminary written and oral exams, a formal dissertation prospectus, and the dissertation itself.

Graduate student faculty advisers help graduate students with all parts of the degree, by articulating a coherent plan of coursework, leading a preliminary examination committee, and guiding them in developing a dissertation project.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Masters in a related discipline, e.g., rhetoric, technical and professional communication, English, communication studies.

Special Application Requirements:
Scores from the General Test of the GRE that are less than five years old are required of students with baccalaureate degrees from U.S. institutions. International students are encouraged to take the General Test of the GRE and to have those results forwarded to the Graduate School. Nonnative speakers of English are required to take the TOEFL with satisfactory scores. All applicants must submit three letters of recommendation, two writing samples, and a professional objective statement. All M.A. and Ph.D. applicants begin in the fall semester and should apply by the January 1 application deadline.
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

---

**Program Requirements**

27 to 42 credits are required in the major.

24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Ph.D. students in rhetoric and scientific and technical communication are required to earn a minimum of 42 credits in seminars and courses. The requirement includes a research core, five courses in three core areas, and at least three in a specialty area (a concentration). The first is two courses in research methods in writing studies and technical communication (WRIT 8011 and 8012, 6 cr). Students take one Writing Studies course or seminar in each of the core areas: rhetoric theory and history, writing studies and pedagogy, and technical communication and technology and culture, as well as two others from any of the three (15 cr).

Examples of specialty areas include rhetorical theory, rhetoric of science, medicine, or law, theories of writing, pedagogies, professional and technical communication, digital literacies, and internet studies (9 cr). Elective courses or a formal doctoral minor from another program are needed in order to fulfill the minimum credit requirement. The written preliminary examination covers three areas: one in rhetoric, one of the other core areas, and the specialty. The first two are based partly on fixed reading lists and coursework in the areas. The preliminary oral examination is built around the written examinations. Twenty four thesis credits are also required.
Twin Cities Campus
Scientific and Technical Communication M.S.
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://www.writingstudies.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

In general, you should not depart substantively from the description available on this page: http://www.catalogs.umn.edu/grad/programs/g150.html.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 33 major credits and null credits outside the major. The is no final exam. A capstone project is required.
Capstone Project: WRIT 8505 - Design Project. Also known as a capstone course, this is the final course necessary to complete the degree requirements. It is usually offered in the summer. The course is primarily for students seeking the M.S. in scientific and technical communication, but is also suitable for graduate students in any program who want structured support to write an extended project report. Classes are conducted in a "writers' workshop" format, during which each student receives feedback and support for his or her individual research report writing.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Scientific and Technical Communication Minor
Writing Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, MN 55455; (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://www.writingstudies.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

In general, you should not depart substantively from the description available on this page: http://www.catalogs.umn.edu/grad/programs/g150.html.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For master's degree students, the minor requires 6 credits in 5xxx and 8xxx WRIT courses.
Twin Cities Campus
Sociology M.A.
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://www.soc.umn.edu/grad

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are never admitted to the sociology graduate program solely to pursue the M.A.; the M.A. is only an optional degree for students already enrolled in the doctoral program. See the Ph.D. for admissions information.

Sociology is concerned with the study of human societies, groups, and social life. The program offers substantive training in five areas of specialization: family and life course; inequality: race, class, and gender; law, crime, and deviance; organizations, work, and markets; and political sociology and social movements. Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research. Training for students interested in either academic or applied employment is generally available.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Students are never admitted to the sociology graduate program solely to pursue the M.A.; the M.A. is only an optional degree for students already enrolled in the doctoral program. See the Ph.D. for admissions information.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is two papers, at least one of which is empirical.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students are never admitted to the sociology graduate program solely to pursue the M.A.; the M.A. is only an optional degree for students already enrolled in the doctoral program. Students must take five required core courses (14 cr) and two additional substantive courses in sociology (6 cr). Students must also complete a minimum of 6 credits in a minor or related field and must complete a minimum of 30 credits total. Courses are chosen in consultation with the adviser and the program committee to meet the student's educational and professional goals. Plan B students submit two papers, at least one of which is empirical. Plan A students are required to submit a master’s thesis and register for 10 thesis credits.
Twin Cities Campus
Sociology Minor
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://www.soc.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sociology is concerned with the study of human societies, groups, and social life. The program offers substantive training in five areas of specialization: family and life course; inequality: race, class, and gender; law, crime, and deviance; organizations, work, and markets; and political sociology and social movements. Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research. Training for students interested in either academic or applied employment is generally available.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A doctoral minor requires four courses in sociology, at least one of which is 8xxx. Course choices are subject to the approval of the director of graduate studies.
Twin Cities Campus
Sociology Ph.D.
Sociology
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Sociology, 909 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax: 612-624-7020)
Email: soc@umn.edu
Website: http://www.soc.umn.edu/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 65
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Sociology is concerned with the study of human societies, groups, and social life. The program offers substantive training in five areas of specialization: family and life course; inequality: race, class, and gender; law, crime, and deviance; organizations, work, and markets; and political sociology and social movements. Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research. Training for students interested in either academic or applied employment is generally available.

The doctoral program is for students planning to do research or teach.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is above 3.00 on a 4.00 scale.

Students are not required to have earned a graduate or professional degree prior to entering the program.

It is recommended that applicants have a background in basic sociology, usually consisting of the equivalent of 18 credits in undergraduate work (including 9 credits of social science statistical methods), or an M.A. degree in sociology or a closely related field. Individuals who have completed fewer than 18 credits of sociology coursework may be admitted but are generally required to complete background coursework in theory and statistics during their first year of residence.

Special Application Requirements:
Applicants are evaluated on their general academic potential, commitment to the field, creativity, and potential for contribution to the field. In addition to the Graduate School application form, and its required documents, applicants must submit the following: standardized test scores; a sample of written work, usually a term paper, written in English; three letters of recommendation; and a personal statement of professional objectives. The department accepts new students for fall admission only. The final application deadline for admittance is December 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
29 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students prepare for a written preliminary examination by developing in close consultation with the adviser a reading list covering the scope of the preliminary exam paper. The reading list selections and the preliminary exam paper must be logically related to the student's major interest in the field. Three representatives from the sociology department must serve on the student's preliminary oral examining and prospectus hearing committees. The final examination is an oral defense of the sole-authored dissertation.

The doctoral program is for students planning to do research or teach. Students take five required core courses (14 cr), including two 1-credit courses on professional-skills development. Beyond that, each student's program is individually planned in consultation with the adviser and the program committee to meet both the student's goals and broad program requirements. Those requirements include four substantive courses in sociology (12 cr minimum) and at least one semester of training in advanced methods (3 cr minimum). Students must also complete a minimum of 12 credits in a minor or supporting program and register for 24 thesis credits. Students who enter the program with an M.A. in sociology must earn a minimum of 18 credits in the department regardless of the number of courses the department approves eligible for transfer credit from other institutions.


Twin Cities Campus

Speech-Language-Hearing Science M.A.

Speech-Language-Hearing Sciences

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing-Sciences, 115 Shevlin Hall, 164 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhs@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphasis in the master's program is speech-language pathology focusing on meeting the standards for certification as a speech-language pathologist by the American Speech-Language-Hearing Association. The program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development.

Accreditation

This program is accredited by American Speech-Language-Hearing Association (ASHA).

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Prerequisite coursework includes undergraduate transcript credit in physical science, biological science, social/behavioral science, and mathematics.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 30 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

Capstone Project: The Plan B project is a written comprehensive project with a final oral examination.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Emphasis in the master's program is speech-language-hearing sciences.

Students may select between two M.A. options. Plan A requires coursework and a thesis that is experimental in nature. Plan B requires coursework, a comprehensive written examination, and an oral examination.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Audiology

The audiology program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development.

The audiology sub-plan requires a total of 52 credits, the completion of a major summative project, and a final oral examination.

Speech-Language Pathology

The speech-language pathology program emphasizes outcome-based learning activities that prepare graduates to interpret research findings and incorporate them into clinical practice. Coursework and clinical education focus on diagnostic, rehabilitative techniques, technology counseling approaches, and human development. This sub-plan is accredited by the American Speech-Language-Hearing Association for certification in speech-language pathology.

Sub-plan includes an average of 52 credits. Credits include clinical education in speech-language-pathology. Students in this sub-plan may elect a Plan A thesis or a Plan B comprehensive project. Both require completion of a final oral examination.
Twin Cities Campus

Speech-Language-Hearing Sciences Minor
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhs@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphasis in the graduate program is speech-language pathology and audiology.

Accreditation
This program is accredited by The American Speech-Language-Hearing Association (ASHA).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of 12 credits, approved by the director of graduate studies, is required for a master's minor. A minimum of 15 credits, approved by the director of graduate studies, is required for a doctoral minor.
Twin Cities Campus
Speech-Language-Hearing Sciences Ph.D.
Speech-Language-Hearing Sciences
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Speech-Language-Hearing Sciences, 115 Shevlin Hall, 164 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3322; fax: 612-624-7586)
Email: slhs@umn.edu
Website: http://www.slhs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 65
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Emphases in the Ph.D. program are speech-language pathology, audiology, speech science, language science, or hearing science. The program prepares students for careers in research, teaching, and advanced clinical applications. Most students entering the program have a master's degree in speech-language pathology, audiology, or a related area. The Ph.D. degree usually requires three years of work beyond the master's degree. In general, a student's program is designed by the student in consultation with the adviser to satisfy the particular objectives of the student, but there are also some department and Graduate School requirements that must be satisfied.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
29 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The Ph.D. degree usually requires three years of work beyond the master's degree. In general, a student's program is designed by the student in consultation with the adviser to satisfy the particular objectives of the student, but there are also some department and Graduate School requirements that must be satisfied. These include coursework, research activities, teaching experience, and preliminary and final exams.

A minimum of 12 course credits in a minor or supporting program and registration for 24 thesis credits are required. Also required is a statistics sequence, for which students typically register during their first two years. The written and oral preliminary exams are taken at the end of the second year.

Each student completes a seminar (SLHS 8430) and a minimum of 4 credits of teaching experience that provide an opportunity for the student to develop and teach sections of department courses. Students also complete a seminar (SLHS 8410) and a minimum of 4 credits of research under the direction of one or more faculty members in the department other than the adviser.
**Twin Cities Campus**

**Statistics M.S.**  
*Statistics, School of ADM*  
College of Liberal Arts

Link to a [list of faculty](#) for this program.

**Contact Information:**  
Department of School of Statistics, 313 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-624-8046; fax: 612-624-8868)  
Email: [info@stat.umn.edu](mailto:info@stat.umn.edu)  
Website: [http://www.stat.umn.edu](http://www.stat.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2011  
- Length of program in credits: 34  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
- IELTS  
  - Total Score: 6.5  
- MELAB  
  - Final score: 80

Key to [test abbreviations](#) (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**  
**Plan B:** Plan B requires 28 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The program prepares students for jobs in industry and the public sector and also for study at the doctoral level.
During the first year, students take a two-semester theory sequence (STAT 8101-8102) and a two-semester methods sequence (STAT 8051-8052). In addition, they usually take two supporting field courses (at least 6 cr) from other departments.

During the second year, students take three courses (at least 9 cr) of approved 5xxx or 8xxx statistics courses; some of this requirement can be satisfied by taking approved courses with heavy statistical content from other departments. Students also take a 3-credit statistical consulting course and complete their Plan B project. A total of at least 34 course credits is required.
Twin Cities Campus
Statistics Minor
Statistics, School of ADM
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Statistics, 313 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-625-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g164.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master’s minor requires at least 9 credits of 5xxx or 8xxx statistics courses. STAT 4101-4102 may be used to satisfy this requirement.
A doctoral minor requires a theory sequence (STAT 4101-4102 or STAT 5101-5102) and familiarity with various statistical methods.
Typical programs include 14 to 18 credits of graduate-level statistical courses. Note: STAT 4101 and 4102 are available to graduate students from other programs, but not to statistics majors.
Twin Cities Campus

Statistics Ph.D.
Statistics, School of ADM
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of School of Statistics, 313 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-625-8046; fax: 612-624-8868)
Email: info@stat.umn.edu
Website: http://www.stat.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 85
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
49 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.
The Ph.D. program core courses cover statistical theory (STAT 8101, 8102, 8111, and 8112; 14 cr), statistical methods (STAT 8051, 8052, 8053, and 8054; 14 cr), and statistical practice (STAT 8802 and 8055; 4 cr). In addition to this core, students take 12 credits outside of statistics in a supporting program, 12 credits of 8xxx statistics electives, 4 credits of literature seminar, and 24 thesis credits. Courses with heavy statistical content from other departments and some 5xxx statistics courses may be used as electives, and students are strongly encouraged to include MATH 8651-8652 - Theory of Probability Including Measure Theory in the supporting program. Students entering with a master's degree or other advanced training are not required to duplicate previous coursework. The Ph.D. preliminary written examination is given at the end of the first year of study and covers theory and methods at the level of STAT 8051, 8052, 8101, and 8102. For more complete information, consult the School of Statistics Graduate Student Handbook or www.stat.umn.edu/Programs/PhDrequirements.html.
Twin Cities Campus
Strategic Communication M.A.
School of Journalism & Mass Communication
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-4054; fax: 612-626-8251)
Email: sjmgrad@umn.edu
Website: http://sjm.umn.edu/grad/

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.A. in strategic communication is designed to serve working communications professionals in advertising, public relations, corporate communications, nonprofit organizations, and government. The 33-credit program is conceptually and structurally distinct from the existing academic master's degree in mass communication in that it focuses on advanced professional study of communications strategy, planning, evaluation, and creative management.

The University of Minnesota is one of only a handful of institutions to offer a professional master's program in strategic communication designed for the busy working professional.

The M.A. in strategic communication curriculum is tailored to provide the best foundation for future communications leaders, recognizing that the communication industry is changing rapidly and is more volatile than ever. With Internet use moving well beyond its infancy, and massive organizational and global forces reshaping the U.S. economy, communications leaders face significant challenges and can prepare themselves through in-depth study of strategic process management.

Program Delivery
This program is available: via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
The minimum requirement for admission is a B.A. or equivalent. Professionals in strategic communication—currently employed in advertising, public relations, or marketing firms, or in a communications function within a corporation or nonprofit organization—must have a baccalaureate degree from an accredited U.S. institution or its foreign equivalent and at least two years professional experience. This professional experience should be in any of the following areas: account planning, account management, advertising management, media planning or buying, media sales, promotion marketing, corporate communications, public affairs, public relations, investor relations, direct marketing, sales management, marketing management, brand management, market research, or event management.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 33 major credits and null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The M.A. in strategic communication requires 33 credits to be completed within 24 calendar months. All students must take the same 18 course credits in communication, and complete the 6-credit individual project. In addition, 9 credits of graduate-level elective studies (at least 6 outside the School of Journalism and Mass Communication) must be completed.

Students must maintain a GPA of at least 3.00 and achieve a grade of B or better on their final 6-credit project. Student progress is evaluated by the academic director, program coordinator, and program faculty. Students must progress each semester to continue in the program, though a student who unexpectedly must temporarily leave the program can return to the program at a later date and resume their studies at the point of departure. All coursework must be taken A-F.
Studies in Africa and African Diaspora Minor
Af Am/African Studies
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of African American and African Studies, 810 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455
(612-624-9847; fax: 612-624-8383)
Email: www.aaas.umn.edu
Website: http://www.aaas.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 15
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary graduate minor is administered through the Department of African American and African Studies. The minor program gives students from a variety of disciplines a structured graduate curriculum that offers a systematic understanding of the contemporary and historical experiences of peoples of Africa and of the African diaspora. It is organized around a group of core seminars and focuses on two broad areas: the humanities and the arts, and the social and behavioral sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students develop their program in consultation with the director of graduate studies in studies in Africa and the African diaspora and in their major. All courses must be outside the student's major field of study.

The master's minor requires a minimum of 9 graduate credits, including the seminar AFRO 5101 - Studies in Africa and the African Diaspora. Remaining courses are selected from one of the following two areas: humanities and the arts or behavioral and social sciences.

The doctoral minor requires a minimum of 15 graduate credits, including the seminar AFRO 5101 - Studies in Africa and the African Diaspora. Students take one additional seminar that focuses on the study of Africa and peoples of African descent. Remaining courses are selected from one of the two areas listed above.
Twin Cities Campus
Studies of Science and Technology Minor

Philosophy
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Studies of Science and Technology, 746 Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455; (612-625-6635; fax: 612-626-8380)
Email: mcps@umn.edu
Website: http://www.mcps.umn.edu/grad/program.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Studies of science and technology (SST) deals with a rapidly expanding field that seeks to understand the conceptual foundations, historical development, and social dimensions and context of science and technology. SST faculty are drawn from a number of research and teaching units dedicated in whole or in part to the history, philosophy, and social studies of science and technology.

The graduate SST minor is for students from any major who want to gain a deeper understanding of the nature and development of science and technology. It can be particularly valuable for students who are planning teaching careers in science or engineering, or those majoring in philosophy or history of science and technology. Students admitted to the SST minor will develop individual programs of study in consultation with the faculty and the director of graduate studies. Adjustments in program requirements can be made for students with relevant previous course experience.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires 7 graduate credits; the doctoral minor requires 12 graduate credits. Both minors must include HSCI 8112 or HMED 8112; one of either PHIL 8601, 8602, or 8605; and SST 8000 - Colloquium (one semester for master's, two for doctoral students). Doctoral students must also take one of the SST seminars (SST 8100, 8200, 8300, 8400, or 8420) in an area primarily outside the student's major.
Twin Cities Campus

Technical Communication Postbaccalaureate Certificate

Writing Studies

College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Writing Studies, 215 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, MN 55455; (612-624-3445; fax: 612-624-3617)
Email: WRIT@umn.edu
Website: http://www.writingstudies.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Technical Communication PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

From this certificate program students will:
- Acquire advanced skills in writing and editing scientific and/or technical documents for various audiences. WRIT 5561 - Editing and Style for Technical Communicators (3 cr) focuses on this learning outcome.
- Acquire skills in oral presentation of scientific and/or technical information for various audiences. (Oral presentations are integrated throughout the curriculum.)
- Design and develop documents for a range of established and emerging technologies relevant to the field of scientific and technical communication.
- Understand user-centered design principles and learn to apply these principles through design and usability testing. WRIT 4501 - Usability and Human Factors in Technical Communication (3 cr) is dedicated to assess this learning outcome.
- Practice experimental/survey research techniques for quantitative/qualitative methodologies in scientific/technical communication focusing on questionnaire development, contextual inquiry, ethics, experimental bias, and inferential statistical analysis. WRIT 5511 - Research in Scientific and Technical Communication (3 cr) is dedicated to assess these learning outcomes.
- Learn the principles of the visual display of technical information and how to effectively apply visual design principles to technical documents. WRIT 5671 - Visual Rhetoric (3 cr) focuses on this learning outcome.
- Understand various theoretical perspectives in scientific and technical communication, as well as the ability to apply these perspectives to document development projects. WRIT 5112 - Information Design (3 cr) focuses on this learning outcome.
- Learn about international and intercultural issues in scientific and technical communication, as well as strategies for effectively addressing these issues. International issues are integrated throughout the curriculum.

The certificate courses provide opportunities for research-based teaching and learning. Two of the certificate’s courses focus on research in the field of technical communication: WRIT 5511 - Research in Scientific and Technical Communication (3 cr), and WRIT 4501 - Usability and Human Factors in Technical Communication (3 cr). These courses teach students about the state of research in the field and to show how research supports the larger technical communication community. These courses also provide preparation and opportunities for students to conduct research as working professional and practitioners. Certificate courses are taught by graduate faculty who themselves have active research agendas.

The program, whenever possible, provides opportunities for students to apply knowledge to solve community and industry problems within the field of technical communication through authentic learning opportunities in the program's courses. These courses routinely require students to engage in projects for "real world" clients that in the past have included such organizations as ISEEK (Minnesota Internet System for Education and Employment Knowledge), the American Community Gardening Association, and the U.S. Forest Service North Central Research Station.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

*IELTS
- Total Score: 6.5
*MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.
Twin Cities Campus
Theatre Arts M.A.
Theatre Arts & Dance
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department's work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning-production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 24 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is written.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 2.80 is required for students to remain in good standing.

The M.A. degree emphasizes academic pursuits and is considered a prerequisite for the Ph.D. The areas of study for the M.A. are devised in collaboration with a faculty adviser, and demand original and challenging research in the fields of theatre historiography or performance criticism.
Twin Cities Campus
Theatre Arts M.F.A.
Theatre Arts & Dance
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Master of Fine Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.F.A. in Design and Technology is awarded to students who, through the three-year course of study, explore challenges in the areas of scenery/properties, costuming, lighting, sound design and technology with an emphasis in at least one of these areas. It is a rigorous program based on the belief that good designers must have a solid understanding of each area of design in order to be able to communicate and collaborate well with the other designers, technicians, and directors. Good designers must also have strong craft skills in order to understand how the design functions in execution. The department believes that technology is an integral tool of design and seeks to balance the education of the student in both areas.

Accreditation
This program is accredited by National Association of Schools of Theatre (NAST)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Admission into the M.F.A. design technology program is dependent on a portfolio review by the design/technology faculty.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 60 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: A realized design and technology project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The three-year, performance-oriented M.F.A. degree specializes in design and technical production. All areas of design are studied to increase understanding in specialization areas, and technology is studied as an essential part of design. Students are expected to achieve proficiency in at least two areas of any combination of design and technology (scenery/properties, costuming, lighting, sound) and a level of expertise in at least one of these areas. Program faculty work with students to identify the final areas for the degree. The M.F.A. degree is considered a terminal degree in these areas of theatre arts.

The M.F.A. requires 60 graduate credits, although a particular program's requirements may exceed this minimum. The degree requires 6 credits of dramatic literature or theatre history, which may be fulfilled by TH 4177 and 4178; and a minimum of 6 credits from outside the department (at least 3 credits of which must be a University course that contributes substantially to the degree program). Each program requires a final performance practicum and written record of it. For specific program requirements, contact the director of graduate studies.
**Twin Cities Campus**

**Theatre Arts Minor**

**Theatre Arts & Dance**

**College of Liberal Arts**

Link to a list of faculty for this program.

**Contact Information:**
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department’s work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning-production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires a minimum of 9 credits as approved by the director of graduate studies. A doctoral minor requires a minimum of 12 credits as approved by the director of graduate studies.
Twin Cities Campus
Theatre Arts Ph.D.
Theatre Arts & Dance
College of Liberal Arts

Link to a list of faculty for this program.

Contact Information:
Department of Theatre Arts and Dance, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-6699; fax: 612-625-6334)
Email: theatre@umn.edu
Website: http://theatre.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The University of Minnesota offers a unique graduate program drawing from the varied research expertise of its core faculty. Together, the faculty is committed to the study of theatre and performance as practices of social, cultural, and political consequence. The department's work in theatre historiography and performance criticism examines the stakes of acts of representation, movement, and meaning-production both within and without the discipline of theatre. The curriculum of this program trains students to be rigorous scholars and expert teachers of theatre and performance studies at the college level.

Accreditation
This program is accredited by National Association of Schools of Theatre (NAST).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
In order to be admitted to the M.A./Ph.D. program, you must have a working knowledge/reading proficiency of at least one foreign language (or a sign language).

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required outside the major.
24 thesis credits are required.
This program may not be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.
Language Requirement: Proficiency in one foreign language.
A minimum GPA of 3.50 is required for students to remain in good standing.
At least 2 semesters must be completed before filing a Degree Program Form.
The M.A./Ph.D. core curriculum includes three categories of 8xxx courses. Students are required to take a minimum of two courses each from category A and category B, and both courses in category C.

A: Signature Seminars
Each member of the M.A./Ph.D. faculty will offer a "signature seminar" on a two-year rotation. These seminars focus on the faculty member's current primary area of research interest, with an emphasis on articulating the distinct research methodology that the faculty member brings to bear on his/her field.

B: Field Seminars
Each member of the M.A./Ph.D. faculty will offer a "field seminar" on a two-year rotation. These seminars are designed to give students a level of field expertise that will enable them to teach in the history, literature, and criticism of theatre studies, and each focuses on a distinct period, problematic, or performance tradition. The emphasis here is on mastery of a body of literature and theory pertaining to a specific field.

C: Pedagogy and Professionalization
This seminar is taught every second year, over an entire year (meeting every second week, 3 cr). It introduces students to the academic profession through a series of focused workshops on pedagogy (ethics, politics, and practice), professional protocols (publishing, job search, conferences), and forms of professional writing (grants, abstracts, statements of teaching philosophy, etc.).

Historiography Seminar
This seminar is taught every second year (3 cr). It focuses on the contested nature of historical (theatre/performance) knowledge, and introduces students to idea of historiography defined as an ethical exploration of the encounter with the Other (the past, the writing of history, the archive, the event, the fact, the object) that questions relations of knowledge and power, as well as the current apparatus of inquiry and interpretation.
Course Descriptions

Course Numbers, Symbols, and Abbreviations .... 2
Guide to Course Designators ............ 192

Accounting (ACCT) .......... 4
Addiction Studies (ADDS) ....... 4
Adult Health Nursing (ADNM) ... 6
Aerospace Engineering and Mechanics (AEM) .... 5
African American and African Studies (AFRO) .... 7
Agricultural, Food, and Environmental Education (AFEE) .... 7
Agronomy and Plant Genetics (AGRO) .... 8
Akkadian (AKKA) .......... 8
American Indian Studies (AIMN) .... 9
American Sign Language (AMEL) .... 9
Anatomy (ANAT) .......... 10
Anesthesiology (ANES) ....... 10
Animal Science (ANSC) ....... 10
Anthropology (ANTH) ....... 11
Apparel Studies (APST) ....... 12
Applied Economics (APEC) .... 13
Applied Plant Sciences (APSC) .... 15
Applied Professional Studies (APS) .... 15
Arabic (ARAB) .......... 15
Architecture (ARCH) ....... 15
Art (ARTS) ........ 18
Art History (ARTH) ....... 18
Arts and Cultural Leadership (ACL) .... 21
Asian American Studies (AAS) .... 21
Asian Languages and Literatures (ALL) .... 21
Astronomy (AST) ....... 21

Biochemistry (BIOC) .......... 22
Bioethics, Center for (BTHX) .... 23
Bioinformatics (BINF) ....... 23
Biolography (BIOL) ....... 24
Biomedical Engineering (BME) .... 24
Biomedical Science (BMS) .... 25
Biophysical Sciences (BPHY) .... 25
Bioproducts and Biosystems Engineering (BBE) .... 26
Business Administration (BA) .... 27

Carlson School of Management (CSOM) .... 27
Center for Allied Health Programs (CAHP) .... 27
Center for Spirituality and Healing (CSPH) .... 27
Chemical Engineering (CHEN) .... 30
Chemical Physics (CHPH) .... 31
Chemistry (CHEM) ....... 31
Chicano Studies (CHIC) ....... 33
Child and Adolescent Psychiatry (CAPY) .... 33
Child Psychology (CPSY) .... 33
Chinese (CHN) ....... 34
Civil Engineering (CE) ....... 35
Classical and Near Eastern Studies (CINES) .... 38
Clinical Laboratory Science (CLS) .... 39
Clinical Physiology and Movement Science (CPMS) .... 39
Cognitive Science (CGSC) .... 39
Collaborative Physics Interdisciplinary Program (COLA) .... 39
College of Food, Agricultural and Natural Resources Sciences (CFANR) .... 40
College of Liberal Arts (CLA) .... 40
College of Science and Engineering (CSE) .... 40
Communication Studies (COMM) .... 40
Comparative and Molecular Biosciences (CMB) .... 41
Comparative Literature (CL) .... 41
Comparative Studies in Discourse and Society (CDS) .... 42
Computer Engineering (CMPE) .... 43
Computer Science (CSCI) .... 43
Conservation Biology (CBI) .... 45
Control Science and Dynamical Systems (CDSY) .... 45
Coptic (COPT) ....... 45
Cultural Studies and Comparative Literature (CSCI) .... 45
Curriculum and Instruction (CI) .... 46

Dakota (DAKO) .......... 53
Dance (DANCE) ....... 53
Dental Hygiene (DH) ....... 53
Dental Therapy (DT) ....... 53
Dentistry (DENT) ....... 55
Design (DES) ........ 55
Development Studies and Social Change (DSSC) .... 56
Dutch (DUTCH) ....... 56

Early Modern Studies (EMS) .... 56
Earth Sciences (EESCI) .... 56
East Asian Studies (EAS) .... 57
Ecology, Evolution, and Behavior (EEB) .... 58
Economics (ECON) .... 59
Education (EDUC) .... 67
Education and Human Development (EDHD) .... 64
Educational Psychology (EPSY) .... 62
Electrical and Computer Engineering (EE) .... 67
Endodontics (ENDOC) .... 70
English: Creative Writing (ENGW) .... 71
English: Literature (ENGL) .... 72
Entomology (ENTO) .... 73
Environmental Sciences, Policy, and Management (ESPM) .... 74
Experimental and Clinical Pharmacology (ECP) .... 75
Family Medicine and Community Health (FMCH) .... 76
Family Policy Minor (FPM) .... 76
Family Social Science (FSOS) .... 76
Finance (FINA) .... 78
Financial Mathematics (FM) .... 79
Finnish (FIN) .... 79
Fisheries and Wildlife (FW) .... 79
Food Science and Nutrition (FSCN) .... 80
Forestry Science and Planning (FSP) .... 80
Forest Resources (FR) .... 80
French (FREN) .... 81
French and Italian (FRIT) .... 82

Gay, Lesbian, Bisexual, and Transgender Studies (GLBT) .... 83
Gender, Women, and Sexuality Studies (GWSS) .... 83
General Dentistry (GEND) .... 84
Genetics, Cell Biology and Development (GCD) .... 84
Geographic Information Science (GIS) .... 85
Geography (GEOG) .... 85
Geological Engineering (GEOE) .... 85
German (GER) .... 88
German, Scandinavian, and Dutch (GSD) .... 88
Gerontology (GERO) .... 88
Global Studies (GLOS) .... 89
Graduate School (GRAD) .... 89
Graphic Design (GDES) .... 90
Greek (GRK) .... 90

Health Informatics (HINF) .... 91
Hebrew (HEBR) .... 91
Hindi (HINDI) .... 91
History (HIST) .... 92
History of Medicine (HMED) .... 95
History of Science and Technology (HSC) .... 96
Hmong (HMNG) .... 97
Horticulture Science (HORT) .... 97
Housing Studies (HSG) .... 98
Human Factors (HUMFAC) .... 98
Human Resources and Industrial Relations (HRIR) .... 98

Industrial Engineering (IE) .... 100
Information and Decision Sciences (IDSC) .... 100
Infrastructure Systems Engineering (ISE) .... 100
Innovation Studies (IS) .... 102
Insurance and Risk Management (INS) .... 103
Interdisciplinary Archaeological Studies (IANA) .... 103
Interior Design (IDES) .... 103
International Business (IBUS) .... 103
International Relationships Research (IRE) .... 104
Introduction to Species and Genotypes (ISG) .... 105
Italian (ITAL) .... 105

Japanese (JPN) .... 105
Jewish Studies (JWST) .... 105
Journalism and Mass Communication (JOUR) .... 106

Kinesiology (KIN) .... 107
Korean (KOR) .... 109

Laboratory Medicine and Pathology (LAP) .... 109
Land and Atmospheric Science (LASS) .... 109
Landscape Architecture (LA) .... 110
Language, Teaching, and Technology (LGT) .... 112
Latin (LAT) .... 112
Liberal Studies (LS) .... 113
Linguistics (LING) .... 113
Logistics Management (LM) .... 114

Management (MGMT) .... 114
Management of Technology (MOT) .... 114
Managerial Communications (MCOM) .... 115
Marketing (MKTG) .... 115
Master of Business Taxation (MBT) .... 116
Educational Psychology (EPSY) .... 116
Master of Healthy Administration (MAHA) .... 116
Materials Science (MATS) .... 117
Mathematics (MATH) .... 118
Mathematics Education (MTHE) .... 118
Mechanical Engineering (ME) .... 123
Medical Industry Leadership Institute (MILI) .... 125
Medicinal Chemistry (MEDC) .... 125
Medieval Studies (MEDS) .... 126
Microbial Engineering (MICE) .... 126
Microbiology, Immunology, and Cancer (MIC) .... 126
Middle Eastern Languages and Cultures (MELC) .... 127
Minnesota Studies in International Development Program (MISID) .... 127
Molecular Cellular Developmental Biology and Genetics (MCDBG) .... 127
Moving Image Studies (MIMS) .... 127
Music (MUS) .... 127
Music Education (MUED) .... 131
Music Theory and Composition (MUSIC) .... 131
Nutrition (NUTR) .... 134
Nutrition (NUTR) .... 139
Obstetrics and Gynecology (OBST) .... 139
Occupational Therapy (OT) .... 140
Ojibwe (OJIB) .... 140
Ophthalmology (OPH) .... 140
Oral and Maxillofacial Surgery (OSUR) .... 140
Oral Biology (OBIO) .... 141
Organizational Leadership, Policy and Development (OLPD) .... 141
Orthodontics (OTH) .... 147
Otolaryngology (OTOL) .... 147

Pediatric Dentistry (PDEN) .... 148
Periodontics (PERO) .... 148
Pharmacology (PHM) .... 148
Pharmacy (PHAR) .... 148
Philosophy (PHIL) .... 150
Physical Medicine and Rehabilitation (PMED) .... 151
Physical Therapy (PT) .... 151
Physics (PHYS) .... 151

Physiology (PHYS) .... 153
Plant Biological Sciences (PBS) .... 154
Plant Biology (PBIO) .... 154
Plant Pathology (PLPA) .... 154
Polish (PLSH) .... 155
Political Science (POL) .... 155
Portuguese (PORT) .... 159
Postsecondary Teaching and Learning (PSTL) .... 159
Preventive Science Minor (PREV) .... 159
Product Design (PDES) .... 159
Psychology (PSY) .... 160
Public Affairs (PA) .... 162
Public Health (PUBH) .... 167
Radiation Therapy (RTT) .... 168
Radiology (RAD) .... 168
Recreation Resource Management (RRM) .... 168
Recreation, Park, and Leisure Studies (REC) .... 169
Rehabilitation Science (RSC) .... 169
Russian Studies (RELS) .... 170
Retail Merchandising (RM) .... 171
Russian (RUSS) .... 171
Russian Area Studies (RAS) .... 171

Scandinavian (SCAN) .... 171
Scientific Computation (SCCI) .... 171
Second Language Studies (SLS) .... 172
Courses

Security Technologies (ST) ............................................172
Social and Administrative Pharmacy (SAPH) ..............173
Social Work (SW) ..........................................................173
Social, Administrative, and Clinical Pharmacy (SACP) .................177
Sociology (SOC) ...........................................................177
Software Engineering (SENG) ........................................178
Soil, Water, and Climate (SOIL) .....................................179
Spanish (SPAN) ...........................................................179
Spanish and Portuguese (SPPT) .....................................181
Speech-Language-Hearing Sciences (SLHS) ..................181
Statistics (STAT) ..........................................................182
Stem Cell Biology (SCB) .................................................184
Studies in Cinema and Media Culture (SCMC) ..............184
Studies of Science and Technology (SST) .......................184
Supply Chain and Operations (SCO) .........................184
Surgery (SURG) ..........................................................185
Sustainable Agricultural Systems (SAGR) ......................185
Swahili (SWAH) ..........................................................185
Theatre Arts (TH) ..........................................................185
Therapeutic Radiology (TRAD) ......................................186
TMJ/Craniofacial Pain (TMJP) .........................................187
Toxicology (TXCL) ........................................................187
Translation and Interpreting (TRIN) ...............................187
Turkish (TURK) ............................................................187
University College (UC) ...............................................187
Urban Studies (URBS) ...................................................187
Urologic Surgery (UROL) ..............................................187
Veterinary and Biomedical Sciences (VBS) .......................187
Veterinary Medicine, Graduate (VMED) .........................187
Water Resources Science (WRS) .................................189
Writing Studies (WRIT) ...............................................190
Youth Development and Research (YOST) ......................191
Course Descriptions

Course Numbers, Symbols, and Abbreviations

Courses in this catalog PDF are current as of October 1, 2012. See www.catalogs.umn.edu/courses.html for the most up-to-date course information.

Students should also note that courses are not offered every semester. For a listing of courses offered in a particular semester, consult the Class Schedule at http://onestop.umn.edu/onestop/registration.html.

Course Numbers—Courses numbered from 5000 to 5999 (listed as 5xxx if individual course number is unspecified) are primarily for graduate students, but are also open to third or fourth year undergraduate students. (5xxx courses in the School of Dentistry and in some clinical departments of the Medical School may not be applied to graduate programs.) Courses numbered 8000 or above (8xxx) are open to graduate students only.

Courses at the 6000 (6xxx) and 7000 (7xxx) levels are for postbaccalaureate students in professional degree programs not offered through the Graduate School. Courses numbered at the 4000 (4xxx) level are primarily for undergraduate students in their fourth year of study. 4xxx, 6xxx, and 7xxx courses may be applied toward a Graduate School degree with approval by the student’s major field and if the course is taught by a member of the graduate faculty or an individual authorized by the program to teach at the graduate level. For course descriptions for 4xxx, 6xxx, and 7xxx courses, consult the list of University courses at http://onestop2.umn.edu/courses/index.html.

Courses at the 1000 (1xxx), 2000 (2xxx), and 3000 (3xxx) levels are for undergraduates and may not be applied to graduate programs. Courses numbered 0000 to 0999 do not carry credit.

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

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

Prereq.................Course prerequisites.

cr......................Credit.

1-4 cr [max 6]........The course can be taken for 1 to 4 credits and may be repeated for up to 6 credits.

!........................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 term 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.

%........................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.”

DGS....................Director of graduate studies.

W........................Following a course number, the W indicates the course is writing intensive.

A-F, S-N, NGA........Grading options. NGA means “no grade associated.” If no grading option is listed, the course may be taken either A-F or S-N. For more information about grading, see page 10 of the General Information section.

Course Listing Sample

Xology (Xolo)

Xology and Diometrics

College of Liberal Education

Xolo 5101. Methods in Xology. (3-4 cr [max 8 cr]; A-F only. §3101. Prereq-3578 or #)

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

Credit will not be granted if credit has been received for the course listed after this symbol.

Prerequisite information

Course title

Course credits

Department

College

Course number

Course designator

Grading option

Course description
Courses

Accounting (ACCT)

Department of Accounting

Curtis L. Carlson School of Management

ACCT 5101. Intermediate Accounting I. (4 cr; A-F or Aud. Prereq-5010 [mgmt major] or 5010 [acct major] or 5100 or 5011) Covers areas of financial reporting frequently covered on the CPA exam, including partnerships, foreign operations, and accounting for government and nonprofit organizations.

ACCT 5102W. Intermediate Accounting II. (4 cr; A-F or Aud. Prereq-5101 [mgmt major] or 5101 [acct major] or 5100 or 6100) Basic valuation problems encountered in financial reporting. Focuses on valuation of liabilities. Accounting for leases, pensions, and deferred taxes. Introduces consolidated financial statements.

ACCT 5125. Auditing Principles and Procedures. (4 cr; A-F or Aud. Prereq-[5100 or 5101 or 5100] or 5101 or 5010) Concepts of auditing internal control/financial statements in accordance with generally accepted auditing standards established by Public Company Oversight Board (PCAOB) and American Institute of Certified Public Accountants (AICPA).


ACCT 5160. Financial Statement Analysis. (2 cr; A-F or Aud. Prereq-[5100 or 6100] or 5101) Interpretation/analysis of financial statements. Introduces basic techniques of financial statement analysis and applies them in different settings (e.g., in investment/credit considerations).

ACCT 5180. Consolidations and Advanced Reporting. (2 cr; A-F or Aud. Prereq-[5102 or 5102]) Theory underlying the preparation of consolidated financial statements, as well as the mechanical computations needed to prepare the statements themselves.

ACCT 5326. Introduction to Taxation of Business. (2 cr; A-F or Aud. Prereq-5315, acct major) Introduction to the income tax laws governing the taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students will also increase their knowledge and skills related to tax research by writing research memoranda.

ACCT 5327. Foreign National Tax Consulting. (2 cr; S-N only. Prereq-5315, accounting major) Tax return preparation/consulting experience. Partnership between U, IRS, Minnesota State Department of Revenue to provide free tax help to foreign national students, researchers, and visiting professors. Students preparing tax returns for nonresident aliens use commercial tax preparation software.

ACCT 5821. Special Topics in Financial Reporting. (2 cr; A-F or Aud. Prereq-5502, [mgmt or grad mgmt student]) Covers areas of financial reporting frequently covered on the CPA exam, including partnerships, foreign operations, and accounting for government and nonprofit organizations.

ACCT 5310. International Accounting. (2 cr; A-F or Aud. Prereq-5101; [5102 or Pr [5102] recommended) Causes/history of international differences in design of financial accounting/reporting systems, efforts to harmonize them into worldwide system. Role/impact of currency translation on financial statements. International Accounting Standards, conceptual framework.

ACCT 5320. Current Topics in Accounting. (2 cr; S-N only) Topics vary.

ACCT 5420. Macc directed study. (1-4 cr; max 4 cr; A-F or Aud. Prereq-Macc student) Internship or directed study in Master of Accountancy degree program.


ACCT 8800. Empirical Research Topics. (2 cr; max 4 cr; Stdt Opt) Current research topics that are cutting-edge and in instructor’s area of expertise. Topics vary.


ACCT 8811. Information Economics I. (4 cr; Stdnt Opt. Prereq-Business admin PhD student or #) Asymmetric information, incentives, and contracts. Moral hazard, adverse selection, reputation, and signaling phenomena. Applications to accounting such as transfer pricing, budgeting, cost allocations, performance measurement, audit pricing.

ACCT 8812. Information Economics II. (4 cr; Stdnt Opt. Prereq-Business admin PhD student or #) Information in capital markets; asset pricing with asymmetric information; economics of disclosure and information acquisition.

ACCT 8831. Theory of Contracts I: Moral Hazard and Adverse Selection. (2 cr; Stdt Opt) Foundational models of moral hazard, models with adverse selection, from theoretical economics literature. How models have been applied to fundamental issues in accounting research.

ACCT 8832. Theory of Contracts II: Renegotiation and Incomplete Contracting. (2 cr; Stdt Opt) How theoretical economics literature has introduced contract friction such as incompleteness/renegotiation. How these frictions have been applied to issues in accounting research.

ACCT 8892. Readings in Accounting. (1-8 cr; max 16 cr; Stdt Opt. Prereq-Business admin PhD student or #) Readings appropriate to an individual student’s program or objectives that are not available in regular courses.

ACCT 8894. Research in Accounting. (1-8 cr; max 16 cr; Stdt Opt. Prereq-Business admin PhD student or #) Individual research on an approved topic appropriate to student’s program and objectives.

Addiction Studies (ADDS)

College of Continuing Education

ADDS 5007. Adolescence and Substance Abuse. (2 cr; A-F only) Screening, assessing, and treating adolescents. How to involve family and others. Interventions, approaches, best practices. Legal/ethical issues. Lectures, discussion, readings, exercises.


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

ADDS 5041. Methods and Models I: Motivational Counseling. (2 cr; A-F or Aud. Prereq-5021 or 5002 or %) Concepts of motivational interviewing. Spirit of MI. Primary counseling skills. Working with resistance. Identifying/elicting change talk. Transitioning into change, negotiating a treatment plan. Strengths/shortcoming of MI.
ADD501. Methods and Models II: Cognitive Behavioral Therapy. (2 cr; A-F or Aud. Prereq-5021 or 5022 or #) Components of cognitive model. Assessment, case formulation, automatic thoughts, core beliefs, cognitive restructuring, behavior change elements, therapeutic relationship. Students learn, practice and master key concepts.

ADD504. Foundations of Group Work. (3 cr; A-F or Aud. Prereq-5021 or 5022 or #) Designing/facilitating therapy groups. Intra-/interpersonal dynamics, leadership skills, developmental aspects, ethical issues. Application to therapy of chemically addicted individuals. Lectures, discussion, experiential exercises, small groups, readings.

ADD501. Foundations of Co-occurring Disorders. (2 cr; A-F or Aud. Prereq-Cannot be taken for credit by MSW students) Understanding the mentally ill and chemically abusive or dependent client. Intervention, advocacy, education, and support for client and those who are part of his/her environment. Social, environmental, and multicultural factors that contribute resources for these clients.

ADD501. Multicultural Foundations of Behavioral Health. (3 cr; A-F or Aud) What is culture? How might culture, cultural practices, and history be significant in the use/abuse of substances? How is culture relevant to the attitudes/practice of clients? Social, environmental, and multicultural factors that contribute resources for these clients.

ADD501. Assessment and Treatment Planning I. (3 cr; A-F or Aud. Prereq-[5001 or 5011],[5002 or 5021],[5003 or 5031]) Core additions counseling functions including clinical assessment, case management, documentation treatment planning, and ethical issues. Students begin process of securing internship.

ADD590. Special Topics. (1-4 cr [max 12 cr]; A-F or Aud. Prereq-#) Special topics in addiction studies.

ADD593. Directed Study. (1-3 cr [max 9 cr]; St'dnt Opt. Prereq-#) Directed study.

ADD594. Directed Research. (1-3 cr [max 9 cr]; A-F only. Prereq-#) Directed research.

ADD596. Internship in Substance Abuse Counseling. (1-8 cr [max 8 cr]; S-N or Aud. Prereq-4001. ADDS or IBH student, #) Supervised field work experience. Practical application of substance abuse counseling. Assessment, treatment planning, case management.

Adult Psychiatry (ADPY)
Department of Psychiatry

Medical School

ADPY 5515. Neuropsychology: University Hospitals. (3-9 cr [max 9 cr]; O-N or Aud)

ADPY 8205. Special Assignments. (1-16 cr [max 16 cr]; St'dnt Opt)

ADPY 8206. Research. (1-16 cr [max 16 cr]; St'dnt Opt)

ADPY 8249. Clinical Neuropsychopharmacology. (1-15 cr [max 15 cr]; St'dnt Opt. Prereq-Resident status or 3rd- or 4th-yr med student or 8248 for grad students) The course is designed for a two-day presentation, four hours one afternoon, followed by eight hours the next day, to include the following subject matter: introduction to neurotransmitter theory and mechanism of action of psychotropic drugs; evaluation of anxiety states and use of antianxiety agents; clinical picture of depression, use of antidepressants, and principles of drug combinations; schizophrenia diagnosis, use of antipsychotic drugs, antiiparkinson medication, parkinson side effects of neuroleptics, and tardive dyskinesia; clinical evaluation of epilepsy and use of anticonvulsants; neuropsychology of sleep, prescription of hypnotics and sedatives, and significance of over-the-counter sleep aids; use of anorexients, over-the-counter suppressants, and opiate analogues; geriatric psychopharmacology; classification of drug side effects and principles oldf drug interaction; abused drugs; and ethnopsychopharmacology.

ADPY 8970. Directed Studies. (1-24 cr [max 24 cr]; St'dnt Opt)

Aerospace Engineering and Mechanics (AEM)
Department of Aerospace Engineering and Mechanics

College of Science and Engineering


AER 5441. Structural Dynamics. (3 cr; A-F or Aud. Prereq-2012, 5031, [grad student or CSE upper div]) Frequency, time domain analysis of multi-degree of freedom mechanical systems. Natural frequencies, normal modes of vibration. Free-forced vibrations of strings, rods, and shafts beams. Introduction to finite elements in structural dynamics.

AER 5451. Optimal Estimation. (3 cr; A-F or Aud. [EE 5251, Prereq-[MATH 2243 or STAT 3021 or equiv], [EE 4231 or EE 5281 or equiv]] or #) Basic probability theory. Batch/recurtive least squares estimation. Filtering of linear/non-linear systems using Kalman and extended Kalman filters. Applications to sensor fusion, fault detection, and system identification.

AER 5495. Topics in Aerospace Systems. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#) Topics of current interest. Individual projects with faculty sponsor.

AER 5501. Continuum Mechanics. (3 cr; St'dnt Opt. Prereq-CSE upper div or grad, Math 2243 or equiv or #) Concepts common to all continuous media; elements of tensor analysis; motion, deformation, vorticity, material derivatives; mass, continuity equation; balance of linear, angular momentum; geometric characterization of stress, constitutive equations.

AER 5503. Theory of Elasticity. (3 cr; A-F or Aud. Prereq-4501 or equiv, Math 2245 or equiv or #) Introduction to the theory of elasticity, with emphasis on linear elasticity. Linear and nonlinear strain measures, boundary-value problem for linear elasticity, plane problems in linear elasticity, three dimensional problems in linear elasticity. Topics from nonlinear elasticity, micromechanics, contact problems, fracture mechanics.

AER 5561. Aeroelasticity. (3 cr; A-F or Aud. Prereq-4202, 4301, [grad student or CSE upper div]) Static aeroelastic phenomena, torsional divergence of a lifting surface, control surface reversal. Aeroelastic flutter, unsteady aerodynamics. Problems of gust response, buffeting. Design project.

AER 6000. Seminar: Aerospace Engineering and Mechanics. (1 cr [max 4 cr]; S-N or Aud. Prereq-DSG consent)

AER 8201. Fluid Mechanics I. (3 cr; St'dnt Opt. Prereq-4201 or equiv, Math 2263 or equiv) Mathematical and physical principles governing the motion of fluids. Kinematic, dynamic, and thermodynamic properties of fluids; stress and strain deformation; equations of motion; analysis of rotational and irrotational inviscid incompressible flows; two-dimensional and three-dimensional potential flow.

AER 8202. Fluid Mechanics II. (3 cr; St'dnt Opt. Prereq-8201) Analysis of incompressible viscous flow; creeping flows; boundary layer flow.

AER 8203. Fluid Mechanics III. (3 cr; St'dnt Opt. Prereq-8202) Analysis of compressible flow and shock waves; method of characteristics for one-dimensional unsteady flow and for two-dimensional steady flow.

Courses

AEM 8211. Theory of Turbulence I. (3 cr; Stdnt Opt. Prereq-8202) Reynolds equation, methods of averaging, elements of stability theory and vortex dynamics; description of large vortical structures in mixing layers and boundary layers; horseshoe vortices; flow visualization.

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


AEM 8221. Rheological Fluid Mechanics. (3 cr; Stdnt Opt. Prereq-8201 or 5501 or #) Methods of solution for flows of simple fluids with general constitutive equations. Topics from viscometric flow, extensional flow, perturbations of the rest state with steady and unsteady flow, secondary flow.


AEM 8241. Perturbation Methods in Fluid Mechanics. (3 cr; Stdnt Opt. Prereq-8202 or #) Method of matched asymptotic expansions presented through simple examples and applied to viscous flows at high and low Reynolds numbers and other problems in fluid mechanics and applied mathematics.

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


AEM 8261. Nonlinear Waves in Mechanics. (3 cr; Stdnt Opt. Prereq-5501 or #) Theory of kinematic, hyperbolic, and dispersive waves, with application to traffic flow, gas dynamics, and water waves.

AEM 8271. Experimental Methods in Fluid Mechanics. (3 cr; Stdnt Opt. Prereq-4201, #) Overview of computer organization, including external controls, computer interface, and D/A conversion. Measurement techniques, such as pressure measurements and hot-wire and laser Doppler anemometry. Signal processing; uncertainty; computer control of experiments.

AEM 8295. Selected Topics in Fluid Mechanics. (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-#) Includes individual student projects completed under guidance of a faculty sponsor.

AEM 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

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


AEM 8421. Robust Multivariable Control Design. (3 cr; Stdnt Opt. Prereq-5321 or equiv) Application of robust control theory to aerospace systems. Role of model uncertainty/modeling errors in design process. Control analysis and synthesis, including H[space2] and H[infinity symbol] optimal control design and structural singular value [Greek letter mu] techniques.

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


AEM 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

AEM 8451. System Identification: Theory and Applications. (3 cr; A-F or Aud. Prereq-[4303W, 4325 or equiv]) Modeling methods for dynamic systems using measurement data, or in combination with first principles, based on the theory of systems and signals. Primary emphasis on control system design and simulation applications. Examples from aerospace applications as well as human pilot response modeling and robotics.

AEM 8455. Advanced Topics in Aerospace Systems. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#) Individual student projects completed under guidance of a faculty sponsor.

AEM 8500. Research Seminar in Mechanics of Materials. (1-3 cr [max 12 cr]; A-F or Aud. Prereq-#) Seminars given by students, faculty, and visitors on topics drawn from current research.

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

AEM 8521. Advanced Topics in Elasticity. (3 cr; A-F or Aud. Prereq-5503) Contact stresses, finite deformations, and other topics.

AEM 8523. Elastodynamics. (3 cr; A-F or Aud. Prereq-8521 or 5501 or #) Waves and vibrations in rods, beams, and plates; dispersion; volume and surface waves; reflection; energy transmisions; vibrations of bounded media and relation to theoretical topics; elements of nonlinear waves, inelastic waves, and stability of motion of elastic systems.


AEM 8531. Fracture Mechanics. (3 cr; A-F or Aud. Prereq-5503 or #) Theory of mechanical breakdown. Kinetic rate theories and instability considerations; formation of equilibrium cracks and circular crack propagation under pulses; statistical aspects of strength and fracture of micromechanical systems; time and temperature dependency in fracture problems and instability of compressed material systems.

AEM 8533. Theory of Plasticity. (3 cr; Stdnt Opt. Prereq-5203 or #) Theory of permanent deformation of ductile metals; bi-linear material models, Drucker's three bar truss, and other examples; 3-D continuum formulation, yield surfaces, hardening rules, and material stability; slip line theory, Prandtl punch solution; single crystal plasticity.


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

AEM 8595. Selected Topics in Mechanics and Materials. (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-#) Includes individual student projects completed under guidance of a faculty sponsor.

AEM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 3% for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to 4 times, up to 60 combined cr)

AEM 8777. Thesis Credits: Master's. (1-15 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])
Agricultural, Food, and Environmental Education (AFEE)

AFRO 4478, POL 5478, POL 4478W. Prereq-Pol 1054 or Pol 3051 or non-pol sci grad student or #) How current politics in mainly, though not exclusively, sub-Saharan Africa have been shaped by pre-colonial/colonial processes. Reality of independence, recurrent political/economic crises. Global context, prospects for effective democracy.

AFRO 5551. Methods: Use of Oral Traditions as Resources for History. (3 cr; Stdtnt Opt) 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 5756. Social and Cultural History of Blacks in Sports. (3 cr; Stdtnt Opt; [AFRO 5756]) Social and cultural contexts surrounding eras of athletes such as Jack Johnson, Jackie Robinson, Joe Louis, Jesse Owens, Althea Gibson, Wilma Rudolph, Muhammad Ali, Michael Jordan, and Tiger Woods. Impact of these athletes on national/international events. Periods when it was not uncommon for black entertainers/athletes to become involved in politics and community activism.

AFRO 5864. Proseminar: African-American History. (3-4 cr [max 4 cr]; Stdtnt Opt, Prereq-#) Examination of issues including slavery, Reconstruction, the Great Depression, and civil rights movement using cultural and intellectual history and autobiography/biography. Focuses on dynamics of race, gender, class, region, sexuality, and religion.

AFRO 5865. Proseminar: African-American History. (3-4 cr [max 4 cr]; Stdtnt Opt, Prereq-#) Construction of a detailed research agenda, locating appropriate depositories of primary materials and secondary sources, and developing appropriate methodologies and frameworks.


AFRO 5876. Proseminar: Approaches to African Development. (3 cr; Stdtnt Opt) Study, critical analysis, and comparison of primary documents relevant to African development.

AFRO 5910. Topics in African American and African Studies. (3 cr [max 9 cr]; Stdtnt Opt) Topics vary by instructor.

AFRO 5993. Directed Study. (1-3 cr [max 3 cr]; Stdtnt Opt, Prereq-#) Guided individual reading/study for qualified seniors and graduate students.

AFRO 8202. Seminar: Intellectual History of Race. (3 cr; Stdtnt Opt) Shifting and contested meanings of “race” from the “Age of Conquest” to the present. Starting from the proposition that race is not a fixed or stable category of social thought or being, the seminar seeks to ascertain how and why Western ideas about race have changed.

AFRO 8554. Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora. (3 cr; Stdtnt Opt, Prereq-#) Interdisciplinary analysis of U.S. domestic and foreign policies as they affect Africans and peoples of African descent in the diaspora. Intersections of gender, race, nation, and class.

AFRO 8590. Figures in Contemporary Black Fiction. (3 cr [max 9 cr]; Stdtnt Opt) Each term focuses on works of an individual writer, such as Toni Morrison, Paula Marshall, and Jamaica Kincaid. Critical studies.

AFRO 8802. Seminar: Orientalism. (3 cr; Stdtnt Opt) Recent arguments related to Orientalism as a trend in modern literary and cultural criticism.

AFRO 8910. Topics in Studies of Africa and the African Diaspora. (3 cr [max 9 cr]; Stdtnt Opt) Topics specified in [Class Schedule].
Agriculture and Plant Genetics (AGRO) Department of Agronomy and Plant Genetics

College of Food, Agricultural and Natural Resource Sciences

AGRO 5121. Applied Experimental Design. (4 cr; Stdnt Opt. [S]ENT 5121, Prereq-Stat 5201 or equiv or *)
Principles of sampling methodologies, experimental design, and statistical analyses. Methods/procedures in generating scientific hypotheses. Organizing, initiating, conducting, and analyzing scientific experiments using experimental designs and statistical procedures.

AGRO 5211. Student Organic Farm Planning, Growing, and Marketing. (3 cr; Stdnt Opt. [S]HORT 5131, AGRO 5315, HORT 5313, Prereq-[1011, 1103, BIOI 1001, BIOI 1009, HORT 1001] or *)
Students plan/implement cropping/marketing strategies for organic produce/flowers from Student Organic Farm on St. Paul campus.

AGRO 5311. Research Methods in Crop Improvement and Production. (1 cr; S-N or Aud. Prereq-applied plant sciences grad)
Demonstrations and discussions of techniques in crop improvement and/or production research. Presentations integrate biotechnology with traditional breeding methods; production sessions emphasize ecologically sound cropping systems.

AGRO 5321. Ecology of Agricultural Systems. (3 cr; A-F or Aud. [S]ENT 5321, Prereq-[3xxx or above] course in [Agro or AnSc or Ent or Hort or PLPA or Soil] or *)
Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

AGRO 5800. Publishing in Plant Science Journals. (2 cr; S-N only. Prereq-#)
Organizational/writing skills for reporting research results in a peer-reviewed journal manuscript. Publication process; choosing your journal; characteristics of good scientific writing; ethics, plagiarism, and authorship; stating your objectives; writing the different components of a manuscript; citing literature; use of tables and figures; proofreading. Written manuscript ready for submission to a plant science journal.

AGRO 5999. Special Problems: Workshop in Agronomy. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-Jr or Sr grad student)
Workshops on various topics in agronomy and plant genetics. Presenters/faculty may include guest lecturers/experts. Topics specified in Class Schedule.

AGRO 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. [S]IBBE 8005, SOIL 8005, PLPA 8005, LAAS 8005, HORT 8005. Prereq-Grad SENG major, #)
Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticultural Science; Plant Pathology; or Soil, Water, and Climate. Participation in discussions about effective teaching to strengthen skills and develop personal teaching philosophy.

AGRO 8023. Evolution of Crop Plants. (3 cr; A-F or Aud. Prereq-9 grad cr in ag or bio science)
Origin, distribution, and evolution of cultivated plants; implication of the effects of evolutionary processes on crop breeding for needs of people today.

AGRO 8201. Advanced Plant Breeding. (5 cr; A-F or Aud. [S]HORT 8201. Prereq-Stat 5301 or equiv)
Principles/current methods involved in breeding agronomic and horticultural crops. Use of genotype/environment data to increase genetic gain, population improvement, parent building, alternative selection strategies, breeding for special traits, and new approaches.

AGRO 8202. Breeding for Quantitative Traits in Plants. (3 cr; Stdnt Opt. Prereq-[5201, STAT 5201] or *)
Principles and concepts of population and quantitative genetics/application in designing and implementing a plant breeding program/theory, experimental approaches, and evidence that form the basis for these concepts and breeding strategies.

AGRO 8241. Chromosomal and Molecular Genetics of Plant Improvement. (3 cr; Stdnt Opt. Prereq-Introductory Genetics course)
Mixture of classic/current info in molecular plant genetics, biotech, and genomics. Students devise experiments in breeding, genetics, genomics, physiology, cellular/molecular biology, and other areas.

AGRO 8270. Graduate Seminar. (1 cr; A-F or Aud. [S]HORT 8270. Prereq-Grad major in [agro or applied plant sciences or ent or hort or plant brdgr or plnt path or soil] or *)
Reports/discussions of problems and investigational work.

AGRO 8280. Current Topics in Applied Plant Sciences. (1 cr; S-N or Aud. Prereq-Grad major in agro or applied plant sciences or ent or hort or plant brdgr or plant path or soil or *)
Topics presented by faculty or visiting scientists.

Introduction to plants and their reactions and responses in managed and natural ecosystems, including carbon and nitrogen allocation, root biology, microbial interaction, secondary metabolism, and plant response to biotic and abiotic stress.

AGRO 8505. Advanced Perspectives in Weed Science. (2 cr; A-F or Aud. Prereq-Grad major in agro or applied plant sciences or ent or hort or plant brdgr or plant path or soil or *)
Topics concerning the biochemistry and sustainability of chemical and biological weed control methods. Lecture and student-directed discussion.

AGRO 8605. Advanced Management of Agroecosystems. (3 cr; Stdnt Opt. Prereq-Gp4005 or #)
Problem-based learning approach to developing a holistic approach to agroecosystem-based crop management. Field trips combined with classroom discussion and decision-focused case studies. Students conduct research and develop a decision case.

AGRO 8900. Advanced Discussions. (1-3 cr [max 12 cr]; S-N or Aud. [S]HORT 8900. Prereq-#)
Special workshops or courses in applied plant sciences.

Akkadian (AKKA) Department of Classical and Near Eastern Studies

College of Liberal Arts

AKKA 5011. Elementary Akkadian I. (5 cr; Stdnt Opt. Prereq-Adv undergrads with # or grad)
Introduction to cuneiform script. Basics of Old Babylonian morphology and syntax. Written drills, readings from Hammurabi laws, foundation inscriptions, annals, religious and epic literature.
American Studies (AMST)

Department of American Studies

College of Liberal Arts

AMIN 5107. The Structure of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F or Aud. [S]AMIN 3107, Prereq: 3104) Analysis of grammatical structures of Anishinaabemowin.

AMIN 5108. History of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F or Aud. [S]AMIN 3108, Prereq: 3107 or #) Historical development of Anishinaabemowin.

AMIN 5109. Anishinaabe Literature. (3 cr; A-F or Aud. [S]AMIN 3109, Prereq: 3107 or 5107 or #) Readings in Anishinaabe oral literature.


AMIN 5303. American Indians and Photography. (3 cr; Stdent Opt. [S]AMIN 5303) Historical/comparative overview of photos in which American Indian people are central subjects. Primary features of images in American Indian photos. Relationships among those involved in making/viewing photos. Ways in which photos are interpreted. Relation of photos to social contexts in which they are produced and to agencies of those who stand behind their making.

AMIN 5302. American Indians and the Cinema. (3 cr; A-F or Aud) Representations of American Indians in film, historically/contemporarily. What such representations assert about Native experience and cultural viability. What they reflect about particular relationships of power.

AMIN 5407. Craft and Conventions of American Indian Ethnohistory. (3 cr; A-F only) Conventions and paradigmatic approaches scholars follow to represent/interpret written documents and oral traditions in constructing their narratives. Craft of ethnohistory: techniques, methods, styles of criticism.


AMIN 5890. Problems in American Indian History. (3 cr; Stdent Opt. [S]HIST 5890. Prereq-#) Intensive consideration of topics in American Indian history. Possible topics include social history, Indian history of particular regions, political systems, education, and American Indian policy.

AMIN 5920. Topics in American Indian Studies. (3 cr [max 12 cr]; A-F or Aud) Various topics in American Indian studies, depending upon instructor/semester.

AMIN 5991. Graduate Level Directed Studies. (1-6 cr [max 9 cr]; A-F or Aud. Prereq-#) Contact department for further information.

American Studies (AMST)

Department of American Studies

College of Liberal Arts


AMST 5920. Topics in American Studies. (1-4 cr [max 9 cr]; Stdent Opt) Topics specified in Class Schedule.

AMST 8201. Historical Foundations of American Studies. (3 cr; Stdent Opt. Prereq-grad Amst major) Examination of American studies as a field of inquiry, including its history, major theoretical framework, and interdisciplinary methodologies.

AMST 8202. Theoretical Foundations and Current Practice in American Studies. (3 cr; Stdent Opt. Prereq-grad Amst major or # or %) Analysis of central theoretical work in the field and survey of key methodologies.


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

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

AMST 8240. Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development. (3 cr [max 9 cr]; Stdent Opt. Prereq-#) Social, cultural, and artistic modes of self-expression and intellectual analysis of people in the United States identified as female or male and/or as members of groups defined by race, ethnicity, class, or sexual orientation.


AMST 8259. Literature, History, and Culture: Research Strategies. (3 cr; Stdent Opt. Prereq-#) Interdisciplinary study of connections between literary expression and history, particularly as they articulate themes in American culture.

AMST 8260. Literature, History, and Culture: Topical Development. (3 cr; Stdent Opt. Prereq-#) Interdisciplinary study of connections between literary expression and history, particularly as they articulate themes in American culture.


AMST 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

AMST 8401. Practicum in American Studies. (3 cr; S-N or Aud. Prereq-#) Training in teaching undergraduate courses in American Studies.

AMST 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

AMST 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

AMST 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

AMST 8801. Dissertation Seminar. (3 cr; S-N or Aud. Prereq-Amst doctoral student beginning dissertation work) Conceptualizing the research problem for the dissertation and structuring the process of writing a chapter of it.

AMST 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

AMST 8920. Topics in American Studies. (3 cr [max 9 cr]; Stdent Opt) Topics specified in Class Schedule.

AMST 8970. Independent Study in American Studies. (1-9 cr [max 9 cr]; Stdent Opt. Prereq-#) % Independent study of interdisciplinary aspects of American civilization under guidance of faculty members of various departments.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

Anatomy (ANAT)

Department of Integrative Biology and Physiology

Medical School

ANAT 5095. Advanced Problems in Anatomy. (1-6 cr; [max 12 cr]; A-F only. Prereq-one or more
ANAT Classes, #)

Exceptional projects that do not easily fit within confines of other ANAT offerings. Examples include but not limited to individual teaching or research projects.

ANAT 5150. Human Gross Anatomy. (5 cr; A-F only. Prereq-#)

Human cadaveric dissection based on traditional preparation, lab dissection, review sections, radiographic analysis, clinical correlations. Taught by regions. Extremities, torso, head/neck. Assessment by mid-semester/final written/practical examinations.

ANAT 5525. Anatomy and Physiology of the Pelvis and Urinary System. (1-2 cr [max 2 cr]; A-F only. [S]PHSL 5525, Prereq-One undergrad anatomy course, one undergrad physiology course, #)

Two-day intensive course. Pelvis, perineum, and urinary system with cadaveric dissection. Structure/ function of pelvic and urinary organs, including common dysfunction and pathophysiology. Laboratory dissection, including kidneys, ureters, urinary bladder, pelvic viscera and perineum (male or female), pelvic floor, vascular and nervous structures. Grand rounds section.

ANAT 5999. Head and Neck Anatomy. (5 cr; A-F or Aud. Prereq-#)

Anesthesiology (ANES)

Department of Anesthesiology

Medical School

ANES 5587. Adv Clinical Physiology I for Nurse Anesthetists. (3 cr; A-F or Aud)

Cellular mechanisms underlying systems physiology. Cellular physiology, physiology of excitable tissues, renal physiology, cardiovascular physiology, hemostasis.

ANES 5588. Advanced Clinical Physiology II for Nurse Anesthetists. (3 cr; A-F or Aud. Prereq-Advanced Clinical Physiology I for Nurse Anesthetists)

Respiratory physiology, acid-base physiology, gastrointestinal physiology, metabolism, endocrinology, reproductive physiology, physiology of pregnancy/labor.

ANES 5686. Chemistry and Physics for Nurse Anesthetists. (3 cr; A-F or Aud. Prereq-General chemistry or #)

Chemical equilibrium, organic chemistry, physics of fluids/gases, anesthetic applications.

ANES 8269. Research in Anesthesia. (1 cr; Stdnt Opt)

Animal Science (ANSC)

Department of Animal Science

College of Food, Agricultural and Natural Resources Sciences

ANSC 5099. Special Workshop in Animal Science. (1-6 cr [max 12 cr]; A-F or Aud. Prereq-#)

Topics vary. See Class Schedule or department. Topics may use guest lecturers/experts.

ANSC 5200. Statistical Genetics and Genomics. (4 cr; Stdnt Opt. Prereq-[Stat 3021 or equiv]. [Biol 4003 or equiv])


ANSC 5305. Companion & Wild Species Reproduction. (2 cr; A-F only. Prereq-#)

Principles of reproductive physiology specific to domesticated companion canine and feline species as well as avian species. These principles discussed in the context of the management of breeding and reproductive diseases in companion species as well as conservation management in wild species.

ANSC 5625. Nutritional Biochemistry. (3 cr; Stdnt Opt. Prereq-BIOC 3201 or #)

Overview of biochemical molecules and pathways important in nutritional events.

ANSC 5626. Nutritional Physiology. (3 cr; A-F only)

Whole body macronutrient metabolism as it relates to etiology of metabolic diseases. Signaling between tissues to control homeostasis. How dysregulation of crosstalk can lead to metabolic diseases. How diet, exercise, or starvation impact metabolism. Regulation of food intake and energy expenditure. Designing/ analyzing/interpreting research data.

ANSC 5700. Cell Physiology. (4 cr; A-F only. Prereq-[Two semesters of physics/chemistry, calculus, one semester of systems-level physiology or #])

Control mechanisms in maintaining homeostasis with respect to critical cell functions. Regulation of pH, volume, nutrient transport, intracellular electrolyte composition, membrane potential. Aspects of intercellular communication.

ANSC 8111. Genetic Improvement of Animals. (3 cr; Stdnt Opt. Prereq-#)

Application of population genetics to livestock breeding; selection index theory and practice; basis of relationships and covariances among relatives; and selection based on multiple sources of information.

ANSC 8121. Linear Model Methods. (3 cr; Stdnt Opt. Prereq-Stat 3021 or equiv)

Techniques and statistical tools for analysis of data. Matrix manipulation, least-squares procedures, correction for environmental factors, estimation of components of variance, and standard errors of estimates.

ANSC 8344. Mechanisms of Hormone Action. (2 cr; Stdnt Opt. Prereq-Course in biochemistry or cell biology or #)

Major signal transduction, apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature.

ANSC 8394. Research in Animal Nutrition. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#)

Research in selected areas: topics and animal species determined by consultation.

ANSC 8411. Physiology of Reproduction. (3 cr; A-F or Aud. Prereq-3305 or equiv)

Emphasis is on gametogenesis, conception, and implantation.

ANSC 8421. Physiology of Fertilization and Gestation. (3 cr; Stdnt Opt. Prereq-3305 or #)

Physiological events occurring during gametogenesis, capacitation and fertilization; period of the embryo; period of the fetus; and parturition.

ANSC 8431. Immunoreproduction. (3 cr; Stdnt Opt. Prereq-3305 or #)

Blood groups and polymorphic proteins affecting reproduction; immunoglobulin formation; antigens of semen, ova, and genital secretions; immunopathology; maternal-fetal incompatibility; and antibodies to hormones.

ANSC 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

ANSC 8451. Reproductive Endocrinology. (2 cr; A-F or Aud. Prereq-3305 or #)

Hormonal regulation of mammalian reproductive cycles and seasonal patterns; nutritional and stress effects on reproductive endocrinology; mechanism of hormone action.
Anthropology (ANTH)

Department of Anthropology

College of Liberal Arts

ANTH 5008. Advanced Flintknapping. (3 cr; A-F or Aud. Prereq [5008 or 5269] or #) Hands-on training in techniques of advanced stone tool production, artifact reproduction, and lithic experimental design for academic/artistic purposes.

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


ANTH 5021W. Anthropology of the Middle East. (3 cr; Stdnt Opt. [S]ANTH 5021W) Anthropological field methods of analyzing/interpreting Middle Eastern cultures/societies.


ANTH 5031W. Ethnographies of Science. (3 cr; A-F only. Prereq 5Sr or grad student or #) Ethnographic, historical, and sociological accounts of scientific practice. How facts are constructed/negotiated. Social, cultural, and political influences on scientific methods. How scientific projects articulate with hierarchies of race/gender. Interdisciplinary differences in scientific practice.

ANTH 5033. Feminist Anthropology. (3 cr; Stdnt Opt. Prereq 5034 or grad or #) Advanced introduction to the development of feminist theory in anthropology. Theoretical and methodological shifts in feminist anthropology and ethnography. Feminist ethnography within the discipline as a whole; current debates concerning the reading and writing of ethnography.

ANTH 5041. Ecological Anthropology. (3 cr; Stdnt Opt. [S]ANTH 5041, ANTH 8213. Prereq or grad or #) Concepts, theories, and methods of ecological anthropology (ecological theory) show how humans interact with the biophysical environment. Compare biological and cultural influences on the environment; examine adaptive strategies cross-culturally.

ANTH 5121. Business Anthropology. (2 cr; Stdnt Opt) Ways in which anthropological understandings/research techniques, particularly ethnographic techniques, can be used to enhance study/practice of business.


ANTH 5211. Anthropology of Material Culture. (3 cr; A-F or Aud) Material culture as a social creation, studied from multiple perspectives (e.g., social anthropology, archaeology, primatology). Conceptions of how humans articulate with material world they construct.


ANTH 5269. Analysis of Stone Tool Technology. (4 cr; A-F or Aud, Prereq 1001 or 3001 or #) Practical lab experience. How to analyze archaeological collections of stone tools to learn about human technological behavior in past. Students analyze archaeological/experimental collections, make stone tools themselves.


ANTH 5401. The Human Fossil Record. (3 cr; A-F only. [S]ANTH 5401, Prereq 1001 or #) Fossil evidence paleoanthropologists use to reconstruct human evolutionary history. Taxonomy, phylogeny, behavior, ecology, tool use, land use, and biogeography. Examination of fossil casts, readings from primary/secondary professional sources.

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

ANTH 5403. Quantitative Methods in Biological Anthropology. (4 cr; A-F only. Prereq-Basic univariate statistics course or #) Quantitative methods used by biological anthropologists. Applying these methods to real anthropometric data. Lectures, complementary sessions in computer lab.

ANTH 5405. Human Skeletal Analysis. (3 cr; A-F only. [S]ANTH 5405, Prereq 1001 or #) Structure, design, and variability of modern human skeleton. Anatomy, functional morphology, development, evolutionary history. Bone histology/biology, excavation, preservation, taphonomy, pathology, forensic analyses. Differences between males/females, adults/sub-adults, and humans/non-humans. Quizzes, exams, research paper, project.

ANTH 5422. Anthropologies of Citizenship and Nationalism. (3 cr; A-F only. Prereq 3-xxx course in [anthropology or related discipline]) Why/how citizenship and nationalism have been constructed over time as a force of cultural identity/belonging. Key theories, recent developments in citizenship theory. Defining an anthropological approach to citizenship.


ANTH 5444. Archaeological Ceramics. (4 cr; A-F only. Prereq 3001 or #) Ceramics as material, technology, and cultural/social trace. Methods of assessing technology/use. Research, description, and interpretation of ceramic assemblages. Students work with collections and propose/answer a research question about a ceramic assemblage. Readings, discussion.

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

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

ANTH 5980. Topics in Anthropology. (1-6 cr [max 12 cr], Stdnt Opt) Topics specified in Class Schedule.

ANTH 5990. Topics in Anthropology. (3 cr [max 9 cr]; A-F or Aud. Prereq or #) Topics specified in Class Schedule.

ANTH 8001. Ethnography, Theory, History. (5 cr; A-F or Aud) Introduction to foundational concepts, methods, and ethnographic work. Emphasizes theories that have shaped 20th-century thinking in cultural anthropology. Connection of these theories to fieldwork and contemporary issues.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

ANTH 8002. Ethnography: Contemporary Theory and Practice. (5 cr; A-F or Aud)

ANTH 8004. Foundations of Anthropological Archaeology. (3 cr; Stdnt Opt. Prereq-8001, 8002)
Theoretical foundations of anthropological archaeology in historical and contemporary perspective.

ANTH 8005. Linguistic Anthropology. (3 cr; Stdnt Opt)
Introduction to literature of anthropological linguistics.

ANTH 8120. Problems in Culture Change and Applied Anthropology. (3-6 cr [max 6 cr]; Stdnt Opt)
Comparative studies of change in cultural systems. Impact of global processes on local cultures. Roles of anthropology and anthropologists in policy, planning, implementation, and evaluation.

ANTH 8210. Business Anthropology. (3 cr; Stdnt Opt. [S]ANTH 5121)
Ways in which anthropological understandings and research techniques, particularly ethnographic techniques, can be used to enhance study/practice of business.

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

ANTH 8203. Research Methods in Social and Cultural Anthropology. (3 cr; Stdnt Opt. Prereq-Grad anth major or #)
Classic and current issues in research methodology, including positivist, interpretivist, feminist, and postmodernist frameworks. Methodology, in the broadest sense of the concept, is evaluated. Students conduct three research exercises and set up an ethnographic research project.

ANTH 8205. Economic Anthropology. (3 cr; Stdnt Opt. [S]ANTH 4053)
Theoretical foundations of economic anthropology examined through critical readings of traditional, classical, and contemporary authors. Ethnographic puzzles of material life and issues of ecological degradation, development, market expansion, gender, and transglobal processes.

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

ANTH 8215. Ecological Anthropology. (3 cr; Stdnt Opt. [S]ANTH 3041, ANTH 5041)
Seminar on method, theory, and key problems in ecological anthropology and human ecology. Examines approaches to a broad range of human practices, interactions between culture and the environment, global environmental change, and our understanding of human dimensions of ecosystem-based management.

ANTH 8219. Anthropology of Gender. (5 cr; Stdnt Opt. Prereq-Grad anth major or #)
Comparative, cross-cultural approach to gender. Focuses on various theories (e.g., feminist, postmodernist, psychoanalytic) of power, gender, authority, and femininity and masculinity. Gender ambiguity and issues of sexuality.

ANTH 8219. Grant Writing. (2 cr; Stdnt Opt. Prereq-Grad anth majors preparing to submit research grant proposals next academic yr)
Students draft a research proposal in their area of interest. Seminar involves reading and evaluating proposals, learning about funding and process of submitting proposals, nuts of bolts of composing a proposal, and ethics of research in anthropology.

ANTH 8220. Archaeology Field School. (6 cr; Stdnt Opt. Prereq-Grad anth major)
Advanced archaeological field excavation, survey, and research. Intensive training in excavation techniques, recordation, analysis, and interpretation of archaeological materials.

ANTH 8230. Development and Management of Anthropological Research Projects. (1 cr [max 4 cr]; A-F or Aud. Prereq-Anth grad student or #)
Training seminar on research development, coordination, grant management, field laboratory research management, and fundraising.

ANTH 8244. Interpreting Ancient Bone. (4 cr; A-F or Aud. [S]ANTH 5244)
How anthropologists use fossil bones to answer questions of past human diet, behavior, and environments. Skeletal element and species identification (of humans, large mammals). Students analyze small assemblage of bones for class project. Scientific method, data analysis using computers.

ANTH 8355. FTE: Masters. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)
ANTH 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

ANTH 8510. Topics in Archaeology. (3-9 cr [max 9 cr]; Stdnt Opt)
Seminar examines particular aspects of archaeological methods and/or theory. Topics vary according to student and faculty interests.

ANTH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
ANTH 8777. Thesis Credits: Master’s. (1-16 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))
ANTH 8810. Topics in Sociocultural Anthropology. (3-9 cr [max 9 cr]; Stdnt Opt)
Seminar examines particular aspects of method and/or theory. Topics vary according to student and faculty interests.

ANTH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)
ANTH 8991. Independent Study. (1-18 cr [max 18 cr]; Stdnt Opt. Prereq-#)
Under special circumstances and with instructor approval, qualified students may register for a listed course on a tutorial basis.

ANTH 8992. Directed Reading. (1-18 cr [max 18 cr]; Stdnt Opt. Prereq-#)
ANTH 8993. Directed Study. (1-18 cr [max 18 cr]; Stdnt Opt. Prereq-#)
ANTH 8994. Directed Research. (1-18 cr [max 18 cr]; Stdnt Opt. Prereq-#)

Apparel Studies (APST)

Department of Design, Housing, and Apparel
Clothing Design

APST 5117. Retail Environments and Human Behavior. (3 cr; A-F or Aud. Prereq-Grad student or #)
Theory/research related to designed environment across retail channels.

APST 5121. History of Costume. (4 cr; A-F only)
Analysis/interpretation of primary data about 19th/20th centuries based on historical methods. Critique of cultural, social, economic, technological, political, and artistic data presented through lens of dress in film/literature.

APST 5123. Living in a Consumer Society. (3 cr; A-F only. Prereq-Sr or grad student)

APST 5124. Consumers of Design. (3 cr; A-F only. Prereq-5123 or DHA 5123 or equiv or #)
Contemporary approaches to consumer behavior.

APST 5170. Topics in Apparel Studies. (1-4 cr [max 52 cr]; A-F or Aud. Prereq-Jr or Sr grad student)
In-depth investigation of specific topic, announced in advance.

APST 5193. Directed Study in Apparel Studies. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#)
Independent study in apparel studies under tutorial guidance.

APST 5196. Field Study: National/International. (1-10 cr [max 10 cr]; A-F or Aud. [S]DES 5196, HS 5196, DES 5196, IDES 5196. Prereq-#)
Faculty-directed field study in national or international setting.

APST 5218. Fashion, Design, and the Global Industry. (3 cr; A-F only)
Relationship of fashion, dress, and culture to time, place, and design. Focuses on fashion centers, fashion industry, and globalization. Chinese fashion industry as case study.

APST 8170. Topics in Apparel Studies. (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Varies with topic)
In-depth investigation of a topic announced in advance.

APST 8180. Professional Seminar. (1-2 cr [max 4 cr]; A-F or Aud)
Professional development issues/trends.

APST 8192. Readings in Apparel Studies. (1-3 cr [max 8 cr]; A-F or Aud. Prereq-#)
Independent study/review of books/periodicals under tutorial guidance.

APST 8193. Directed Study. (1-3 cr [max 8 cr]; A-F or Aud. Prereq-#)
Directed study in apparel studies.

APST 8222. Plan B Master’s Project. (3 cr; S-N or Aud. Prereq-DHA master’s student, #)
Plan B master’s project.

APST 8267. Dress and Culture. (3 cr; A-F or Aud. Prereq-2121 or #)
Cultural factors of identity expressed through dress. Focuses on issues of cultural diversity through analysis of dress and textiles within a specific world region.

APST 8268. Behavioral Aspects of Dress. (5 cr; A-F or Aud)
Research and social science theories as applied to appearance/dress as manifestations of human behavior.
**Applied Economics (APEC)**

**Department of Applied Economics**

**College of Food, Agricultural and Natural Resource Sciences**


Statistical and econometric 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 5032. Economic Data Analysis for Managerial and Policy Decisions. (3 cr; Stdnt Opt. Prereq-5031 or #)**

Statistical and econometric methods for the analysis of large data sets to support managerial/policy decisions. Methods for organizing, accessing, and ensuring the quality of data. Estimation techniques include panel data methods, limited dependent variable models, and time series analysis. Clarity of reporting and design of procedures for maintaining/updating data estimates.

**APEC 5151. Applied Microeconomics: Firm and Household. (3 cr; Stdnt Opt. Prereq-3001 or Math 1271 or Math 2243 or equiv or grad student or #)**

Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis Regression analysis, mathematical programming, and present value analysis.

**APEC 5152. Applied Macroeconomics: Income and Employment. (3 cr; Stdnt Opt. Prereq-3001 or Math 1271 or Math 2243 or equiv or grad student or #)**

Static general equilibrium open economy models and simple business cycle models that examine economic growth, business cycles, and fiscal and monetary policy. Input-output analysis and large scale econometric models. Sources/properties of economy and sector-wide data. Empirical applications.

**APEC 5521. Regional Economic Analysis. (3 cr; Stdnt Opt. Prereq-3006 or ECON 3102 or #)**


**APEC 5341. Public Finance. (3 cr; A-F or Aud. Prereq-3001 or Econ 3101 or PA 5021)**

Which services should the public sector provide? Which level of government should provide them? How should governments fund those services? Which types of taxes should be levied and on whom? Applying economic theory/analysis to spending, revenue, and tax policy issues facing governments.

**APEC 5451. Food Marketing Economics. (3 cr; A-F or Aud. [SAPEC 4451W, Prereq-grad student])**


**APEC 5481. Futures and Options Markets. (3 cr; Stdnt Opt. [SAPEC 4481, Prereq-grad student])**

Economic concepts related to futures/options trading. Hedging, speculation.

**APEC 5351. Labor Economics. (3 cr; Stdnt Opt. Prereq-[3001 or Econ 3101 or PA 5021], [PA 5022 or equiv], grad student or #)**

Theoretical foundations of labor markets. Intertemporal/household labor supply. Demand for labor, efficiency wages. Human capital theory, unemployment. Analysis of econometric research applied to labor policy issues such as minimum wage, tax policy, social insurance, education.

**APEC 5611. Economic Aspects of Environmental Management. (3 cr; A-F or Aud. Prereq-[Sr or grad student] in [biological science or conservation biology or ecology or fisheries or forestry or public affairs or water resources or wildlife conservation] or CLA or #)**

Economist approach to environmental problems such as water/air pollution. Application of supply/demand concepts to evaluation of environmental resources. Methods of evaluation. Analysis of pollution control policies from economic point of view.

**APEC 5651. Economics of Natural Resource and Environmental Policy. (3 cr; Stdnt Opt. PA 5722. Prereq-[3001 or ECON 3101], [3611 or ECON 3611 or ESM 3261] or #)**

Economic analyses, including project evaluation of current natural resource/environmental issues. Intertemporal use of natural resources, nature conservation, scarcity/adequacy, environmental quality, and mechanisms for pollution control and their implications for public policy.

**APEC 5711. U.S. Agricultural and Environmental Policy. (3 cr; Stdnt Opt. Prereq-3001 or Econ 3101)**

U.S. agricultural policy in an open world economy; role of private markets and government in regulating supply and demand; income vs. price support, supply controls, environmental constraints, and export protectionism; functioning of markets; roles of public interest groups and future of American agricultural policy.

**APEC 5721. Economics of Science and Technology Policy. (3 cr; Stdnt Opt. Prereq-3001 or Econ 3101 or #)**


**APEC 5731. Economic Growth and International Development. (3 cr; Stdnt Opt. Prereq-3002 or [ECON 3101, Stat 3022]. Econ 4211 recommended)**


**APEC 5751. Global Trade and Policy. (3 cr; Stdnt Opt. Prereq-3001 or Econ 3101 or PA 5021)**


**APEC 5811. Cooperative Organization. (3 cr; Stdnt Opt. Prereq-3001 or Econ 3101 or PA 5021 or #)**

Application of economic analysis to cooperative form of organization. Producer/consumer cooperatives used to examine economic issues such as changing market organization, financing, incentives, taxation, and antitrust regulations. Cooperatives as a tool for economic development.

**APEC 5891. Independent Study: Advanced Topics in Farm and Agribusiness Management. (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-#)**

Special topics or individual work suited to the needs of particular groups of students.
Courses

APEC 8205. Applied Game Theory. (3 cr; Stdnt Opt. Prereq-[B101, B102, B103, B104] or [Econ 8001, Econ 8002, Econ 8003, 8004] or #). Topics in game theory, application to economic problems. For each topic, important theory/equilibrium concepts are followed by extensive applications. Focuses on static/dynamic games of complete/incomplete information, evolutionary games.

APEC 8206. Dynamic Optimization: Applications in Economics and Management. (3 cr; Stdnt Opt. Prereq-[Stat 5102 or Stat 5102], Ph.D. student) or #. Classical multiple linear regression, stochastic regressors, heteroscedasticity, autocorrelated disturbances, panel data, discrete dependent variables.

APEC 8212. Econometric Analysis II. (4 cr; Stdnt Opt. Prereq-B8211 or equiv or #). Second semester of econometrics for Ph.D. students. Specification tests, instrumental variables, heteroscedasticity, panel data, simultaneous equations, bootstrap methods, limited dependent variable models, semiparametric estimation, econometrics of program evaluation, general method of moments, time series, hazard models.

APEC 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

APEC 8341. Applied Public Finance. (3 cr; A-F only. Prereq-8001-8004 or Econ 8001-8004 or Econ 8101-8104) Current economic research on government tax and expenditure policy. Apply tools of applied economics to public finance issues. Tax policy, taxation and household decision, utility theory, budget, saving, and tax reform. Examining the (including the cost of capital), and fundamental tax reform. Alternative demand models for public goods, public choice theory, and fiscal federalism.

APEC 8401. Consumer Behavior and Household Economics. (2 cr; A-F or Aud. Prereq-[B8301, B8312] or [P][B8211 or B8312], [Econ 8102, Econ 8103, Econ 8104] or [P][Econ 8102 or [P][Econ 8103 or [P][Econ 8104] or [Econ 8101, Econ 8102, Econ 8103, Econ 8104] or [P][Econ 8001 or [P][Econ 8002 or [P][Econ 8003 or [P][Econ 8004]]) Seven-week course. Microeconomic analysis of individual/household behavior, both theoretical and empirical issues. Demand theory—static models to dynamic models. Equivalence scales and intra-household allocation.

APEC 8402. Information and Behavioral Economics. (2 cr; A-F or Aud. Prereq-B8401, [B8311, B8312] or [P][B8111 or B8122], [Econ 8102, Econ 8103, Econ 8104] or [P][Econ 8102 or [P][Econ 8103 or [P][Econ 8104] or [Econ 8101, Econ 8002, Econ 8003, Econ 8004] or [P][Econ 8001 or [P][Econ 8002 or [P][Econ 8003 or [P][Econ 8004) Whether consumer behavior is consistent with standard economic models. Alternative models that incorporate psychological phenomena. Influence of information on consumer choice over time and under uncertainty. Expected/unexpected utility theory, bounded rationality, prospect theory, choice over time, rational addiction with applications to empirical work.

APEC 8403. Consumer Theory and Demand Analysis. (3 cr; A-F only. Prereq-[B8001 or B8002, B8003 or B8004] or [Econ 8001 or concurrent Econ 8002] [B8003 or concurrent Econ 8003]. [B8004 or concurrent Econ 8004]). Topics in applied microeconomics related to labor supply and human capital. Focuses on household decisions and resulting outcomes in labor market. Household labor supply. Estimation of labor supply/earnings functions. Theory of human capital, wage structure/determination, and impacts of tax/tranfer policies.

APEC 8501. Labor Economics I. (2 cr; A-F only. Prereq-8003 or equiv or [P][B8003, B8211, 5032 or equiv]) Theoretical and empirical studies of compensating differentials, discrimination, personnel economics, and gross flows.

APEC 8502. Labor Economics II. (2 cr; A-F or Aud. Prereq-[B8211, B8001, B8002] or [Econ 8001, Econ 8002] or [Econ 8001, Econ 8102] or [Econ 8101, Econ 8102]) Topics in applied microeconomics related to labor supply and human capital. Household decisions and resulting outcomes in labor market. Household labor supply. Estimation of labor supply/earnings functions. Theory of human capital, wage structure/determination, and impacts e of tax/tranfer policies.

APEC 8601. Natural Resource Economics. (3 cr; Stdnt Opt. Prereq-[B8111, B8202, B8206 [Econ 8101 or equival or #]) Economic analysis of resource use/management. Capital theory, dynamic resource allocation.

APEC 8602. Economics of the Environment. (3 cr; Stdnt Opt. Prereq-8004 or Econ 8004 or Econ 8104 or equiv or #) Economic analysis of environmental management, emphasizing environmental policy. Application of microeconomic theory to problems of market failure, market-based pollution control policies, contingent valuation, hedonic models, option value, and other topics.

APEC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 24 cr]). No grade. Doctoral-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2004 may register up to four times, up to 60 combined cr) Doctoral Pre-Thesis Credits

APEC 8701. International Economic Development, Growth, and Trade. (3 cr; Stdnt Opt. Prereq-Econ 8002 or Econ 8102 or #) Development, growth, and trade of developing nations and emerging market economies. Course links stylized characteristics of economic development, economic policy, and political economy using modern economic theory and empirical methods of analysis.

APEC 8702. Economic and Trade Policy: Sectoral and Institutional Issues. (3 cr; Stdnt Opt. Prereq-Econ 8002 or Econ 8102 or #) International trade across developed/developing countries. National policies, regional agreements/treaties, multilateral arrangements such as World Trade Organization. Applying international trade and multinationals theory and econometric methods.

APEC 8703. Microeconomic Analysis of Economic Development. (3 cr; A-F or Aud. Prereq-Econ 8001-8004 or Econ 8010-8014, ApEc 8211-8212 or #. Concurrent registration is ok) Topies concerning microeconomics of economic development in low-income countries. Focuses on behavior of agricultural households, poverty, inequality, education, health/nutrition, and evaluation of development programs.

APEC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]). No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only]

APEC 8793. Master’s Paper: Plan B Project. (1-6 cr [max 6 cr]). S-N or Aud. Prereq-Agric/ApEc MS student or ApEc MS student) Students work under guidance of adviser to complete their Plan B Paper project.


APEC 8802. Financial Economics. (2 cr; A-F or Aud. Prereq-[B8211, Econ 5151]) or [Econ 8001, Econ 8102]) Major theories of asset pricing under assumptions of uncertainty, competitive markets, and symmetric information. Equilibrium/arbiter models of financial markets with econometric applications. Pricing/use of derivatives.


APEC 8804. Managerial Economics. (3 cr; Stdnt Opt. Prereq-[B8001, B8002, B8003, 8004] or [Econ 8101, Econ 8102, Econ 8103, Econ 8104] or [Econ 8001 or concurrent Econ 8001, Econ 8102] or concurrent Econ 8102] or concurrent Econ 8103] or Econ 8104 and concurrent Econ 8102] or concurrent Econ 8103] or Econ 8104 or concurrent Econ 8102] or concurrent Econ 8103]). Concurrent registration is ok) Topics concerning microeconomics of economic development in low-income countries. Focuses on behavior of agricultural households, poverty, inequality, education, health/nutrition, and evaluation of development programs.

APEC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]). No grade. Prereq-ApEc PhD student; max 18 cr per semester or summer; 24 cr required) Doctoral thesis credit.

University of Minnesota Fall 2012 Graduate Education Catalog


**Applied Plant Sciences (APSC)**

College of Food, Agricultural and Natural Resource Sciences

APSC 8115. Research Ethics in the Plant and Environmental Sciences. (3 cr; S-N or Aud. [S])

APSC 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

APSC 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

APSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 12 combined cr)

APSC 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 12 cr total required [Plan A only])

APSC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

**Applied Professional Studies (APS)**

College of Continuing Education

APS 5201. Career and Job Search Preparation for Graduate Students. (1 cr; S-N only. Prereq-%)

APS 8001. Introduction to Research in the Biological Sciences. (3 cr; S-N only)

APS 8002. Capstone Course for Plan B MBS Students. (2 cr; S-N only. Prereq-%) MBS students synthesize/complete Plan B graduate final project.

APS 8003. Capstone Course for Plan C MBS Students. (2 cr; S-N only. Prereq-%) MBS students synthesize/complete Plan C graduate final project.

APS 8110. Graduate Seminar Series. (1 cr [max 10 cr]; S-N only. Prereq-%) Recent developments in student’s field of interest presented in research seminars by scientific experts.

**Arabic (ARAB)**

Department of African American and African Studies

College of Liberal Arts

ARAB 5010. Advanced Arabic I. (3 cr [max 4 cr]; Stdnt Opt. Prereq-5101 or equiv or #) Advanced readings in classical and modern Arabic. Compositions based on texts.


**Architecture (ARCH)**

School of Architecture

College of Design


ARCH 5110. Architecture as Catalyst. (1 cr [max 3 cr]; S-N only. Prereq-MArch) Topical workshops on design methods, theories, or emerging practices.

ARCH 5211. Principles of Design Programming. (3 cr; S-N only. A-F or Aud. Prereq-[8251, 8252, 8253] or arch grad major)


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

ARCH 5311. Theory of Architectural Representation. (3 cr; A-F or Aud. [S])ARCH 4311. Prereq-(5371, 5372, M Arch) or instr consent) Integration of emerging computer graphics with photography and architectural graphic conventions. Historical, theoretical, and critical issues of representation. Influence of visual media on architectural field.

ARCH 5312. Visual Communication Techniques in Architecture. (3 cr; A-F or Aud. [S])ARCH 4311. Prereq-MArch major or instr consent) Organization, presentation, and design techniques. Various visual media and methods of investigation.

ARCH 5321. Architecture in Watercolor. (3 cr; A-F or Aud. [S])ARCH 4321. Prereq-MArch grad student or #) Watercolor as a tool in design process. Foundation principles, techniques, medium, tools, materials. Color relationships, mixing, composition, applications to design.

ARCH 5350. Topics in Architectural Representation. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-Arch major or MArch major or #) Selected topics in architectural representation.

ARCH 5361. 3-D Computer Architectural Modeling and Design. (3 cr; A-F or Aud. [S])ARCH 4361. Prereq-MArch major) Use of 3D computer modeling for representation in abstract/realistic ways. Computer modeling software. Creation/arrangement of objects, setting up lighting, developing surface materials, creating still renderings/animations. Ways in which computer visualization can be used for design exploration, for feedback during development of ideas, and for realistic representation of fully formed designs.

ARCH 5372. Computer Methods II. (1 cr; S-N or Aud. [S])ARCH 5372. Prereq-5371, [P]8252 and M Arch major or #) Current techniques, computer programs, and their application to architectural computing and design.

ARCH 5374. Computer Methods IV. (1 cr; Stdnt Opt. Prereq-5373, [P]8254, M Arch major or #) Advanced architectural computing applications in design, history, theory, representation, and technology.

ARCH 5381. Introduction to Computer Aided Architectural Design. (3 cr; A-F or Aud. Prereq-Arch or BED or M Arch or grad student in LA or #) 2-D drawing, 3-D modeling/animation, printing, plotting. Electronic networking/communications, database management, spreadsheet analysis, land-use analysis, project management.

ARCH 5382. Computer Aided Architectural Design. (3 cr; A-F or Aud. Prereq:5381 or arch grad major or #) 2-D/3-D CAD, image manipulation. Advanced multimedia visualization techniques for design, including solid modeling, photo-realistic imaging, animation, video-editing/recording.

ARCH 5410. Topics in Architectural History. (3 cr [max 12 cr]; A-F or Aud. Prereq-MArch or M Arch major or #) Advanced study in architectural history. Readings, research, seminar reports.

ARCH 5411. Principles of Design Theory. (3 cr; A-F or Aud. Prereq-MArch major or #) 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 5421. Architecture and Interpretation: The Cave and the Light. (3 cr; A-F only. [S])ARCH 4421W. Prereq-[5431, 5432] or #) Historical/hermeneutical investigation of iconography of grotto. Interwoven themes of descent into earth and ascent to light, from earliest strata of human culture to present day.

ARCH 5423. Gothic Architecture. (3 cr; A-F or Aud. [S])ARCH 4423. Prereq-MS Arch or M Arch major or #) History of architecture and urban design in Western Europe, from 1150 to 1400.

ARCH 5424. Renaissance Architecture. (3 cr; A-F or Aud. [S])ARCH 4424. Prereq-MS Arch or M Arch major or #) History of architecture and urban design in Italy, from 1400 to 1600. Emphasizes major figures (Brunelleschi, Alberti, Bramante, Palladio) and evolution of major cities (Rome, Florence, Venice).
ARCH 5425. Baroque Architecture. (3 cr; A-F or Aud. [S]ARCH 4425. Prereq-MS Arch or M Arch major or #) Architecture and urban design in Italy, from 1600 to 1750. Emphasizes major figures (Bernini, Borromini, Cortona, Guarini) and evolution of major cities (Rome, Turin).


ARCH 5431. Eighteenth-Century Architecture and the Enlightenment. (3 cr; A-F or Aud. [S]ARCH 4431W. Prereq-M Arch grad student or #) Architecture, urban planning, and garden design in Europe and America from 1650 to 1850.

ARCH 5432. Modern Architecture. (3 cr; A-F or Aud. [S]ARCH 4432. Prereq-MS Arch or M Arch major or #) Architecture and urban design in Europe and the United States, from early 19th century to World War II.

ARCH 5434. Contemporary Architecture. (3 cr; A-F or Aud. [S]ARCH 4434. Prereq-MS Arch or M Arch major or #) Developments, theories, movements, and trends in architecture and urban design, from World War II to present.

ARCH 5439. History of Architectural Theory. (3 cr; A-F or Aud. [S]ARCH 4439. Prereq-MS Arch or M Arch major or #) History of architectural theory, from antiquity to 20th century.


ARCH 5445. Suburbia. (3 cr; A-F only. [S]ARCH 4445W) Suburbia, from origins in 18th-century England to present. Historical changes and present challenges, especially in America. Ideology, mythology, planning, development, geography, transportation, the family. Specific site investigations. Representations in film, television, popular literature, and music.


ARCH 5450. Topics in Architectural Theory. (1-3 cr [max 9 cr]; A-F or Aud. Prereq-Arch major or M Arch major or #) Selected topics in architectural theory and criticism.

ARCH 5451. Architecture: Defining the Discipline. (4 cr; A-F only. Prereq-M Arch major) Paradigms through which architecture has defined itself. Implications for its practice, product, and architecture in general. Lecture, discussion, design exercises.

ARCH 5452. Architecture: Design, Form, Order, and Meaning. (4 cr; A-F or Aud. Prereq-M Arch major or #) Architecture and the issue of meaning. Explores fundamental and constituent elements of architectural form and order; their inherent tectonic, phenomenal, experiential, and symbolical characteristics; their potential and implications for the creation and structure of meaningful human places.

ARCH 5455. Typology and Architecture: Theories of Analysis and Synthesis. (3 cr; A-F or Aud. Prereq-5411, M Arch major, #) 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; A-F or Aud. Prereq-5412, Arch major or grad student or #) Architecture as a cultural medium. Relationships among architecture, people, and culture; research findings and design; vernacular and high style architecture. Physiological and symbolic messages; reception theory in architecture; cultural critique and change; implications for architectural practice.

ARCH 5459. Gender and Architecture. (3 cr; Stdtnt Opt. Prereq-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 5465. LeCorbusier’s Search for Theory and Identity in His Formative Years. (3 cr; A-F only. Prereq-5411, 5412 recommended) Seminar. Charles-Edouard Jeanneret’s transition from apprentice of watchcase engraving to student of architecture, 1902-20. Early education, travels, design of houses in La Chaux-de-Fonds, transition to life in Paris, success in establishing theoretical identity.

ARCH 5468. Constructing Sacred Space. (4 cr; A-F only. Prereq-mArch or MS) Speculative understandings of space, form, and expression of sacred space in historic/contemporary cultural/social contexts, using Islamic art/architecture. Language of architecture.

ARCH 5513. Environmental Technology I: Thermal Design in Architecture. (3 cr; A-F or Aud. Prereq-M Arch major or #) 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; A-F or Aud. Prereq-M Arch major or #) 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 5516. Technology Two: Luminous and Thermal Design. (6 cr; A-F only. Prereq-M Arch) Concepts/principles of daylighting, thermal, energy, and systems integration. Architectural/technological implications of lighting and thermal design. Ecological thinking in support of sustainable design decision making.


ARCH 5521. Material Investigation: Concrete. (4 cr; A-F only. Prereq-MArch or MS) Design projects identify common problems/improvements, investigate alternatives, and develop solutions where concrete is primary building material.

ARCH 5523. Material Investigation: Steel and Glass. (4 cr; A-F only. Prereq-Grad student) Design projects identify common problems and improvements, investigate alternatives and develop solutions where steel and glass are the primary building materials.

ARCH 5527. Material Investigations: Stone and Water. (4 cr; A-F only. Prereq-MArch or M.S) Design projects identify common problems/improvements, investigate alternatives, and develop solutions where wood is primary building material.

ARCH 5539. Daylighting and Architecture Design. (4 cr; A-F only. Prereq-M Arch major) Ecological design approaches that combine ecological, physiological, and experiential aspects to enhance relationship to place. How formal, aesthetic, and experiential aspects of daylighting support/foster sustainable architectural design.

ARCH 5541. Material Strategies. (5 cr; A-F only. Prereq-M Arch or Arch MS major) Emergent materials in advanced building design; strategies for material approaches relevant to global resource flows, technocultural trajectories, and sociocultural effects. Research projects based on evaluative tools and case studies.

ARCH 5550. Topics in Technology. (1-4 cr [max 12 cr]; A-F only. Prereq-M Arch major) Selected topics in architecture technology, e.g., construction, environmental management, energy performance, lighting, materials.


ARCH 5611. Design in the Digital Age. (3 cr; A-F or Aud. [S]ARCH 5611. Prereq-Grad student or upper level undergrad student) Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project.

ARCH 5621. Professional Practice in Architecture. (3 cr; A-F or Aud. Prereq-M Arch major or #) 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; A-F or Aud. Prereq-M Arch major or #) Legal subject matter relevant to the work of architects and design professionals.

ARCH 5645. Real Estate Development in Architecture. (3 cr; Stdnt Opt. Prereq-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. (1-4 cr [max 16 cr]; Stdnt Opt. Prereq-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 5651. Building Stories. (3 cr [max 12 cr]; A-F only) Professional practice education by means of case study analysis.

ARCH 5670. Topics in Historic Preservation. (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-5621, Arch major or 5621, M Arch major or #) Selected topics in the theory, philosophy, research, and methods of architectural historic preservation.

ARCH 5671. Historic Preservation. (5 cr; Stdnt Opt. Prereq-5612 or #) Philosophy, theory, and origins of historic preservation. 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 5711. Theory and Principles of Urban Design. (3 cr; A-F or Aud. Prereq-M Arch major or LA grad major or grad student or #) Seminar. Design on dominant theories/paradigms informing city design from renaissance to 21st century. Critical issues central to current debates.

ARCH 5721. Case Studies in Urban Design. (3 cr; A-F or Aud. [S]LA 5721. Prereq-Grad student or #) Reading seminar. Evolution of contemporary city. Dynamics that created contemporary urban spatial patterns. Planning/design theories that have guided public interventions in built environment. Thematic texts, classroom discussions.

ARCH 5731. Territorial City. (3 cr; A-F only) Seminar. Students research, define, and test conditions within which the territory and contemporary city coexist. Site for research is Twin Cities metropolitan area. Readings, discussions, field trips, collaborative development of urban proposals.

ARCH 5750. Topics in Urban Design. (1-4 cr [max 16 cr]; A-F or Aud. Prereq-Arch major) Special topics in theory/practice of urban design.

ARCH 5770. Field Studies in Urban Design. (2-6 cr [max 6 cr]; A-F only) Travel study of urbanism through guided field trips and lectures by local experts. Relationship between built environment, land, water, and transit. Planning and development policies. On-site graphic documentation and analysis. Design or written papers.

ARCH 5790. Special Topics in Metropolitan Design. (3 cr [max 6 cr]; A-F or Aud. Prereq-Arch major or #) Special topics in theory/practice of urban design.

ARCH 5993. Directed Study. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#) Guided individual reading or study.

ARCH 8010. Subjects and Methods in Architecture. (2 cr; S-N or Aud. Prereq-Grad Arch major or #) The discipline of architecture.

ARCH 8250. Advanced Topics in Design. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-Admitted to 3rd track for MArch prog or #) Design studio.

ARCH 8251. Graduate Architectural Design I. (9 cr; A-F or Aud. Prereq-MArch or #) Design projects focus on fundamental issues of space/form/light/materiality in relation to human habitation. Design as a process of exploration/inquiry. Modes/media of representation, their critical impact.

ARCH 8252. Graduate Architectural Design II. (6 cr; A-F or Aud. Prereq-82521, grad Arch major or #) Fundamental architectural problems involving design as a creative inquiry. Individual and collaborative effort.

ARCH 8253. Graduate Architectural Design III. (9 cr; A-F or Aud. Prereq-[8252, 82521, MArch or #]) Issues of design process, representation, programming, technology, and urban relations.

ARCH 8254. Technical Applications in Design. (4 cr [max 8 cr]; A-F or Aud. Prereq-[8253, MArch major or #]) Design potential inherent in technical development process of design project. Testing concepts, developing details, integrating building systems. Structural bay enclosure, cost considerations, regulatory compliance. Building-information modeling, analog/digital representations in architecture document production.

ARCH 8255. Graduate Architectural Design V. (6 cr [max 12 cr]; A-F or Aud. Prereq-[8254, grad Arch major or #]) Fundamental architectural problems involving design as a creative inquiry. Individual/collaborative effort.

ARCH 8295. Directed Graduate Architectural Design. (6 cr; A-F or Aud. Prereq-8251, grad Arch major or #)

ARCH 8299. Master’s Final Project. (10 cr; S-N only. Prereq-Plan C, MArch) Final studio project for Plan C master’s. Measures knowledge of architecture and ability to conduct research for design proposal, communicate in visual/written representations. Proposal, graphic presentation of project.

ARCH 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

ARCH 8350. Advanced Topics in Representation. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad Arch major or #) Theory and practice of visual representation in architecture.

ARCH 8450. Topics in Theory. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-5411, grad Arch major or #) Topics vary

ARCH 8494. Directed Research in Architectural History. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad Arch major or #)

ARCH 8550. Topics in Technology. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad Arch major or #) Special topics in theory/practice of architecture technologies.


ARCH 8565. Materials Performance in Sustainable Building. (3 cr; A-F only. Prereq-[5513, [grad MS or MArch] or #) Building-material properties, resource conservation, fabrication/construction processes in production of high performance sustainable building designs. Application of assessment/evaluation tools (LCA, BEES, Athena or LEED) for IEQ, waste reduction and management with an emphasis on experimental/analytic methods. Aesthetic/technical solutions that integrate design selection processes, construction methods, commissioning processes, and facility management, maintenance, and decommissioning.

ARCH 8567. Site and Water Issues in Sustainable Design. (3 cr; A-F only. Prereq-[5512, [grad MS or MArch student] or #) Site, water and site/building integration aspects of sustainable design. Ecological principles, site analysis, Water/site/building integration strategies, methods, and tools integrated with sustainable design issues such as energy, indoor environmental quality, and material. Research projects, case studies, measurement methods.

ARCH 8650. Topics in Architectural Practice. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad Arch major or #)

ARCH 8750. Topics in Urban Design. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad Arch major or #)

For definitions of course numbers, abbreviations, and symbols, see page 3.

ARTS 5110. Advanced Painting; Interpreting the Site. (4 cr; Stdnt Opt. Prereq-3106 or #) Search for personal content as inspired by site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations enhanced by experimentation with new marks/symbols.


ARTS 5106. Advanced Drawing; Interpreting the Site. (4 cr; Stdnt Opt. Prereq-3106 or #) Search for personal content as inspired by site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations enhanced by experimentation with new marks/symbols.

ARTS 5110. Advanced Drawing; Interpreting the Site. (4 cr; Stdnt Opt. Prereq-3106 or #) Search for personal content as inspired by site. Field trips (2/3 of course) to draw or paint from various metropolitan area locations. Interpretations enhanced by experimentation with new marks/symbols.


ARTS 5403. Women’s Images and Images of Women. (5 cr; Stdnt Opt. [S]ARTS 4303. Prereq-1001 or #) Women’s place in Western art from the artist’s perspective. Women as artists and the imagery they have created. Women as the object of imagery and the social and political attitudes those images convey. Survey of women artists from late-Renaissance through contemporary feminism; relevant issues.

ARTS 5441. Professional Practices. (3 cr; Stdnt Opt. Prereq-Grad or #) Intensive writing seminar provides a context for theoretical issues, business practices, and professional skills required for career management and development in the visual arts.

ARTS 5444. Bachelor of Fine Arts Exhibition. (1-5 cr; 5-N only. Prereq-5400, BFA candidate, sr) Final solo or small group exhibition and artist’s statement developed in consultation with faculty adviser. Visual documentation of work and statement as appropriate to media.

ARTS 5450. Workshop in Art. (1-4 cr [max 12 cr]; Stdnt Opt) Selected topics and intensive studio activity. Topics vary yearly.


ARTS 5550. Advanced Papermaking. (4 cr [max 12 cr]; Stdnt Opt. Prereq-3505 or #) Distinct expressive qualities of handmade paper, its versatility as contemporary art form. Independent research pursued in consultation with instructor.


ARTS 5670. Interdisciplinary Media Collaborations. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Upper-division undergraduate or graduate student in art, creative writing, dance, music or theater) Interdisciplinary, collaborative artist teams explore modes of creative expression at intersections of the arts. Students collaborate to co-author/produce works of art for public presentation. Emphasizes integration of media arts with visual art, music, dance, and theater to produce interdisciplinary/collaborative art.


ARTS 5701. Performed Photography: Documentation of Artistic Acts and Social Interventions. (4 cr; Stdnt Opt. Prereq-Two 3xxx [photography or video] courses) Studio course. Use of image-based media to document various artistic, site-specific acts that may otherwise go unnoticed. Relationship between original event (performance, social intervention, sculptural prop, ephemeral gesture) and memory trace left in image/record.


**ARTS 5821. Ceramic Materials Analysis.** (4 cr; Stdnt Opt. Prereq-3501 or 3802 or #) Ceramic materials, their interrelationships. Advanced investigation of glazes, slip formulation, clay bodies in high/low temperature ranges. Individual interests related to students’ aesthetic needs.

**ARTS 5990. Independent Study in Art.** (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-Major, completed regular course with instructor, #) Independent study project designed by student in consultation with instructor.

**ARTS 8100. Drawing and Painting: Theory and Practice.** (3 cr [max 12 cr]; Stdnt Opt. Prereq-Art MFA student) Tutorial in drawing and/or painting.

**ARTS 8300. Sculpture: Theory and Analysis.** (3 cr [max 6 cr]; Stdnt Opt) Theoretical issues of sculpture as understood by practicing sculptors. Research on and discussion of current sculpture in light of historical precedent; personal work related to contemporary practice.

**ARTS 8533, FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)


**ARTS 8401. Studio and Pedagogy: Philosophy and Practice.** (3 cr [max 6 cr]; Stdnt Opt) Orientation to establishing studio practice, introduction of department and community resources, and preparation for teaching. Studio visits and critiques; development of teaching strategies. Required of drawing and painting students.

**ARTS 8410. Studio Critique.** (3 cr [max 6 cr]; A-F or Aud. Prereq-8400) Studio based critique to foster critical dialogue about art practice across media/disciplines. Colloquium for ideas/theories that migrate between artistic practices and influence studio work.

**ARTS 8420. Seminar: Visiting Artists Program.** (2 cr [max 12 cr]; S-N only. Prereq-MFA student) Introduction to work/ideas of visiting artists/critics. Individual studio critiques, group discussion. Students connect/extend topics to their thesis and supporting paper.

**ARTS 8500. Printmaking: Theory and Practice.** (3 cr [max 12 cr]; Stdnt Opt) Focus on the complexities and multi-disciplinary activities of printmaking. Development of concepts and personally significant imagery leading to thesis work.

**ARTS 8600. Time and Interactivity: Theory and Practice.** (3 cr [max 12 cr]; Stdnt Opt) Tutorial. Issues related to creative visual work using computer/other technologies. Interactivity, robotics, digitally based conceptual art, time-based art.

**ARTS 8700. Photography: Theory and Practice.** (3 cr [max 12 cr]; Stdnt Opt) Contemporary issues in the production of photographic images.

**ARTS 8800. Ceramics: Theory and Practice.** (3 cr [max 12 cr]; A-F or Aud) Tutorial emphasizing individual goals and directions. Discussion of aesthetics, history, theory, contemporary issues in clay, and criticism.


---

**Art History (ARTH)**

**College of Liberal Arts**

**ARTH 5108. Greek Architecture.** (3 cr; Stdnt Opt. [S]CNES 5108) Prereq-Art 5109/Class 3008, jr or sr or grad, or #) Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor, and Italy.

**ARTH 5112. Archaic and Classical Greek Art.** (3 cr; Stdnt Opt. Prereq-Jr or Sr or Grad or #) Sculpture, painting, architecture and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture, architectural problems such as identifying and dating buildings; analysis of methods and techniques.

**ARTH 5113. Archaic and Classical Greek Art.** (3 cr; Stdnt Opt. Prereq-Jr, Jr, or Sr or Grad or #) Sculpture, painting, architecture and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; architectural problems such as identifying and dating buildings; analysis of methods and techniques. Emphasis on Periclean Athens.

**ARTH 5113. Heritage After Iraq and Afghanistan: Debates in Art History, Museum Studies, and the Art Market.** (3 cr; Stdnt Opt) Pre- and postwar Iraq, looting of the Baghdad Museum. Systematic looting of archaeological sites; destruction of Afghanistan’s cultural heritage under the Taliban, looting/trade in antiquities since the overthrow; art/war in historical/contemporary perspective; nationalistic uses of archaeology, museology.

**ARTH 5115. Hellenistic and Iranian Asia: Art and Archaeology of Hellenistic, Scythian, Kushan, and Sogdian Asia.** (3 cr; Stdnt Opt) Prereq-MFA student) Transformations of Greek architecture, sculpture, painting, mosaic, and decorative arts beginning of the eastern Mediterranean and Hellenistic Asia. Art and archaeology of the post-Hellenistic Iranian world. Religious, political and historical contexts of archaeological sites, monuments, and art objects.

**ARTH 5172. House, Villa, Tomb: Roman Art in the Private Sphere.** (3 cr; Stdnt Opt. [S]CNES 5172) Prereq-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 physical evidence in illuminating gender roles.

**ARTH 5188. Art and Archaeology of Early Christianity and the Late Roman Empire.** (3 cr; Stdnt Opt) Emergence of Christian visual culture in Rome. Age of Constantine and Constantine the Great. Age of Justinian. Development of liturgical environments such as imperial and Christian art, architecture, and ritual. Constantinople, from its founding through sixth century. Church architecture. Early icon/monstrous painting.

**ARTH 5192. Persia and the Ancient Iranian World from the Rise of the Achaemenid Empire to the Conquest of Alexander.** (3 cr; Stdnt Opt) Prereq-Art 5109/Class 3008, jr or Sr or grad, or #) Theoretical and practical consideration of themes related to ancient Iranian art and architecture. Development of concepts and significant imagery leading to thesis work.

---

**For definitions of course numbers, abbreviations, and symbols, see page 3.**
Courses

ARTH 5466. Contemporary Art. (3 cr; Stdnt Opt. Prereq-3 or 5 or 6 cr. 3\(\text{cr}\))
Survey of the most important critical literature of the period after 1970. Origins and full development of postmodern and subsequent aesthetic philosophies.

ARTH 5484. The Art of Picasso and the Modern Movement. (4 cr; Stdnt Opt)
Works of Picasso in all media: Blue. Rose, Cubist, Classical, and later periods of Picasso's development against innovations in media; collage, utilization of found-objects, printmaking and ceramics. Autobiographical nature of imagery gives methodological basis for exploring frequently personalized themes.

ARTH 5494. East/West, West/East. (3 cr; Stdnt Opt)
Beginning in the early 18th century and culminating at the dawn of the First World War. Cosmopolitan, Orientalism, Japanism, and western influence in Japan during the Meiji Era. Historical and critical context of trade competition, the colonial race, and the shrinking geopolitical map as the period progresses. Paintings to prints, decorative arts to architecture, and world fair exhibitions to photography.

ARTH 5535. Style, Tradition, and Social Content in American Painting: Colonial Era to 1876. (3 cr; Stdnt Opt)
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 chronicles of the Western frontier.

ARTH 5546. American Architecture: 1840 to 1914. (3 cr; Stdnt Opt)
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 5556. American Art in the Gilded Age. (3 cr; Stdnt Opt)
Major artists, artistic movements, and aesthetic concerns that dominated American art history from the Civil War to the turn of the century. Nationalism and cosmopolitanism as well as masculinity and femininity, industrialization and the "incorporation of America," methods of art instruction and its social role. Place of art in civic life.

ARTH 5575. Boom to Bust: American Art from the Roaring Twenties to the Great Depression. (5 cr; Stdnt Opt)

ARTH 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

ARTH 8500. Issues in Latin American Art. (5 cr [max 12 cr]; Stdnt Opt)
Topics vary.


ARTH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; up to 12 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ARTH 8710. Seminar: Islamic Art. (3 cr [max 12 cr]; Stdnt Opt. Prereq-AM 8710. Prereq-AM 8710. Focus depends on current research interests of the professor and needs and interests of graduate students in Islamic and Asian art history.

ARTH 8720. Seminar: East Asian Art. (3 cr [max 12 cr]; Stdnt Opt. Prereq-3 cr art history, #)
Research focuses on closely defined topic, such as a short period of Chinese art, a restricted subject, or role of a single artist. A substantive research paper is required and participation in the seminar dialogue is expected.


ARTH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

ARTH 8920. Seminar: Film History and Criticism. (3 cr [max 12 cr]; Stdnt Opt. Prereq-ART 8920. Prereq-ART 8920. Selected topics in film history and theory, including specific directors, genres, movements, periods, and critical issues (e.g., violence).
Arts and Cultural Leadership (ACL)

College of Continuing Education

ACL 5100. Topics in Arts and Cultural Leadership. (1-4 cr [max 24 cr]; A-F or Aud. Prereq-%) Topics in arts and cultural leadership.

ACL 5200. Trends and Impacts in Arts and Cultural Leadership. (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#)

Asian American Studies (AAS)

Department of Asian Languages and Literatures

College of Liberal Arts

AAS 5920. Topics in Asian American Studies. (1-4 cr [max 12 cr]; Stdnt Opt) Topics specified in Class Schedule.

AAS 5993. Directed Readings. (1-4 cr [max 8 cr]; Stdnt Opt) Directed reading--must be set up with individual instructor.

AAS 5996. Graduate Proseminar. (1 cr [max 4 cr]; S-N only) Discussions/presentations from various disciplinary perspectives on research, activism, and performance in Asian American/Diasporic Studies. Students engage in dialogue, observe models of scholarly engagement, and reflect on issues within Asian American/diasporic studies.

Asian Languages and Literatures (ALL)

Department of Asian Languages and Literatures

College of Liberal Arts


ALL 5212. Introductory Classical Chinese. (3 cr; Stdnt Opt. Prereq-5211 or #, at least one yr of an East Asian language) Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese and its importance in the study of East Asian cultures. Taught in English.


ALL 5276. Liberalism and Its Critics: Global Perspectives. (3 cr; A-F only) Survey of liberal political thought and various critiques of it that arose in extreme left/right political perspectives, including those in colonial contexts and within non-Western religious formations, especially Hindu and Muslim.

ALL 5436. Literature by 20th-Century Japanese Women in Translation. (3 cr; Stdnt Opt) Literary and historical exploration of selected works by Japanese women writers in a variety of genres. All literary texts read in English.


ArTH 8970. Directed Studies. (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#)

Astronomy (AST)

Minnesota Institute for Astrophysics

College of Science and Engineering

AST 5001. Galactic Astronomy. (3 cr; A-F only) Prereq-2001 or grad student) Structure of the Milky Way galaxy. Stellar populations including, open and globular clusters and the solar neighborhood, and the formation/evolution of its structure. Stellar distances/motions.


For definitions of course numbers, abbreviations, and symbols, see page 3.

AST 5201. Methods of Experimental Astrophysics. (4 cr; Stdnt. Opt. Prereq-Upper div CSE or grad or #) Contemporary astronomical techniques and instrumentation. Emphasizes data reduction and analysis, including image processing. Students make astronomical observations at O’Brien Observatory and use department’s computing facilities for data analysis. Image processing packages include IRAF, AIPS, IDL, MIRA.

AST 8001. Radiative Processes in Astrophysics. (4 cr; Stdnt. Opt. Prereq-#) Introduction to classical/quantum physics of electromagnetic radiation as it applies to astrophysics. Emphasizes radiative processes (e.g., emission, absorption, scattering) in astrophysical contexts (e.g., ordinary stars, ISM, neutron stars, active galaxies).


AST 8110. Topics in Astrophysics. (2-4 cr [max 4 cr]; Stdnt. Opt. Prereq-#)

AST 8120. Topics in Astrophysics. (2-4 cr [max 4 cr]; Stdnt. Opt. Prereq-#)

AST 8200. Astrophysics Seminar. (1-3 cr [max 3 cr]; Stdnt. Opt. Prereq-#)

AST 8331. FTE: Master’s. (1 cr; No grade. Prereq-Master student, adviser and DGS consent)

AST 8332. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

AST 8600. Doctoral Pre-thesis Credits. (1-5 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim final; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

AST 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

AST 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)


Biochemistry (BIOC)

Department of Biochemistry, Molecular Biology, and Biophysics

College of Biological Sciences


BIOC 5215. Selected Topics in Molecular Biology. (3 cr; A-F or Aud. Prereq-4332 or 8002 or 5021, BIOL 4005) or #) Cutting edge areas in molecular biology. Topics focus on the “3 R’s” of DNA: repair, replication, and recombination. Faculty who are experts in these areas teach modules on specific topics, including discussion of their research interests.

BIOC 5225. Graduate Laboratory in NMR Techniques. (1 cr; A-F only. Prereq-5001 or #) Practical aspects of nuclear magnetic resonance (NMR) spectroscopy. Hands-on experience with 500-600 MHz instruments. Sample preparation/handling, contamination sources, tube/probe options, experiment selection, experimental procedures, software, data processing.

BIOC 5309. Biocatalysis and Biodegradation. (3 cr; Stdnt. Opt. [SIM] MICE 5309. Prereq-chemistry through organic chemistry, knowledge of wordprocessing, e-mail, access to World Wide Web, access to college-level science library) Assess validity of information on biocatalysis and biodegradation; knowledge of fundamentals of microbial catalytic metabolism as it pertains to biodegradation of environmental pollutants; biodegradation for specialty chemical synthesis, display of this information on the Web.

BIOC 5352. Biotechnology and Bioengineering for Biochemists. (3 cr; A-F or Aud. [S]MICB 5352. Prereq-(5021 or 4331 or BIOL 5021 or MICB 4111, [BIOL 3501 or MICB 3301] or #) Protein biotechnology. Microorganisms used as hosts for protein expression, protein expression, and engineering methods. Production of enzymes of industrial interest. Applications of protein biotechnology in biotechnology. Formulation of therapeutic biopharmaceuticals.


BIOC 5531. Macromolecular Crystallography I: Fundamentals and Techniques. (1 cr; A-F or Aud. Prereq-[One organic chemistry or biochemistry course], two calculus or college physics courses)] or #) Macromolecular crystallography for protein structure determination/engineering. Determining macromolecule structure by diffraction.


BIOC 5960. Special Topics in Biochemistry. (3 cr; A-F only. Prereq-[5021 or equiv], CHEM 2301) or #) In-depth study of topics in biochemistry.

BIOC 8002. Molecular Biology and Regulation of Biological Processes. (3 cr; Sdnt Opt. Prereq: [MBMB or MCDG] grad student or #) Classical to current topics in molecular biology. Aspects of DNA, RNA, and protein biology. DNA replication, repair, and recombination. RNA transcription, editing, and regulation. Protein translation/modification. Technologies such as deep-sequencing micro-RNA and prions.

BIOC 8084. Research and Literature Reports. (1 cr [max 3 cr]; S-N or Aud. Prereq: Grad MBMB major or #) Current developments.

BIOC 8184. Graduate Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq: Grad MBMB major or DGS consent) Reports on recent developments in the field and on research projects in the department.

BIOC 8213. Selected Topics in Molecular Biology. (4 cr; Sdnt Opt. [SJGCD 8213. Prereq: BIOC 8002 or #) Current topics such as DNA replication, recombination and gene conversion, regulation of gene expression, chromatin structure and transcription, developmental gene regulation, organellar gene expression, RNA splicing, initiation/control of translation, animal viruses, transposable elements, somatic recombination, oncogenes.

BIOC 8216. Signal Transduction and Gene Expression. (3 cr; Sdnt Opt. Prereq: BIOC 8002 or #) Cell signaling, metabolic regulation in development. Prokaryotic/eucaryotic systems used as models for discussion. Literature-based course.

BIOC 8290. Current Research Techniques. (1-3 cr [max 9 cr]; S-N or Aud. Prereq: Grad MBMB major) Research project carried out in laboratory of a staff member.

BIOC 8333. FTE: Master's. (1 cr; No grade. Prereq: Master's student, adviser and DGS consent)

BIOC 8401. Ethics, Public Policy, and Careers in Molecular and Cellular Biology. (1 cr [max 2 cr]; S-N or Aud, Prereq: Graduate student in [MBMB or MCDG])(PG) Ethics of scientific investigation from viewpoint of western scientific enterprise. Relationship between science, culture, and public policies. Careers in molecular/cellular biology. Nontraditional career tracks. Invited speakers, case studies, small-group discussions, lectures.

BIOC 8444. FTE: Doctoral. (1 cr; No grade. Prereq: Doctoral student, adviser and DGS consent)

BIOC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 1% for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BIOC 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only])

BIOC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq: Max 18 cr per semester or summer; 24 cr required)

Bioethics, Center for (BTHX)

Center for Bioethics

BTHX 5000. Topics in Bioethics. (1-4 cr [max 8 cr]; Sdnt Opt. Prereq-Grad student or #) Bioethics topics of contemporary interest. Topics specified in Class Schedule.

BTHX 5010. Bioethics Proseminar. (2 cr; A-F only. Prereq: Bioethics grad student or grad minor) Introduction to topics in bioethics.

BTHX 5100. Introduction to Clinical Ethics. (3 cr; Sdnt Opt. Prereq: Jr or sr or grad student or #) Most frequent ethical problems faced by clinicians, patients/families, and ethics consultants. Forging life sustaining treatment, decisional capacity, informed consent, treatment refusals, death/dying, pediatric ethics, reproductive issues, research ethics, psychiatric illness. Real cases.


BTHX 5300. Foundations of Bioethics. (3 cr; Sdnt Opt. Prereq: Grad student or #) Overview of major contemporary frameworks, foundational issues in bioethics.

BTHX 5325. Biomedical Ethics. (3 cr; Sdnt Opt. Prereq: Jr or sr or grad student or #) Major topics/issues in biomedical ethics. Patients’ rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, allocation of medical resources.

BTHX 5400. Introduction to Bioethics in Health Policy. (3 cr; Sdnt Opt. Prereq: Grad student or professional student or #) Topics vary to reflect issues of current significance. Relates to law/politics as appropriate but focuses on moral analyses of policy issues.


BTHX 5453. Law, Biomedicine, and Bioethics. (3 cr; A-F only. Prereq: Grad student or #) Law/bioethics as means of controlling important biomedical developments. Relationship of law and bioethics. Role of law/bioethics in governing biomedical research, reproductive decisionmaking, assisted reproduction, genetic testing/screening, genetic manipulation, and cloning. Definition of death. Use of life-sustaining treatment. Organ transplantation.


BTHX 5620. Social Context of Health and Illness. (3 cr; Sdnt Opt. Prereq: Grad student or #) Social context in which contemporary meanings of health and illness are understood by providers/patients. Ethical implications. Readings from history, social science, literature, and first-person accounts.

BTHX 5900. Independent Study in Bioethics. (1-4 cr [max 8 cr]; Sdnt Opt. Prereq-#) Students propose area for study with faculty guidance, write proposal which includes outcome objectives and work plan. Faculty member directs student’s work and evaluates project.

BTHX 8000. Advanced Topics in Bioethics. (1-4 cr [max 8 cr]; Sdnt Opt. Prereq-xxx or xxxxx ethics course or #) Topics of contemporary interest. Topics specified in Class Schedule.


BTHX 8333. FTE: Master's. (1 cr; No grade. Prereq: Master’s student, adviser consent, DGS consent)

BTHX 8500. Practicum in Bioethics. (1-3 cr [max 12 cr] Prereq: Bioethics grad [major or minor] or #) Supervised placement to apply knowledge/skills from core courses. Individualized plan is developed between student, bioethics adviser or DGS, and mentor at practicum site.

BTHX 8510. Gender and the Politics of Health. (3 cr; Sdnt Opt. Prereq-#) Significance of gender to health and health care. Feminist analysis regarding moral/political importance of gender, possibly including contemporary western medicine's understanding of the body, childbirth, and reproductive technologies; cosmetic surgery; chronic illness; disability; participation in research; gender and classification of disease. Care work, paid/non-paid. Readings from feminist theory, history, social science, bioethics, and moral philosophy.

BTHX 8610. Medical Consumerism. (3 cr; Sdnt Opt) Roots/implications of “medical consumerism.” How consumerist model shapes concepts of disease/disability. Larger historical developments that have led to current situation. How movement toward consumerism changes the profession of medicine. How tools of medical enhancement shape the way we think about our identities and live our lives. Texts from philosophy, history, literature, law, film, and social sciences.

BTHX 8777. Thesis Credits: Master's. (1-16 cr [max 50 cr]; No grade)

BTHX 8900. Advanced Independent Study in Bioethics. (1-4 cr [max 8 cr]; Sdnt Opt. Prereq-#) Students propose area for individual study with faculty guidance. Students write proposal, which includes outcome objectives and work plan. Faculty member directs student’s work and evaluates project.

Bioinformatics (BINF)

Department of Laboratory Medicine and Pathology
Medical School

BINF 5480. Bioinformatics Journal Club. (1 cr [max 12 cr]; S-N or Aud) Bioinformatics Journal Club

BINF 5490. Topics in Bioinformatics. (1-6 cr [max 12 cr]; Sdnt Opt. Prereq-#) Independent or group study in bioinformatics.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Biological Sciences (BIOL)

College of Biological Sciences


BIOL 5309. Molecular Ecology And Ecological Genomics. (3 cr; Stdt Opt. Prereq-BIOL 3407 or BIOL 3409 or BIOL 4003) Application of molecular tools (PCR, sequencing, AFLP, SNPs, QTL) and analyses of molecular data for understanding ecological/processive processes. Strengths/weaknesses of techniques/analyses. Questions molecular tools are used to answer.

BIOL 5407. Ecology. (3 cr; Stdt Opt. [S] BIOL 3407W. BIOL 3507, EEB 3001, BIOL 3407. Prereq-[One semester college biology, [MATH 1142 or MATH 1217 or MATH 1281 or equiv], grad student] or #) Principles of population growth/interactions and ecosystem function applied to ecological issues, including regulation of human populations, dynamics/impacts of disease, invasions by exotic organisms, habitat fragmentation, and biodiversity. Lab.


BIOL 5511. Teaching the Biological Sciences. (3 cr; A-F or Aud. Prereq-6 cr in the life sciences) Methods and teaching styles used by outstanding university teachers including reviews and critiques from research on teaching. Opportunities for students to practice and evaluate teaching strategies.

BIOL 5910. Special Topics in Biology for Teachers. (1-4 cr [max 12 cr] Stdt Opt. Prereq-BA or BS in science or science education or elementary education or K-12 licensed teacher) Courses developed for K-12 teachers depending on topics or subtopics which might include any of the following: plant biology, animal biology, genetics, cell biology, biochemistry, microbiology.

BIOL 5950. Special Topics in Biology. (1-4 cr [max 8 cr; A-F only] In-depth study of special topic in life sciences.

Biomedical Engineering (BMEN)

Department of Biomedical Engineering

College of Science and Engineering

BMEN 5001. Advanced Biomateterials. (3 cr; A-F or Aud. Prereq-3301 or MatS 3011 or grad student or #) Commonly used biomaterials. Chemical/physical aspects. Practical examples from such areas as cardiovascular/orthopedic applications, drug delivery, and cell encapsulation. Methods used for chemical analysis and for physical characterization of biomaterials. Effects of additives, stabilizers, processing conditions, and sterilization methods.

BMEN 5401. Tissue Engineering. (3 cr; Stdt Opt. Prereq-CSE upper div or grad student or med student or #) Fundamentals of wound healing and tissue repair; characterization of cell-matrix interactions; case study of engineered tissues, including skin, bone marrow, liver, vessel, and cartilage; regulation of biomaterials and engineered tissues.

BMEN 5101. Advanced Bioelectricity and Instrumentation. (3 cr; Stdt Opt. Prereq-[CSE upper div, grad student or med student or #] Instrumentation, computer systems, and processing requirements for clinical physiological signals. Electrode characteristics, signal processing, and interpretation of physiological events by ECG, EEG, and EMG. Measurement of respiration and blood volume/flow.

BMEN 5111. Biomedical Ultrasound. (3 cr; Stdt Opt. Prereq-[[3401 or equiv], [MATH 2373 or equiv], [MATH 2374 or equiv], [CSE upper div or grad student]] or #) Introduction to biomedical ultrasound, including physics of ultrasound, transducer technology, medical ultrasound imaging, photoacoustic imaging, applications of non-linear acoustics, and high-intensity ultrasound.

BMEN 5201. Introduction to BioMEMS and Medical Microdevices. (2 cr; A-F or Aud. Prereq-CSE sr or grad student or medical student) Design/microfabrication of sensors, actuators, drug delivery systems, microfluidic devices, and DNA/protein microarrays. Packaging, biocompatibility, ISO 10993 standards. Applications in medicine, research, and homeland security.


BMEN 5351. Cell Engineering. (3 cr; Stdt Opt. Prereq-[4201, 2501 or [P]5501, [MATH 2243 or MATH 2373]] or CSE upper div or grad student or #) Engineering approaches to cell-related phenomena important to cell/tissue engineering. Receptor/ligand binding. Trafficking/signaling processes. Applications to cell proliferation, adhesion, and motility. Cell matrix interactions.

BMEN 5401. Advanced Biomedical Imaging. (3 cr; A-F or Aud. Prereq-CSE upper div or grad student or #) Functional biomedical imaging modalities. Principles/applications of technologies that offer high spatial/temporal resolution. Application of electromagnetic and magnetic resonance imaging. Other modalities.


BMEN 5412. Neuroumodulation. (3 cr; A-F only. Prereq-5411 or #) Fundamentals of bioengineering approaches to modulate the nervous system, including bioelectricity, biomagnetism, and optogenetics. Computational modeling, design, and physiological mechanisms of neuromodulation technologies. Clinical exposure to managing neurological disorders with neuromodulation technology.

BMEN 5413. Neural Decoding and Interfacing. (3 cr; A-F or Aud. Prereq-5411, [3201 or 3401 or equiv recommended]) Neural interface technologies currently in use in patients as well as the biophysical, neural coding, and hardware features relating to their implementation in humans. Practical and ethical considerations for implanting these devices into humans.

BMEN 5421. Introduction to Biomedical Optics. (3 cr; A-F or Aud. Prereq-CSE sr or grad student) Biomedical optical imaging/sensing/principles, laser-tissue interaction, detector design, noise analysis, interferometry, spectroscopy. Optical coherence tomography, polarization, birefringence, flow measurement, fluorescence, nonlinear microscopy. Tours of labs.

BMEN 5444. Muscle. (3 cr; Stdt Opt) Muscle structure/function: molecular mechanism by which force is generated.


BMEN 5910. Special Topics in Biomedical Engineering. (3 cr [max 6 cr]; Stdt Opt) Special topics in biomedical engineering.

BMEN 5920. Special Topics in Biomedical Engineering. (2-3 cr [max 6 cr]; Stdt Opt) Special topics in biomedical engineering.

BMEN 8001. Polymeric Biomaterials. (3 cr; A-F or Aud. Prereq-[5001, [CHEN 4274 or MATH 4274 or equiv]] or #) Introduction to polymeric biomaterial research. Molecular engineering, characterization of properties, material-cell interaction, biocompatibility/bioactivity. Applications in biology and medicine.

BMEN 8101. Biomedical Digital Signal Processing. (3 cr; A-F or Aud. Prereq-[[MATH 2243 or MATH 2373], [MATH 2263 or MATH 2374]] or equiv) Signal processing theory for analyzing real world digital signals. Digital signal processing and mathematically derived algorithms for analysis of stochastic signals. Spectral analyses, noise cancellation, optimal filtering, blind source separation, beamforming techniques.


<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMEN 8533</td>
<td>FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMEN 8354</td>
<td>Laboratory Neuroengineering. (1 cr [max 6 cr]; S-N only. Prereq-Grad student in CSE or neuroscience)</td>
<td>Lab rotation in neuroengineering.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMEN 8355</td>
<td>Neuroengineering Practicum. (3 cr [max 6 cr]; A-F only. Prereq-PhD student in BMEn, EE, ME, or NSc or #)</td>
<td>Topics/issues in neuroengineering. Ethics, professional conduct, conflicts, plagiarism, copyright, authorship, research design considerations, IRB, intellectual properties, review process, professional presentations, proper writing.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8381</td>
<td>Bioheat and Mass Transfer. (3 cr; Stdnt Opt. Prereq-CSE grad student, upper div transport/fluids course; [physics, biology] recommended)</td>
<td>Analytical/numerical tools to analyze heat/mass transfer phenomenon in cryobiological, hyperthermic, other biomedically relevant applications.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8401</td>
<td>New Product Design and Business Development. (4 cr; A-F or Aud. [S]ENTR 6041, ENTR 6087, ME 8221. Prereq-[CSE grad student or CSOM grad student], [some design experience; 8401, 8402 must be taken same yr])</td>
<td>Student teams work with CSE and CSOM faculty and company representatives to develop a product concept for sponsoring company. Assignments include concept/design, manufacturing, marketing, introduction strategy, product prototype.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BMEN 8402</td>
<td>New Product Design and Business Development. (4 cr; A-F or Aud. [S]ME 8222. Prereq-[S]ME 8222, 8401)</td>
<td>Student teams work with CSE and CSOM faculty and company representatives to develop a product concept for sponsoring company. Assignments include concept/design, manufacturing, marketing, introduction strategy, product prototype.</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>BMEN 8431</td>
<td>Controlled Release: Materials, Mechanisms, and Models. (3 cr; A-F or Aud. [S])</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8444</td>
<td>FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMEN 8501</td>
<td>Nonlinear Dynamics in Electrophysiology. (3 cr; A-F or Aud. Prereq-Grad student in [engineering or physics or math or physiology or neuroscience])</td>
<td>Electrophysiological behavior of nerves and cardiac myocytes. Methods of nonlinear dynamics.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8502</td>
<td>Physiological Control Systems. (5 cr; A-F only. Prereq-[S]8101 or equiv)</td>
<td>Simulation, identification, and optimization of physiological control systems. Linear and nonlinear systems analysis, stability analysis, system identification, and control design strategies, including constrained, adaptive, and intelligent control. Analysis and control of physiological system dynamics in normal and diseased states.</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>BMEN 8601</td>
<td>Biomedical Engineering Seminar. (1 cr; S-N or Aud)</td>
<td>Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMEN 8602</td>
<td>Biomedical Engineering Seminar. (1 cr; S-N or Aud)</td>
<td>Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>BMEN 8666</td>
<td>Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)</td>
<td>Supervised lab or industrial experience unrelated to student’s normal academic or employment experience.</td>
<td>1-6</td>
<td></td>
</tr>
<tr>
<td>BMEN 8710</td>
<td>Directed Research. (1-3 cr [max 3 cr]; Stdnt Opt)</td>
<td></td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8720</td>
<td>Internship in Biomedical Engineering. (1-3 cr [max 6 cr]; S-N or Aud. Prereq-Grad BMEn major)</td>
<td>Supervised lab or industrial experience unrelated to student’s normal academic or employment experience.</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8777</td>
<td>Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan B only])</td>
<td></td>
<td>1-18</td>
<td></td>
</tr>
<tr>
<td>BMEN 8820</td>
<td>Plan B Project. (2-3 cr [max 3 cr]; Stdnt Opt; Prereq-BMEn MS student)</td>
<td>Project chosen by student and adviser to satisfy M.S. Plan B project requirement. Written report required.</td>
<td>2-3</td>
<td></td>
</tr>
<tr>
<td>BMEN 8888</td>
<td>Thesis Credit: Doctoral. (1-2 cr [max 100 cr]; No grade. Prereq-PhD student in biomedical engineering; max 14 cr per semester or summer; 24 cr required)</td>
<td>Thesis credit: doctoral.</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td>BMEN 8900</td>
<td>Special Topics in Biomedical Engineering. (1-6 cr [max 8 cr]; A-F or Aud)</td>
<td>Topics in biomedical engineering.</td>
<td>1-6</td>
<td></td>
</tr>
<tr>
<td>BMEN 8910</td>
<td>Independent Study. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-Grad BMEn major)</td>
<td>Research or study of a topic determined by interests of student in consultation with faculty supervisor. Requires approval by faculty supervisor and director of graduate studies.</td>
<td>1-3</td>
<td></td>
</tr>
</tbody>
</table>

**Biomedical Science (BMSC)**

**Medical School**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMSC 8900</td>
<td>Research: Biomedical Sciences. (1-7 cr [max 42 cr]; S-N or Aud. Prereq-Enrollment in MD/PhD program)</td>
<td></td>
<td>1-7</td>
<td></td>
</tr>
</tbody>
</table>

**Biophysical Sciences (BPHY)**

**Department of Radiology**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPHY 5138</td>
<td>Research Seminar. (1-5 cr [max 5 cr]; S-N or Aud)</td>
<td>Topics introduce techniques/goals of biophysical sciences and medical physics. Lectures/ demonstrations.</td>
<td>1-5</td>
<td></td>
</tr>
</tbody>
</table>

**Biophysical Sciences and Medical Physics. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-#)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPHY 5171</td>
<td>Medical and Health Physics of Imaging I. (3 cr; Stdnt Opt. [S]TRAD 7171. Prereq-5170 or #)</td>
<td>Physics of diagnostic imaging: specification/quantification of image quality, X-ray production, image receptors, magnetic resonance imaging, radiation exposure and protection. Special imaging techniques, including mammography, computed tomography, and direct digital image capture.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BPHY 5172</td>
<td>Radiation Biology. (3 cr; Stdnt Opt. [S]TRAD 7172. Prereq-5170 or #)</td>
<td>Effects of ionizing radiation on cells, tissues, and organs. Biochemical, physiological effects of radiation effects. Biological rationale for radiation therapy practices.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BPHY 5174</td>
<td>Medical and Health Physics of Imaging II. (3 cr; Stdnt Opt. [S]TRAD 7174. Prereq-5170 or #)</td>
<td>Physics of diagnostic imaging. Ultrasound, theoretical/experimental applications of radiocinematics in medicine and biology. Counting statistics and imaging systems associated with radiopharmaceuticals, radiation dosimetry, and safety in nuclear medicine.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BPHY 5177</td>
<td>Radiation Therapy Physics Lab: Radiation Physics Basics. (3 cr; A-F only. Prereq-5170 or [P]5173 or #)</td>
<td>This course provides students hands-on experience with Hardware/software used in radiation therapy clinic for physics measurements.</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**BPHY 8147** Advanced Physics of Magnetic Resonance Imaging (MRI). (3 cr; Stdnt Opt. Prereq-5174 or #)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPHY 8148</td>
<td>Advanced Digital Imaging Science. (3 cr; Stdnt Opt. Prereq-5171 or #)</td>
<td>Role of digital image science in medical imaging. Measurement of image quality, digital radiography. Image reconstruction of CT, SPECT, PET, and MRI. 3D image processing, image registration/visualization. Picture archiving, communications systems.</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>BPHY 8149</td>
<td>Advanced Topics in Radiation Therapy Physics. (2 cr; A-F only. Prereq-[S]TRAD 5170, 5173 or #)</td>
<td>Special procedures. Total body irradiation, intensity-modulated radiation therapy, stereotactic radiosurgery/radiotherapy, image-guided radiation therapy. Treatment planning algorithms/techniques. Brachytherapy.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>BPHY 8293</td>
<td>Directed Study in Biophysical Sciences and Medical Physics. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-#)</td>
<td>Individualized study under faculty direction.</td>
<td>1-12</td>
<td></td>
</tr>
<tr>
<td>BPHY 8294</td>
<td>Directed Research in Biophysical Sciences and Medical Physics. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-#)</td>
<td>Individualized research under faculty direction.</td>
<td>1-12</td>
<td></td>
</tr>
</tbody>
</table>
Bioproducts and Biosystems Engineering (BBE)

Department of Bioproducts and Biosystems Engineering

College of Food, Agricultural and Natural Resource Sciences


BBE 5023. Process Control and Instrumentation. (3 cr; Stdt Opt. [S]BBE 4023W. Prereq-Grad student or #) Fundamental principles in system dynamics/control. Emphasizes process systems and problems faced by process engineers.

BBE 5095. Special Problems. (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#) Advanced individual-study project. Application of engineering principles to specific problem.

BBE 5202. Wood and Fiber Science. (3 cr; A-F or Aud.) Wood as a bio-material. Wood’s anatomical/cellular structure compared with other plant-derived materials. Wood’s physical properties/characteristics in various applications. Non-wood fiber, bio-product characteristics.

BBE 5203. Environmental Impacts of Food Production. (5 cr; A-F or Aud. Prereq-intended for non-engineering students; Credit will not be granted if credit has been received for AGET 5203) Crop production intensity, animal raising options, food processing waste alternatives, pest control.

BBE 5212. Safety and Environmental Health Issues in Plant and Animal Production and Processing. (3 cr; A-F or Aud. Prereq-Grad student or #) Safety/health issues in food production, processing and horticultural work environments using public health, injury control, and promotion frameworks: regulation, engineering, education. Traumatic injury, occupational illness, ergonomics, pesticide health effects, biotechnology, air contaminants.


BBE 5333. Off-road Vehicle Design. (4 cr; A-F only. [S]BBE 4333. Prereq-[[3001, 4303] or [AEM 201, AEM 3051], [CE 3502 or [PICE 3502], upper div CSE] or #) Mechanics involved in designing/testing off-road vehicle. Vehicle mechanics, traction, and performance. Complexity/modeling of vehicle interaction with soil, muskeg, and snow. Students conduct case study or literature review and develop paper for publication.

BBE 5401. Bioproducts Engineering. (5 cr; A-F or Aud. Prereq-Grad student or #) Unit operations of bioproducts engineering/ manufacture. Project required.


BBE 5403. Bio-based Products Engineering Lab II. (3 cr; A-F or Aud. [S]BBE 4403. Prereq-Grad student or #) Laboratory exercises in bio-based products engineering.


BBE 5413. A Systems Approach to Residential Construction. (4 cr; Stdt Opt. [S]HS 4413. BBE 4413. Prereq-Grad student or #) Dynamic/interrelated issues of energy, moisture control, indoor air quality in residential bldg. Emphasizes design, construction, and operational aspects to provide an energy efficient, durable structure, and healthy living environment. Interaction between moisture and wood products within building system.


BBE 5515. Watershed Management. (3 cr; A-F or Aud. Prereq-3023, upper div CSE) Application of engineering principles to managing surface runoff from agricultural, rural, 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.


BBE 5535. Assessment and Diagnosis of Impaired Waters. (3 cr; A-F only. [S]BBE 4535. Prereq-Grad student or #) Assessing impaired waters and developing TMDL for conventional pollutants. Preparing/communicating legal, social and policy aspects. TMDL analysis of real-world impaired waters problem. Field trip to impaired waters site.


BBE 5723. Food Process Engineering. (3 cr; A-F or Aud. [S]BBE 4723. Prereq-[[3033, 4013], [upper div CSE or grad student] or #) Food processing engineering. Applications of material balance, energy balance, fluid dynamics, and heat/mass transfer to refrigeration, freezing, psychrometrics, dehydration, evaporation, non-thermal processing, and separation. Development/control for food products.
BEE 5733. Renewable Energy Technologies. (3 cr; A-F or Aud.) [S]BEE 4733. Prereq-Grad student or #)


BEE 8001. Seminar I. (1 cr; A-F only)
Presentation/discussions on current research topics, research philosophy/principles, proposal writing, professional presentations.

BEE 8002. Seminar II. (1 cr [max 2 cr]; A-F only. Prereq-BEE 8001 or [P]8001 or equiv)
Organization/critique of seminars on new developments in biosystems and agricultural engineering.

BEE 8003. Research Seminar II. (1 cr [max 2 cr]; S-N or Aud. Prereq-BEE 8002 or equiv)
Moderate and critique seminars in biosystems and agricultural engineering.

BEE 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud.) [S]SOIL 8005, PLPA 8005, AGRO 8005, LAAS 8005, HORT 8005. Prereq-#)
Teaching experience is offered in the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

BEE 8013. Parameter Estimation in Biosystems and Agricultural Engineering. (3 cr; A-F or Aud. Prereq-Stat 3021 or equiv, computer programming course)

Procedures for estimating parameter values and parameter uncertainty from experimental data. Values and interpretation of linear and nonlinear models using ordinary and weighted least-square methods. Design of experiments. Application to biosystems and agricultural engineering problems.

BEE 8094. Advanced Problems and Research. (2-6 cr [max 6 cr]; Stdnt Opt. Prereq-BEE 5995-#)

Independent research under faculty guidance.

BEE 8300. Research Problems. (1-10 cr [max 10 cr]; Stdnt Opt. Prereq-#)

Independent research under faculty guidance.

BEE 8303. Machinery Modeling. (3 cr; Stdnt Opt. Prereq-AEM 2900, CE 3000)

Machinery systems modeling using multidisciplinary dynamics simulation software (MBS). Students study models presented in the literature and report on limitations of modeling approaches used. Models are developed in the students’ areas of interest.

BEE 8304. Advanced Topics in Wood Drying. (2 cr; Stdnt Opt. Prereq-4304)


BEE 8306. Graduate Seminar. (2 cr [max 6 cr]; Stdnt Opt)

Communication of scientific knowledge related to wood and paper science through the media of poster sessions, oral presentations, and the Internet.

BEE 8307. Advances and Methods in Forest Products Pathology and Preservation. (2 cr; Stdnt Opt. Prereq-4003)

Principles of wood protection, methods of evaluating preservatives. Emphasizes international developments.

BEE 8311. Mechanics of Wood and Wood Composites. (2 cr; Stdnt Opt. Prereq-#)

Advanced topics on behavior of wood composites.

BEE 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

BEE 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

BEE 8513. Hydrologic Modeling of Small Watersheds. (3 cr; Stdnt Opt. Prereq-CE 5002, hydrology course)

Study and representation of hydrologic processes by mathematical models: stochastic meteorological variables, infiltration, overland flow, return flow, evapotranspiration, and channel flows. Approaches for model calibration and evaluation.

BEE 8523. Coupled Heat, Moisture, and Chemical Transport in Porous Media. (3 cr; A-F or Aud. Prereq-[CSCI 5301 or equiv], [Math 5512, Math 5513] or equiv, computer programming)

Mathematical study of coupled heat, moisture, and chemical transport in porous media. Derivation of governing equations for coupled heat, moisture, and chemical transport. Derivation of numerical solution techniques to solve coupled equations. Comparison of numerical solutions to analytical solutions.

BEE 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 12 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BEE 8703. Managing Water in Food and Biological Systems. (3 cr; Stdnt Opt. Prereq-Chem 5301 or FSCN 5451 or Mat 3011 or #)

Qualitative and quantitative analysis of water in foods and biological materials using NMR and MRI. Water and chemical reactivity, microbial activity, physiochemical properties and changes, and structural properties and changes in foods and biological materials.

BEE 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

BEE 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Business Administration (BA)

Curtis L. Carlson School of Management

BA 6444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

BA 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BA 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Carlson School of Management (CSOM)

Curtis L. Carlson School of Management

CSOM 8101. Methods and Topics in Applied Economics. (4 cr; Stdnt Opt)
Intermediate methods/topics in business research.

Center for Allied Health Programs (CAHP)

Center for Allied Health Programs

Academic Health Center Shared

CAHP 5110. Foundations of Interprofessional Communication and Collaboration. (1 cr; S-N only. Prereq-Enrolled CLSP or QT student)

Interprofessional approach to health care. Directed group activities in five two-hour sessions: personal/professional image; teamwork, self/peer assessment; health professions; professional identity/integrity; relationships between professions and those they serve. Includes online modules.

Center for Spirituality and Healing (CSPH)

Health Sciences

Academic Health Center Shared

CSPH 5000. Explorations in Complementary Therapies and Healing Practices. (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-Jr or sr or grad student or #)
Research/practice on therapies, delivery of complementary therapies, regulatory issues.

CSPH 5101. Introduction to Integrative Healing Practices. (3 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #)
Cultural contexts of healing traditions. Complementary therapies presented by practitioners, including traditional Chinese medicine, meditation, mind-body healing, spiritual practices, energy healing, naturapathy, herbalism, movement therapies, homeopathy, manual therapies, and nutrition.

CSPH 5102. Art of Healing: Self as Healer. (1 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #)
Introduction to individual transformational journey as part of health science education. Students become aware of their responsibility/resources to facilitate development of the self. Research data, experience of self that is part psychoneuroimmunology, mind-body-spirit approaches. Lecture, scientific literature, meditation, imagery, drawing, group interaction.

CSPH 5111. Ways of Thinking about Health. (2 cr [max 4 cr]; S-N only. Prereq-Enrolled CLSP or QT student or #; instructor permission required for second enrollment in course)

CSPH 5115. Cultural Knowledge, Health, and Contemporary Cultural Communities. (3 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #)
How personal cultural experience affects one’s view of health, illness, and healing and one’s professional practice. Wisdom of cultural communities. Cultural construct underpinning the medical system. Role of culture in interaction between practitioner and patient. Reconnecting to cultural heritage in healing.

For definitions of course numbers, abbreviations, and symbols, see page 3. 27
CSPH 5211. Whole Systems Healing: Health and the Environment. (2 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Selected interfaces between human health and the environment. Using complexity theory as a theoretical framework, students use phenomenological methodologies to analyze and describe the interrelated dynamics of human and natural systems. Case studies. Develop strategies to optimize the healthy functioning of human/environmental systems.

CSPH 5201. Spirituality and Resilience. (2 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Links between resilience, spirituality, and selected interfaces of the fundamental oneness of body, brain, mind, and universe. Mind-body interactions in health. “Hard problem” of consciousness in brain science. Emergence of compassion, wisdom, and healing in non-discursive awareness.

CSPH 5211. Introduction to Traditional Chinese Medicine. (2 cr; A-F or Aud. Prereq-Jr or sr or grad student or #) Philosophical roots of Shamanism, Confucianism, Taoism, and Buddhism. Influence of these philosophies on Chinese medicine. Evolution of concepts of the two energies, yin and yang. Principles of disease. Development of herbal medicine, Tui Na, Qi Gong, acupuncture, moxibustion. Traditional Chinese medicine etiology of disease, physiology, diagnosis, therapy, disease prevention, ethics, psychology, cosmology.


CSPH 5315. Traditional Tibetan Medicine: Ethics, Spirituality, and Healing. (2 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Ethics, spirituality, and healing from perspective of traditional Tibetan medicine. Belief that illness results from imbalance and that treating illness requires correcting underlying imbalance. How to apply these principles, integrate them into clinical practice, and consult with a traditional Tibetan doctor.

CSPH 5317. Yoga: Ethics, Spirituality, and Healing. (2 cr; Stdnt Opt.) Students test claim that systematic yoga practice leads to optimal health. Yoga’s philosophy, scientific evidence, practical application. Students propose research-based programs for integrating yoga into personal/professional life.

CSPH 5318. Tibetan Medicine, Ayurveda, and Yoga in India. (4 cr Prereq-[5315, 5317] or #) Students study with expert practitioners in India. Using critical thinking, philosophical knowledge, cultural practices, scientific evidence, and research-based programs to integrate these traditions into personal/professional life.

CSPH 5321. Public Health Priorities in the Developing World. (2 cr; Stdnt Opt. [S]INMD 7567, Prereq-Jr or sr or grad student or #) Primary public health problems, priorities, and interventions in developing countries. Issues related to culture/indigenous health systems and of concern to health care providers who work abroad or with refugee communities in countries of resettlement.

CSPH 5325. Latinos: Culture and Health. (3 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) How Latino world view influences health and compares with U.S. perspective. Differences in perception of time, family involvement, community “belonging,” gender roles, and communication styles. Folkloric beliefs. Specific issues such as AIDS, pregnancy, women’s issues, pharmacy, and nutrition. Health issues of workers. Cultural competency.

CSPH 5331. Foundations of Shamanism and Shamanic Healing. (2 cr; Sr or S-N Aud. Prereq-Jr or sr or grad student or #) 3-day retreat. Shamanic philosophies, ritual etiquette, core beliefs common to all shamanic healing practices. Cross-cultural healing beliefs/practices, unique psychology for understanding them, their use with contemporary healing practices and for personal growth.

CSPH 5332. Global Healing Traditions: Amazonia Plant Spirit Medicine. (2 cr; Sr or S-N Aud. Prereq-Jr or sr or grad student or #) 3-day retreat. Amazonian philosophies, ritual etiquette, core beliefs common to all shamanic healing practices. Cross-cultural healing beliefs/practices, unique psychology for understanding them, their use with contemporary healing practices and for personal growth.

CSPH 5341. Overview of Indigenous Hawaiian Healing. (2 cr; Stdnt Opt.) Traditional Hawaiian healing, ho’olomilomi (massaging), la‘au lapa‘au (herbal medicine) and ho‘oponopono (conflict resolution). Hawaiian epistemology, traditions, and cultural values compared with western. The science of traditional ecological knowledge for healing and self-repair.


CSPH 5401. People, Plants, and Drugs: Introduction to Ethnopharmacology. (3 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Biologically active substances used in traditional cultures. Ethnopharmacology’s past, current, and potential contributions to human knowledge. Concrete examples.

CSPH 5405. Plants in Human Affairs. (4 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Twelve-day, intensive course. Introduction to ethnobotany/ethnopharmacology. Lectures, field trips, presentations by local experts.


CSPH 5421. Botanical Medicines in Complementary Healthcare. (3 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Widely-used botanical medicines from biomedical perspective. Alternative therapeutic systems presented according to bodily systems/processes. Evidence for therapeutic use. Botanical characteristics, traditional uses, chemical properties, dosage, hazards/safety issues, quality control.


CSPH 5431. Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health. (2 cr; Stdnt Opt. Prereq-Jr or sr or grad student) in Health Sciences or #) Principles of nutrition related to metabolic function. Model attempts to reduce chronic disease by looking for underlying causes/triggers and to intervene to restore function and achieve optimal health. Emphasizes importance of nutrition as a component of self-care.


CSPH 5511. Interdisciplinary Palliative Care: An Experiential Course in a Community Setting. (2 cr;Stdnt Opt. Prereq-#) Multidisciplinary student teams partner with interprofessional teams in a hospice team in delivery of care to patients in a variety of settings. Series of seminars employs self-analysis/case studies.

CSPH 5521. Therapeutic Landscapes. (3 cr; Stdnt Opt. Prereq-[Jr or sr or grad student] in [health sciences or therapeutic recreation or horticulture or landscape architecture] or health professional or #) Principles of therapeutic design for specific population requirements. Therapeutic landscape design. Incorporates interdisciplinary interaction between horticulture, landscape architecture, and health science departments.

CSPH 5522. Therapeutic Horticulture. (3 cr; Stdnt Opt. Prereq-[5101 or Hort 5072 or #]) Central elements of therapeutic horticulture in context of multiple healing modalities. Evidence-based history, principles, precepts, and practical application of therapeutic horticulture. Various plant/plant-related modalities from current research findings are related to populations, using therapeutic horticulture as a treatment intervention.

CSPH 5523. Applications in Therapeutic Horticulture. (2 cr) How to develop comprehensive program plans in therapeutic horticulture. Evidence-based principles, facilitation techniques. Documentation, assessment, program development techniques, evaluation. Leadership training, program plan components, book reviews, readings, comprehensive exam.

CSPH 5533. Introduction to Energy Healing. (2 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Healing techniques that use energetic systems in body to enhance bodily ability to heal. Therapeutic touch, healing touch, Reiki, acupuncture, reflexology, magnetism, homeopathy, other modalities. Scientific theories on mechanisms of energetic medicine and ways to measure energy. Students interact with practitioners of energy healing.

CSPH 5535. Reiki Healing. (1 cr; S-N only. Prereq-Jr or sr or grad student or #) History, principles, precepts, and practical application of Reiki energy healing. Alternative energy healing modalities, current research findings. Activation of the Reiki energy, hand positions to perform a treatment. Students provide Reiki treatments, discuss findings.

CSPH 5536. Advanced Reiki Healing: Level II. (1 cr; S-N only. Prereq-5535.) Principles/application of Reiki energy healing. Four levels of healing. Emphasizes healing at spiritual level. Activation of Reiki energy. Symbols that allow for energy transfer through space/time. Using second level Reiki energy for both distance healing and standard Reiki treatment. Students provide Reiki treatments, discuss findings. Current literature, research findings.

CSPH 5541. Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind. (2 cr; Stdnt Opt. Prereq-Sr or grad student or #) Experiential training in the cultivation of happiness, emotional health, and healing for multi-disciplinary professionals. Analyzes/compares eastern and western approaches. How to increase positive emotions and mind states. Meditation, integrative approaches. Case examples.

CSPH 5545. Mind-Body Healing Therapies. (2 cr; A-F or Aud. Prereq-Grad student or Jr or Sr or #) Philosophes/paradigms. Four modalities commonly used in allopathic nursing, medicine and other health professions (biofeedback, hypnosis, imagery/ visualization, meditation). Experiential and group discussion format.

CSPH 5555. Introduction to Body and Movement-Based Therapies. (2 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Theories/approaches of selected somatic therapies, including dance, movement, and body-based therapies. Historic/theoretical perspectives on use of movement, dance, and somatic re-patterning. Demonstrations of techniques. Application of techniques to specific populations/settings.

CSPH 5561. Overview of the Creative Arts in Health and Healing. (2 cr; Stdnt Opt. Prereq-Jr or Sr or grad student) How creative arts therapies are integrated into health care. Art therapy, poetry therapy, dance/movement therapy, music therapy. Guided experiential exercises, discussions, readings, individual learning interventions, lectures.

CSPH 5601. Music, Health and Healing. (2 cr; Stdnt Opt. Prereq-Jr or Sr or grad student or #) Music therapy, music medicine, music psychotherapy. Techniques/rationale related to interventions. Related research.


CSPH 5611. Healthy Humor. (1 cr; Stdnt Opt. Prereq-Jr or Sr or grad student or #) Use of humor to enhance communication, treatment, and relationships with patients. How to create a positive work environment and outlook. Physiologic effects/benefits of humor/laughter. Humor and spirituality. Connection between positive outlook and health.


CSPH 5631. Healing Imagery I. (2 cr; Stdnt Opt. Prereq-Jr or Sr or grad student) How imagery and imagery interventions are implemented for healing and to promote health/well-being. Experience/create imagery interventions. Instructional strategies include experiential, discussions, readings, lecture, and individual learning interventions.


CSPH 5705. Health Coaching Professional Internship. (2 cr; S-N only. Prereq-5701, 5102, 5701, 5702, admitted to postbaccalaureate certificate in complementary therapies/healing practices health coaching track; [5101, 5102, 5704] recommended) 120 hours of health coaching practice. Students work with individual clients in acute/longitudinal encounters, provide wellness teaching, and design a career plan.

CSPH 5711. Optimal Healing Environments. (3 cr; Stdnt Opt. Prereq-Jr or Sr or grad student or #) Development/implementation of optimal healing environments. Evidence base supporting structural, architectural, human, and care processes. Emphasizes identifying models of optimal healing environments and leadership strategies that support diffusion of innovation.

CSPH 8100. Special Topics in Complementary Therapy and Healing Practices. (1-6 cr [max 12 cr]; Stdnt Opt) Critiquing research on complementary therapies (e.g., design, outcome measures, synthesizing research findings for a therapy). Hypothesizing future directions for research on complementary therapies.


CSPH 8101. Independent Study in Complementary Therapies and Healing Practices. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-#) Students propose area for individual study with faculty guidance. Students write proposal, including objectives and work plan. Faculty member directs.
**Chemical Engineering (CHEN)**

**Department of Chemical Engineering and Materials Science**

**College of Science and Engineering**

**CHEN 5531. Electrochemical Engineering and Renewable Energy.** (3 cr; A-F only. [S]MATS 5531. Prereq-[MATS 5011 or #]. [Upper div CSE or grad student])


**CHEN 5535. Survey of Renewable Energy Technologies.** (3 cr; A-F or Aud. Prereq-[Upper div or #], basic knowledge of chemistry, thermodynamics)


**CHEN 5595. Special Topics.** (1-4 cr [max 12 cr]; A-F only. Prereq-[CHEN major upper div])

New or experimental special topics.

**CHEN 5751. Biochemical Engineering.** (3 cr; A-F or Aud. Prereq-[MATS 5005 or 5008], [P]MATS 5006 or [P]MATS 5008, [P]MATS 5102 or [P]MATS 5104)

Chemical engineering principles applied to analysis/design of complex cellular/enzyme processes. Quantitative framework for design of cells for production of proteins, synthesis of antibodies with mammalian cells, or degradation of toxic compounds in contaminated soil.

**CHEN 5753. Biological Transport Processes.** (3 cr; A-F or Aud. SIB/BCH 5311, ME 5381, Prereq-[MATS 5005 or 5008 or equiv])


**CHEN 5771. Colloids and Dispersions.** (3 cr; A-F or Aud. Prereq-[CHEN-Physical chemistry])

Preparation, stability, coagulation kinetics or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures.

**CHEN 8101. Fluid Mechanics I: Change, Deformation, Equations of Flow.** (3 cr; A-F or Aud. Prereq-[CHEN-Chemical engineering grad student or #])


**CHEN 8102. Principles and Applications of Rheology.** (2 cr; A-F or Aud. Prereq-[CHEN-8101])

Deformation and flow of non-Newtonian and viscoelastic fluids, plastic materials, and perfectly elastic solids. Phenomenological and molecular interpretation of rheology of elastomers, polymer melts and polymer solutions, application of rheology to polymer processing.

**CHEN 8103. Fluid Mechanics III: Porous Media.** (3 cr; A-F or Aud. [S]CHEN 5103, MATS 8219.

Prereq-[Chemical engineering grad student or #]


**CHEN 8104. Coating Process Fundamentals.** (2 cr; A-F or Aud. Prereq-[Chemical engineering grad major or #]


**CHEN 8112. Rheology Laboratory Project.** (1 cr; A-F or Aud. Prereq-[MATS 8102 or MATS 8702 or MATS 8101 or [P]B8102])


**CHEN 8115. Electron Microscopy of Soft Matter.** (2 cr; A-F or Aud. Prereq-[Chemical engineering or materials science/engineering grad major or #]

Operation principles of transmission electron microscope (TEM) and scanning electron microscope (SEM). How these instruments are applied in study of soft materials (e.g., liquid, semi-liquid material systems). Unique specimen preparation techniques, low image contrast, electron-beam radiation-damage, and limited signal-to-noise ratio. TEM/SEM digital imaging.

**CHEN 8201. Applied Mathematics I: Linear Analysis.** (3 cr; A-F or Aud. [S]CHEN 4701.

Prereq-[Chemical engineering grad student or #]

Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/numerical analysis based on linear operator theory.

**CHEN 8202. Applied Mathematics II: Nonlinear Analysis.** (2 cr; A-F or Aud. Prereq-[Grad-level course in linear analysis, chemical engineering grad major or #]


**CHEN 8211. Physical Chemistry of Polymers.** (4 cr; Stdnt Opt. [S]CHEN 8211, MATS 8211. Prereq-[Undergrad physical chem or #]


**CHEN 8221. Synthetic Polymer Chemistry.** (4 cr; A-F or Aud. [S]CHEN 8221, MATS 8221, MATS 8221, MATS 4221. Prereq-[Undergrad organic chemistry course, undergrad physical chemistry course or #]

Condensation reactions, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

**CHEN 8301. Physical Rate Processes I: Transport.** (3 cr; A-F or Aud)


**CHEN 8302. Physical Rate Processes II: Mass Transfer.** (3 cr; A-F or Aud. Prereq-[Chemical engineering grad student or #]

Applications of mass transfer. Membranes, including gas separation and reverse osmosis. Controlled drug release. Dispersion, including examples of pollution modeling. Adsorption/chromatography. Coupled heat/mass transfer, including cooling towers. Double-diffusive effects.

**CHEN 8333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

**CHEN 8401. Physical and Chemical Thermodynamics.** (3 cr; A-F or Aud. Prereq-[Undergraduate [engineering course or chemistry course in thermodynamics], Chemical engineering grad student or #]

Principles of classical thermodynamics. Introduction to nonequilibrium thermodynamics, with applications in chemical engineering and materials science.

**CHEN 8402. Statistical Thermodynamics and Kinetics.** (3 cr; A-F or Aud. Prereq-[Chemical engineering grad student or #]

Introduction to statistical mechanical description of equilibrium and non-equilibrium properties of matter. Emphasizes fluids, classical and statistical mechanics.

**CHEN 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**CHEN 8501. Chemical Rate Processes: Analysis of Chemical Reactors.** (3 cr; A-F or Aud. Prereq-[Course in chemical reactor engineering, chemical engineering grad student or #]


**CHEN 8502. Process Control.** (3 cr; A-F or Aud. Prereq-[Chemical engineering grad major or #]

For linear systems: stability, controllability, observability, pole-placement via state feedback state observers, output feedback, and robustness of control systems. For nonlinear systems: solution properties, stability analysis, singular perturbations, feedback linearization via state feedback, and direct synthesis via output feedback.

**CHEN 8503. Chemical Rate Processes: Homogeneous Reactions.** (3 cr; A-F or Aud. Prereq-[Chemical engineering grad student or #]

Description/characterization of chemically reacting systems. Theories of elementary reactions. Experimental methods for investigating elementary reactions. Applications of chemical kinetics to complex reactions, such as combustion, flames, and the atmosphere.

**CHEN 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**CHEN 8752. Quantitative Biology for Engineers.** (3 cr; A-F or Aud. [S]CHEN 5752. Prereq-[Chemical engineering grad student or #]

CHEM 8754. Systems Analysis of Biological Processes. (3 cr; Stdnt Opt. Prereq-Grad student in life sciences or chemical/physical sciences or engineering; CHE students must take A/F) Relating biological processes at molecular level to physiological level of cells/organisms/populations. Methodology for analyzing data. Quantification of molecular interplays.

CHEM 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CHEM 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Chemistry (CHEM)
Department of Chemistry
College of Science and Engineering
CHEM 5210. Materials Characterization. (4 cr; Stdnt Opt. Prereq-grad student or #) Modern tools/techniques for both bulk- and thin-film characterization. Topics may include ion-solid interactions, Rutherford back scattering, secondary ion mass spectrometry, solid-state NMR, x-ray photoelectron spectroscopy, small-angle x-ray/neutron scattering, transmission/scanning electron/probe microscopy, near-field scanning optical microscopy, porosimetry, adsorption techniques, and ellipsometry.

CHEM 5245. Introduction to Drug Design. (3 cr; A-F or Aud. [S]MEDC 5245, PHAR 6245. Prereq 2502 or equiv) Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design and mechanism of action drugs.


CHEM 5755. X-Ray Crystallography. (4 cr; A-F or Aud. Prereq-Chem grad student or #) Essentials of crystallography as applied to modern, single crystal X-ray diffraction methods. Practical training in use of instrumentation in X-ray crystallography facility in Department of Chemistry. Date collection, correction/refinement, structure solutions, generation of publication materials, use of Cambridge Crystallographic Structure Database.


CHEM 8025. Introduction to Graduate Research. (1-2 cr [max 2 cr]; A-F or Aud. Prereq-Grad student in chem) New areas of chemistry, hands-on exposure to graduate research. Students rotate through up to two different labs for seven weeks. Labs are run by chemistry graduate faculty members.

CHEM 8066. Professional Conduct of Chemical Research. (1 cr; S-N or Aud. Prereq-Chem grad student) Builds sensitivity to ethical issues in chemical research. Readings/case studies, small-group/large-group discussion, summarizing comments from instructors/guests/panels having special expertise. Weekly seminar.

CHEM 8081. M.S. Plan B Project I. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-grad chem major) Satisfies project requirement for Plan B master’s degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional.

CHEM 8082. M.S. Plan B Project II. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-grad chem major) Satisfies project requirements for Plan B master’s degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional.


CHEM 8152. Analytical Spectroscopy. (4 cr; Stdnt Opt. Prereq-grad chem major or #) Survey of analytical spectroscopic methods. Design/application of spectroscopic instruments, including signal generation, acquisition, and interpretation. May include nuclear magnetic resonance, electron paramagnetic resonance, infrared and ultraviolet/visible spectroscopy, and mass spectrometry.

CHEM 8153. Extracting Signal From Noise. (5 cr; A-F or Aud. Prereq-[4101 or equiv], differential equations course) Use of analog/digital electronics and computational methods in experiments. Passive circuits, operational amplifiers, filters, oscillators and Laplace transform techniques in analysis, digital computer use for data acquisition/control, statistics, experimental design. Introduction to chemometrics, Fourier analysis, convolution/deconvolution, curve fitting.

CHEM 8155. Advanced Electroanalytical Chemistry. (4 cr; Stdnt Opt) Thermodynamics, mechanistic aspects of electroanalysis, electric double layer, mass transfer by diffusion/migration. Ion-selective potentiometry, chronomperometry, chronocoulometry, cyclic voltammetry, pulse voltammetry, ion-transfer voltammetry, impedance spectroscopy, bioelectrocatalysis, rotating disk electrodes, microelectrodes, chemically modified electrodes. Scanning electrochemical microscopy. EC-STM, quartz crystal microbalance.

Courses

CHEM 8159. Nuclear Magnetic Resonance Spectroscopy. (4 cr; Stdnt Opt. Prereq-Sem of organic chem) Detailed understanding of relaxation processes, chemical exchange, quadrupolar effects, NMR, NMR hardware, and solid state NMR. NMR imaging and Pulsed Field Gradient (PFG) NMR are discussed.

CHEM 8180. Special Topics in Analytical Chemistry. (2-4 cr [max 4 cr]; Stdnt Opt. Prereq-Grad chem major or #) Topics (and availability) vary by year depending on instructor and development of the field.


CHEM 8280. Special Topics in Materials Chemistry. (2-4 cr [max 4 cr]; Stdnt Opt. Prereq-Grad chem major or #) Topics (and availability) vary by year depending on instructor and development of the field.

CHEM 8311. Introduction to Chemical Biology. (4 cr; Stdnt Opt. Prereq-2302 or equiv) Chemistry of amino acids, peptides, proteins, lipids, carbohydrates, and nucleic acids. Structure, nomenclature, synthesis, and reactivity. Overview of techniques used to characterize these biomolecules.

CHEM 8411. Chemical Biology of Enzymes. (4 cr; Stdnt Opt. Prereq-2302 or equiv) Enzyme classification with representative examples from current literature. Strategies used to decipher enzyme mechanisms. Chemical approaches for control of enzyme catalysis.

CHEM 8433. Nucleic Acids. (4 cr; Stdnt Opt. Prereq-2302 or equiv) Chemistry and biology of nucleic acids: structure, thermodynamics, reactivity, DNA repair, chemical oligonucleotide synthesis, antisense approaches, ribozymes, overview of techniques used in nucleic acid research, interactions with small molecules and proteins.

CHEM 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CHEM 8480. Special Topics in Biological Chemistry. (2-4 cr [max 4 cr]; Stdnt Opt. Prereq-Grad chem major or #) Topics (and availability) vary by year, depending on instructor and development of the field.


CHEM 8580. Special Topics in Physical Chemistry. (2-4 cr [max 4 cr]; Stdnt Opt. Prereq-Grad chem major or #) Topics (and availability) vary depending on instructor and development of the field.

CHEM 8601. Seminar: Modern Problems in Chemistry. (1 cr; S-N or Aud. Prereq-grad chem major or #) Weekly seminar series on modern chemical topics.

CHEM 8602. Seminar: Presentation: Modern Problems in Chemistry. (0 cr; A-F or Aud. Prereq-grad chem major or #) Weekly seminar series on modern chemical topics presented by students.

CHEM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)


CHEM 8715. Physical Inorganic Chemistry. (4 cr; Stdnt Opt. Prereq-4701 or equiv, grad chem major or #) Physical methods and concepts applied to inorganic and organometallic systems, including many of the following methods: NMR, IR, UV-VIS, ESR, MF, X-ray diffraction.

CHEM 8725. Organometallic Chemistry. (4 cr; Stdnt Opt. Prereq-4701 or equiv, grad chem major or #) Synthesis, reactions, structures, and other important properties of main group and transition metal organometallic compounds; treatment in terms of modern electronic and structural theory; emphasis on their use as stoichiometric and homogeneous catalytic reagents in organic and inorganic systems.

CHEM 8735. Bioinorganic Chemistry. (4 cr; Stdnt Opt. Prereq-4701 or equiv, grad chem major or #) Survey of role of metal ions in biology; emphasizes structure, function, and spectroscopy of metalloproteins and their synthetic analogs.

CHEM 8745. Advanced Inorganic Chemistry. (4 cr; Stdnt Opt. Prereq-8715, grad chem major or #) Survey of topics in main group and transition metal chemistry; emphasizes synthesis, structure, physical properties, and chemical reactivity.

CHEM 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CHEM 8780. Special Topics in Inorganic Chemistry. (2-4 cr [max 4 cr]; Stdnt Opt. Prereq-Grad chem major or #) Topics (and availability) vary depending on instructor and development of the field.

CHEM 8880. Special Topics in Chemistry. (2-4 cr [max 4 cr]; Stdnt Opt. Prereq-Grad chem major or #) Topics (and availability) vary depending on instructor and development of the field.

CHIC 5993. Directed Studies. (1-3 cr; max 18 cr.; A-F only. Prereq-Upper Div.) Guided individual reading, research, and study for completion of the requirements for a senior paper or honors thesis.

Child and Adolescent Psychiatry (CAPY) Department of Psychiatry


CAPY 5671. Suicide Prevention: Examining What Interventions May Alter Suicide Risk. (1 cr, Stdnt Opt) Suicide is examined from a range of perspectives by understanding death, sex, development, and culture. Suicide prevention techniques are discussed and controversies in the field will be highlighted. Group participation is encouraged.


CAPY 5673. Prevention Programming: Learning the Skills to Implement a Preventive Intervention. (1 cr, Stdnt Opt) Early intervention to reduce antisocial and risk taking behaviors (e.g., suicide, unsafe sex) in teenagers. “Early Risers Skills for Success” program as model for teaching techniques of early prevention. Social-emotional skill training, academic enrichment, monitoring/mentoring, behavioral management techniques group settings, techniques to support/educate parents of a risk children.


Child Psychology (CPSY) Department of Child Development College of Education and Human Development

CPSY 5187. Master's Paper in Early Childhood Education. (2 cr; max 3 cr; S-N only. Prereq-Students must have satisfied all licensure requirements and student teaching) Students choose an ECE topic/write a paper using primarily empirical research data/provide rationale for chosen topic, interpret, analyze, and critique the research studies, draw conclusions, describe how research may be applied to field, provide suggestions for future research.

CPSY 5251. Social and Philosophical Foundations of Early Childhood Education. (2 cr; A-F only. Prereq-Student in ECE or ECSE) Surveys imagery, history, philosophy, and psychology of early childhood education. Trends in early education, including diversity, special needs, legislation, public policy, and educationally appropriate practice.

CPSY 5252. Facilitating Social and Emotional Learning in Early Childhood Education. (1 cr; A-F only. Prereq-Student in ECE or ECSE) Current theoretical/empirical literature and developmental knowledge as basis for planning, implementing, and evaluating social/emotional growth/development of young children. For students obtaining ECE licensure.

CPSY 5253. Facilitating Cognitive and Language Learning in Early Childhood Education. (1 cr; A-F only. Prereq-Student in ECE or ECSE) Overview of cognitive and language characteristics of children ages 0-8 years and of how teachers can plan curriculum to facilitate children’s development in these areas.

CPSY 5254. Facilitating Creative and Motor Learning in Early Childhood Education. (1 cr; A-F only. Prereq-Student in ECE or ECSE) Unique/diverse qualities and characteristics children possess while progressing through universal sequence of physical growth/development and creative development. Students engage in inquiry, research/planning, and reflection as they complete the action-oriented and applied assignments with small groups of children.

CPSY 5381. Student Teaching in Early Childhood Education. (1-6 cr [max 6 cr], S-N or Aud. Prereq-MEd student in early childhood ed or early childhood special ed) Application of theory/research relating to teaching preschool children. For individuals obtaining ECE licensure.

CPSY 5413. Early Childhood and Public Policy. (3 cr; Stdnt Opt) State, federal, and international policies and legislative activity touching first five years of a child’s life. Family, community, and institutional roles in promoting children’s social, cognitive, and emotional development. Issues related to health, mental health, poverty, developmental delays, and special needs.

CPSY 5414. Individualized Learning Experience in Early Childhood and Public Policy. (1-5 cr; max 3 cr) Prereq-Upper Div. Prereq-Early Childhood Policy Certificate student, # Individualized, applied learning experience. Focuses on early childhood policy development, research, or evaluation. Students attend to early childhood policy lecture series and participate in small discussion and follow-up activities.
**CPSY 5501. Foundations in Infant and Early Childhood Mental Health I.** (3 cr; A-F only. Prereq-Baccalaureate degree in an early-childhood-related field from an accredited U.S. institution or documented equiv., experience in early childhood [research or practice]) History, theory, research, concepts, and issues in infant mental health. Issues pertinent to difficulties in development. Readings, visual material. Expert guest lectures. 


**CPSY 5506. Infant Observation Seminar I.** (1 cr Prereq-5501) How an infant develops in context of family relationships over a 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations. 

**CPSY 5508. Infant Observation Seminar II.** (1 cr Prereq-5506) How an infant develops in context of family relationships over a 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations. 

**CPSY 5511. Infant Observation Seminar III.** (1 cr Prereq-5508) How an infant develops in context of family relationships over 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations. 

**CPSY 5513. Assessment in Infant and Early Childhood Mental Health: DC O-3R.** (2 cr; Stdnt Opt. Prereq-Baccalaureate degree in early-childhood-related field from accredited U.S. institution or documented equiv., [experience in early childhood research or practice]) Infant Mental Health diagnostic manual DC 0-3R. Assessment using the manual. Lectures, discussions, cooperative learning, class exercises, case studies. 

**CPSY 5515. Assessment in Infant and Early Childhood Mental Health: NCAST.** (2 cr; S-N only. Prereq-Baccalaureate degree in early-childhood-related field from accredited U.S. institution or documented equiv., [experience in early childhood research or practice]) Achieving reliability in two observational measures of parent-child interaction: (1) nursing child assessment feeding (2) teaching Sscales. Discussion, lecture, videotapes, listening/observation tasks. 

**CPSY 5518. Prevention and Intervention in Infant and Early Childhood Mental Health I.** (3 cr; A-F only. Prereq-5501, 5503, 5505, 5506, 5508) Students design prevention/intervention programs and apply evidence-based strategies in workplace/practicum settings. Readings, in-class reflective practice groups. 

**CPSY 5521. Prevention and Intervention in Infant and Early Childhood Mental Health II.** (3 cr; A-F only. Prereq-5518) Students design prevention/intervention programs and apply evidence-based strategies in workplace/practicum settings. Readings, in-class reflective practice groups. 

**CPSY 5523. Reflective Supervision in Infant and Early Childhood Mental Health: Community-based**. (1 cr; S-N only. Prereq-[P]5518 or [P]5521) Principles/strategies of reflective supervision/consultation. Discussion, final assignment designated by instructor. 

**CPSY 5525. Reflective Supervision in Infant and Early Childhood Mental Health: Clinical.** (1 cr; S-N only. Prereq-[P]5518 or [P]5521) Principles and strategies of reflective supervision/consultation. Discussion, final assignment designated by instructor. 

**CPSY 8301. Developmental Psychology: Cognitive Processes.** (4 cr; Stdnt Opt. Prereq-Doctoral student or #) Perceptual, motor, cognitive and language development, and biological bases of each. Conceptual framework of research issues. 


**CPSY 8311. Landmark Issues and Great Controversies in Child Development.** (2 cr; S-N or Aud. Prereq-CPsy doctoral student or #) History of developmental psychology and child development movement in context of conceptual/theoretical controversies. Presentations by students/instructor. 

**CPSY 8321. Seminar in Teaching Developmental Psychology.** (1 cr; Stdnt Opt. Prereq-CPsy doctoral student or #) Apprentices attend weekly seminar meetings covering all aspects of university teaching. Planning course coverage, teaching techniques, developing learning activities and examinations. Preparation for CPSY 8322. 

**CPSY 8322. Apprenticeship in Teaching Developmental Psychology.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-Child psychology doctoral student) Co-instruct a section of a CPSY undergraduate course. Plan syllabus, prepare/lecture lectures, devise active learning activities, prepare exams/assignments, and grade. Meet with apprentice/supervisor to discuss teaching progress/issues. 

**CPSY 8333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) 

**CPSY 8360. Special Topics in Developmental Psychology.** (1-3 cr [max 21 cr]; Stdnt Opt. Prereq-Doctoral student) Intensive study in specialized areas of developmental psychology. Topics/credits vary. 

**CPSY 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) 

**CPSY 8606. Advanced Developmental Psychopathology.** (5 cr; Stdnt Opt. Prereq-Doctoral student or #) Alternative formulation of childhood disorders, emphasizing competency training rather than medical nosology. 

**CPSY 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) 

**CPSY 8777. Thesis Credits: Master’s.** (1-18 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required) 

**CPSY 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required) 


**CPSY 8993. Directed Study in Child Psychology.** (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-Doctoral student or #) 

**CPSY 8994. Research Problems in Child Psychology.** (1-6 cr [max 2 cr]; Stdnt Opt. Prereq-Doctoral student or #) Individual empirical investigation. 

**CPSY 8996. Directed Field Experiences in Child Psychology.** (1-6 cr [max 6 cr]; S-N or Aud. Prereq-Doctoral student, #) Emphasizes field experiences focusing on intellectual and/or social development of children as individuals or members of groups; may include interactions with children in natural settings, or research on applied topics or with atypical populations. 

**Chinese (CHN) Department of Asian Languages and Literatures College of Liberal Arts CHN 5011. Research Methods.** (4 cr; Stdnt Opt. Prereq-5332 or 5112) Introduction to the sources and approaches of research in language and literature. 

**CHN 5040. Readings in Chinese Texts.** (5 cr; [max 12 cr] A-F or Aud. Prereq-4042 or equiv or #) Students read authentic materials of various types to increase reading/speaking ability. Topics specified in Class Schedule. 

**CHN 5101. Chinese Survival Skills.** (1 cr; S-N or Aud. Prereq-Enrolled in U of M law school) For students about to depart for China who have had no formal Chinese language instruction. 


**CHN 5120. Topics in Chinese Linguistics.** (4 cr; Stdnt Opt. Prereq-4121 or 4125) Studies of the structure and change in the Chinese language. 

**CHN 5393. Directed Study.** (1-5 cr [max 18 cr]; Stdnt Opt. Prereq-#, %) [B] Guided individual reading or study. 

**CHN 5333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) 

**CHN 6444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) 

**CHN 8494. Directed Research.** (1-5 cr [max 16 cr]; Stdnt Opt) Individual study/research with guidance of a faculty member. 

**CHN 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
Civil Engineering (CE)

Department of Civil Engineering

College of Science and Engineering

CE 5594. Civil Engineering Research. (1-4 cr; [max 4 cr]; Stdt Opt; Prereq-#) Research or independent study in concrete, structural steel, soils, hydraulics, hydrology/municipal, environmental, or transportation problems. Investigations, reports, tests, designs.

CE 5710. Internet Based Study. (1-5 cr; [max 15 cr]; A-F or Aud; Prereq-Upper div CSE) Internet based teaching with bi-weekly exercises on topic of concern.

CE 5810. Special Topics. (1-4 cr; [max 4 cr]; A-F or Aud; Prereq-#) Topics vary depending on faculty and student interests.

CE 5211. Traffic Engineering. (3 cr; Stdt Opt; Prereq-5201; 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 5214. Transportation Systems Analysis. (4 cr; Stdt Opt; Prereq-5201) Systems approach, its application to transportation engineering/planning. Prediction of flows and level of service. Transportation functions, cost optimization, utility theory, demand modeling, transportation network analysis, equilibrium assignment, decision analysis, multidimensional evaluation of transportation projects.


CE 5321. Experimental Geomechanics. (3 cr; A-F or Aud; Prereq-Upper div CSE or grad, 4301, Geol 4501 or #) Machine stiffness, closed-loop testing. Small-strain theory. Measurement of deformation: strain gages, LVDTs, accelerometers, and associated circuits. Direct and indirect testing. Material behavior: experiments on anisotropic, damaged, and fluid-filled solids.

CE 5341. Wave Methods for Nondestructive Testing. (4 cr; A-F or Aud; Prereq-[AEM 2021, AEM 3031] or #) Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical sites). Imaging technologies based on propagation of elastic waves such as ultrasonic/resonant frequency methods, seismic surveys, and acoustic emission monitoring. Lecture, lab.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

CE 8214. Transportation Economics. (4 cr; A-F or Aud) Application of microeconomic theory to transportation. Demand/demand estimation, cost/cost estimation, pricing/insurance, regulation/deregulation. Urban/intercity passenger transportation, freight transportation, freight transportation management. 

CE 8215. Transportation Data Analysis. (3 cr; Stdn Opt. Prereq-[8210 or 8211], [STAT 5021 or equiv]) Maximum likelihood methods for generalized linear models with logit/probit models. Linear regression as special cases. Applications to gap acceptance, discrete choice, speed/headway distributions, accident modeling. Introduction to Bayesian inference. 

CE 8216. Urban Traffic Operations. (3 cr; Stdn Opt) Capacity analysis techniques for urban streets, optimal traffic signal timing, coordination, real time control. Traffic signal hardware, including detectors/controllers. Operational techniques for traffic management. Use of computer program packages in traffic engineering practice. Freeway operations/control. 


CE 8231. Advanced Pavement Engineering. (3 cr, Stdn Opt. Prereq-4231 or #) Advanced concepts in pavement analysis and design; computation of stresses and strains in flexible and rigid pavement systems; review of Boussinesq theory, Burmester model, and Westergaard model; load transfer in rigid pavements; temperature induced stresses; mechanics of drainage. 

CE 8233. Advanced Bituminous Materials Characterization. (3 cr, Stdn Opt. Prereq-[5402, grad student] or #) Applications of viscoelasticity, rheology, elastoplasticity, and fracture mechanics to bituminous materials characterization. Lectures, discussions of advanced research reading assignments, laboratory assignments. 

CE 8300. Seminar: Geomechanics. (1-3 cr [max 4 cr]; S-N or Aud. [S]GEOE 8300) Presentations on various topics. 


CE 8311. Advanced Rock Mechanics. (3 cr; A-F or Aud. [S]GEOE 8311) Prereq-CSE grad student, 4311 or GeoE 4311 or #) Stress transformations; principal stresses and directions; fracture and behavior of rock joints; stability of frictional sliding. Elastic waves; acoustic emission and seismic measurements. Fragmentation and rock breakage. 


CE 8335. FTE: Master’s. (1 cr) (N)Adviser, Prereq-Master’s student, adviser and DGS present) 


CE 8337. Boundary Element Methods II. (3 cr; A-F or Aud. [S]GEOE 8337, Prereq-8336, GeoE 8336 or #) Transient and nonlinear problems. 


CE 8351. Advanced Groundwater Mechanics I. (3 cr; A-F or Aud. Prereq-4351 or GeoE 4351) CSE grad student or #) Solute transport; shallow flow in leaky aquifers; complex variable methods in groundwater flow. Analytic element method: potentials for line sinks, line doublets, line dipoles, area sinks, and special analytic elements; singular Cauchy integrals; analytic elements in domains with closed boundaries. 

CE 8352. Advanced Groundwater Mechanics II. (3 cr; A-F or Aud. Prereq-4352, GeoE 4352) CSE grad student or #) Applying complex methods, including conformal mapping, in groundwater mechanics; solving problems with free boundaries using the hodograph method; drainage in aquifers with free boundaries; superposition of solutions with drains; singular Cauchy integrals; boundary elements. 

CE 8361. Engineering Model Fitting. (3 cr; A-F or Aud. Prereq-CSE grad student or #) Parameter estimation and model fitting for civil and geological engineering. Formulating engineering model fitting problems; comparing and selecting various fit criteria; implementing numerical algorithms; analyzing and interpreting results using both statistical and qualitative tools; designing future measurement plans. 

CE 8400. Seminar: Structures. (1 cr [max 3 cr]; S-N or Aud) 


CE 8412. Shell Structures. (3 cr; A-F or Aud. Prereq-CSE grad or #) Static analysis of thin elastic shells based on Love’s postulates. Membrane and bending theories. Thermal stresses in cylinders. Buckling of shells of revolution. Offered alternate years. 


CE 8422. Earthquake Engineering. (3 cr; A-F or Aud. Prereq-8421 or #) Introduction to earthquake engineering; response spectra; energy absorption capacity of structures; estimation of damping; earthquake resistant design; seismic design codes; base isolation; soil-structure interaction. Blast resistant design. Wind effects on structures. 

CE 8431. Structural Stability. (3 cr; A-F or Aud. Prereq-CSE grad student or #) Classification of discrete/continuous conservative/nonconservative systems. Buckling analysis of, e.g., structural members, frameworks, and plates by classical/numerical methods. Offered alternate years. 

CE 8432. Analysis of Thin-Walled Members. (3 cr; A-F or Aud. Prereq-5411 or #; offered alt yrs) Analysis of thin-walled structural members based on Vlasov theory and its modifications. Members with open and closed cross sections. Second-order effects and buckling. Influence of inelastic material behavior on buckling. 

CE 8441. Ductile Behavior of Steel Structures. (3 cr; A-F or Aud. Prereq-4411 or equiv) Advanced topics in behavior of steel structures; Modeling techniques for material/geometric nonlinearity. Plastic analysis and plasticity of continuum bodies. Computer methods. Seismic design, code provisions.
CE 8442. Nonlinear Analysis of Structural Systems. (3 cr; A-F or Aud. Prereq-4411, 4413 or #; offered all yrs)
Advanced theory and computational techniques for analyzing complex structural building systems. Using comprehensive geometric and material nonlinear analysis for designing steel and composite structures.

CE 8443. Fracture of Materials and Structures. (3 cr; A-F or Aud. Prereq-4401 or #)

CE 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CE 8451. Behavior of Reinforced Concrete Structures. (3 cr; A-F or Aud. Prereq-4412 or #)

CE 8461. Structural Reliability. (3 cr; A-F or Aud. Prereq-[4412, 4413] or #)

CE 8490. Special Topics. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#)
Topics vary depending on faculty and student interests.

CE 8500. Environmental Seminar. (1-3 cr; A-F or Aud. Prereq-#)
Broad coverage of topics in environmental engineering and science. Students consist primarily of graduate students in these areas, but presentations may also be given by University faculty and guest speakers.

CE 8501. Environmental Fluid Mechanics I. (4 cr; A-F or Aud. Prereq-3502 or equiv or #)
Basic laws of mass, energy, and momentum transport in environmental fluid flow. Exact and approximate solutions for viscous flow. Irrotational flow; gravity waves. Simultaneous and inspectional analysis. Laminar boundary layers and slender flows. Application to engineering and environmental problems.

CE 8502. Environmental Fluid Mechanics II. (4 cr; A-F or Aud. Prereq-8501 or #)
Reynolds equations. Developed and developing turbulent boundary layers and slender flows, and their interaction with inviscid flow. Jets, plumes, wakes and shear layers. Statistical description of turbulence; data analysis.

CE 8503. Environmental Mass Transport. (4 cr; A-F or Aud. Prereq-3502, 3501 or equiv or #)
Principles of intraphase and interfacial chemical transport and fate in the environment, specifically the processes of diffusion, dispersion, and convection. Application to surface water and atmospheric mixing, dispersion in groundwater, and transport between these media.

CE 8504. Theory of Unit Operations. (4 cr; A-F or Aud. Prereq-5541)
Theoretical basis, design, operation of chemical/physical processes used in treating/controlling water quality. Membrane separation, coagulation, sedimentation, flotation, gas transfer, gas transfer, coagulation, flocculation, membrane processes, disinfection.

CE 8505. Biological Processes. (5 cr; A-F or Aud. Prereq-2502, 4501 or #)
Theoretical principles underlying chemical and biological wastewater treatment processes, including aerobic and anaerobic treatment for organic carbon and nutrient removal. Mathematical models of microbial growth kinetics and mass transport in suspended, grown and attached film applications are developed.

CE 8506. Stochastic Hydrology. (4 cr; A-F or Aud. Prereq-Stat 3021 or equiv or #)
Analysis and synthesis of hydrologic series and systems; derived distributions; uncertainty and risk analysis; flood frequency analysis; multivariate time series analysis; correlation and spectral analysis; series of long-range dependence; linear estimation; geostatistics; sampling networks; hydrologic forecasting.

CE 8507. Advanced Methods in Hydrology. (4 cr; A-F or Aud. Prereq-8506)
Notions of scale-invariance, scaling, and multiscaling in geophysical processes; methods of multiscaling analysis; wavelet transforms; time-frequency analysis and fractal analysis. Applications in atmospheric, hydrologic, and geomorphologic processes.

CE 8508. Ecological Fluid Mechanics. (4 cr; A-F or Aud. Prereq-3502 or equiv)
Fluid mechanics of microbiological processes in lakes, rivers, and wetlands. Small-scale fluid motion, nutrient uptake, growth kinetics, ecosystem metabolism, scaling, lab/field microstructure measurements.

CE 8511. Mechanics of Sediment Transport. (3 cr; A-F or Aud. [S]ESCI 8511. Prereq-3502 and 4501 or #)

CE 8521. The Atmospheric Boundary Layer. (4 cr; A-F or Aud. Prereq-CSE or COAFES grad student or #)
Land-atmosphere interactions and turbulent transport in the atmospheric boundary layer (ABL), the lowest part of the atmosphere. ABL development and dynamics. Turbulence, surface energy balance, spectral analysis, similarity theory. Flow over homogeneous and heterogeneous surfaces. Atmospheric stability, measurement, simulation, turbulent transport of fluxes.

CE 8541. Aquatic Chemistry. (3 cr; A-F or Aud. Prereq-4541 or #)
Advanced course on water chemistry; physical chemical principles and geochemical processes controlling the chemical composition of natural waters, soil- and sediment-water interactions. Emphasizes behavior of inorganic contaminants in natural waters and engineered systems and dissolved natural organic matter.

CE 8542. Chemistry of Organic Pollutants in Environmental Systems. (3 cr; A-F or Aud. Prereq-[4541, 5541] or #)
Structural characteristics and physico-chemical properties of organic contaminants in aquatic systems. Emphasizes PCBs, PAHs, dioxins, insecticides, herbicides, and chlorinated solvents. Factors affecting their transport/transformation. Structure- and property-activity relationships, their use in predicting organic chemical behavior.

CE 8551. Environmental Microbiology: Molecular Theory and Methods. (4 cr; A-F or Aud)
Introduction to microbial genetics and molecular phyllogeny. Application of nucleic-acid techniques in environmental microbiology and microbial ecology.

CE 8552. Groundwater Microbiology: Laboratory. (4 cr; A-F or Aud. Prereq-grad CE major or #; exposure to basic environ eng and microbiol)
Subsurface microbial ecology, biogeochemical cycling, metabolic classification of subsurface bacteria, modeling bacterial transport, diagnosis of microbial induced fouling (MIF) events, bioremediation of contaminated aquifers. Lectures and four lab hours per week.

CE 8553. Biofilms. (3 cr; A-F or Aud. Prereq-4551 or #)
Science/engineering concepts to investigate formation/ function of biofilms. Properties/composition of biofilms, transport/transformation processes in biofilms, communication in biofilms, mathematical modeling. Applications in environmental engineering.

CE 8561. Analysis and Modeling of Aquatic Environments I. (3 cr; A-F or Aud. Prereq-One sem grad work or #)

CE 8562. Analysis and Modeling of Aquatic Environments II. (3 cr [max 6 cr]; Sdtl Opt. Prereq-One sem grad work or #)
Models for transport/transformation of pollutants, nutrients, particulates, ecosystems, etc., from recently completed theses, articles, or research projects. Students review assigned recent papers, make presentations, and analyze a topic of their choice.

CE 8563. Industrial Waste Treatment. (3 cr; A-F or Aud. Prereq-3501, 4501, 4502, or equiv or #)
Introduction to industrial waste treatment. Individual industries, emphasizing constituents of the waste-stream and how best to recycle, recover, or reduce wastes. Cost concerns and regulations. Field trips to various industries to gain firsthand knowledge of processes involved in treatment.

CE 8571. Hydraulic Measurements. (3 cr; A-F or Aud. Prereq-3502 or #)
Lab and field methods and instruments for measuring hydraulic pressure, velocity, and discharge.

CE 8572. Computational Environmental Fluid Dynamics. (4 cr; A-F or Aud. Prereq-grad student in CSE or COAFES or #)
Finite difference methods, their application to solution of one-/two-dimensional problems in environmental fluid dynamics. Stability, convergence, consistency, and accuracy of numerical schemes. Navier-Stokes equations, their physical meaning, and their numerical solution. Turbulence modeling: RANS and LES.

CE 8581. Research and Professional Ethics in Water Resources and Environmental Science. (4 cr; S-N or Aud. [S]WRSc 8581. Prereq-[Environmental engineering or water resources science] grad student or #)
Ethics of water resources science and environmental engineering research/practice. Societal responsibility, plagiarism, recording-keeping, authorship, confidentiality, intellectual property, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester.

CE 8601. Introduction to Stream Restoration. (3 cr; A-F or Aud)
Background material required to participate in a stream restoration project. How to assess geomorphic, hydrologic, and ecological data at watershed and reach scales to plan a restoration project and evaluate/critique existing stream restoration projects.
Courses

CE 8602. Stream Restoration Practice. (2 cr; S-N only; [S]ESC 8602, EEB 8602. Prereq-8601 or Geo 8601) Field experience, group design project. Students provide a stream restoration context for each others elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site.

CE 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CE 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CE 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Classical and Near Eastern Studies (CNES)

Department of Classical and Near Eastern Studies

College of Liberal Arts

CNES 5013. Introduction to Roman Law. (3 cr; Stdnt Opt. Prereq-Grad student or #) Survey of Roman law from social and historical perspectives. Basic concepts of Roman private law and legal procedure.


CNES 5070. Topics in Ancient Religion. (3 cr [max 18 cr]; Stdnt Opt. Prereq-Grd student or #) Specific aspect of religion in Classical and Near Eastern antiquity, such as healing cults, magic/divination, Gnosticism, or prophecy/authority. Topics specified in Class Schedule.


CNES 5076. Apostle Paul: Life, Letters, and Legacy. (3 cr; Stdnt Opt. [S]CNES 5076) How/what we can know about Paul. What his message was. What he was fighting. How he was later understood by friends/foes.


CNES 5083. Ancient Comedy. (3 cr; Stdnt Opt) Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

CNES 5108. Greek Architecture. (3 cr; Stdnt Opt. [S]ARTH 5108. Prereq-Jr, Clas/ARTH 5008 or #) Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor and Italy.


CNES 5192. Persia and the Ancient Iranian World: Art and Archaeology of Achaemenid Persia and Sassanian Persia. (5 cr; Stdnt Opt) Art, archaeology of ancient Persia and the wider ancient Iranian world from the rise of the Achaemenid empire in 650 BCE to the advent of Islam in the seventh century CE.


CNES 5501. Sexuality and Gender in Ancient Greece and Rome. (3 cr; Stdnt Opt. [S]CNES (max 3601) SWhat we know (or think we know) about ancient Greek/Roman ideas about sexuality and gender roles. Nature of evidence/methodologies by which it is analyzed.


CNES 5713. Introduction to Ugaritic. (3 cr; Stdnt Opt. Prereq-Adv Hebrew, previous study of biblical texts or #) Ugaritic alphabetic cuneiform script, morphology, and syntax. Reading of representative samples of Ugaritic literature. Attention to linguistic and cultural issues and links to biblical and other Ancient Near Eastern texts.

CNES 5794. Introduction to Classical and Near Eastern Studies. (1 cr; S-N or Aud. Prereq-grad major or minor or #) Introduction to core research materials and reference materials in the various disciplines which make up classical studies.

CNES 5796. Classical Texts: Approaches and Methods. (3 cr; Stdnt Opt. Prereq-CNES grad student or #) Methods/approaches, from antiquity to present, for reading/interpreting Greek/Latin literary texts.

CNES 5940. Topics in Classical Literature. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Two literature courses or #) Additional work for graduate credit. Topics specified in Class Schedule. Meets with 3940.

CNES 5950. Aspects of Classical Culture. (1-3 cr; max 12 cr; Stdnt Opt) Topics specified in Class Schedule.

CNES 5993. Directed Studies. (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-#, %, [B]) Guided individual research or study.

CNES 5994. Directed Research. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-#, %, [B]) Guided individual research.

CNES 5996. Directed Instruction. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-#, %, [B]) Guided individual research.
CNES 8190. Seminar: Issues in Ancient Art and Archaeology. (3 cr [max 12 cr]; Sdnt Opt. [S] ARTH 8190)

Selected issues, with special attention to current scholarly disputes. Topics specified in [Class Schedule].

CNES 8335. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

CNES 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CNES 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CNES 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))


CNES 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

CNES 8950. Topics in Classical & Near Eastern Studies. (3 cr [max 12 cr]; Sdnt Opt) Topics such as slavery, women in antiquity, pagans and Jews, the taboo, and modern study of myth.

Clinical Laboratory Science (CLS)

Department of Laboratory Medicine and Pathology

Medical School

CLS 5090. Special Laboratory Methods. (1-2 cr [max 2 cr]; A-F or Aud. Prereq-#) Assignment on an individual basis to one of a variety of special areas of experience in the clinical lab.

CLS 5100. Virology, Mycology, and Parasitology for Medical Technologists. (2 cr; A-F or Aud. Prereq-microbiology course with lab, biochem course) Lab diagnosis of viral, fungal, and parasitic infections. Lecture.

CLS 5120. Seminar: Clinical Laboratory Science. (1 cr [max 3 cr]; S-N or Aud. Prereq-#) Current literature. Presentation/discussion of research.

CLS 5121. Journal Presentations. (1 cr [max 2 cr]; S-N or Aud. Prereq-T1st yr CLS grad student) Critical analysis, evaluation, discussion of current journal articles in student’s specialty area.

CLS 5125. Practicum Teaching. (1-2 cr [max 2 cr]; A-F or Aud. Prereq-#) Supervised teaching experience, develop skills using instructional materials, tests, and measurements.

CLS 5129. Elements of Laboratory Administration. (2 cr; A-F or Aud. Prereq-#) Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, lab safety, labor relations, government regulations.

CLS 5150. Practicum in Laboratory Administration. (2 cr; A-F or Aud. Prereq-#) Supervised experience and assignment of specific problems related to lab service and management in health care institutions.

CLS 5140. Techniques for Teaching. (2 cr; A-F or Aud. Prereq-#) Developing objectives, classroom activities, and evaluation criteria for medical technology education.

CLS 5165. Advanced Clinical Immunohematology. (3 cr; A-F or Aud. Prereq-#) Observation, study, and practice in special problems, advanced techniques, and methodology. Lecture, lab.

CLS 5402. Molecular Diagnostics. (1 cr; A-F or Aud. Prereq-#) Basic theory/application of molecular diagnostics in clinical lab. Lecture, lab.

CLS 5768. Advanced Hematology. (5-10 cr [max 30 cr]; S-N or Aud. Prereq-#) Practical experience collecting bone marrow from patients. Diagnosing hemopathological diseases by evaluating and interpreting cells from clinical specimens of bone marrow, peripheral blood, and, if applicable, lymph nodes.

CLS 5864. Research Seminar. (1 cr [max 10 cr]; S-N or Aud. Prereq-#) Departmental research seminar series.

CLS 5865. Departmental Seminar. (1 cr [max 10 cr]; S-N or Aud. Prereq-#) Departmental clinical lab research seminar series.

CLS 8193. Advanced Topics in Clinical Chemistry. (2 cr; Stdnt Opt. Prereq-#) Includes use of molecular approaches to diagnosis and risk assessment of selected diseases.

CLS 8194. Research on Clinical Laboratory Problems. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Individual research project in a selected area.

CLS 8293. Educational Administration in Medical Technology. (2 cr; Stdnt Opt. Prereq-#) Responsibilities of administration to students, faculty, and educational community. Curriculum planning, accreditation, staffing, student selection, finances. Sample administrative problems and decisions used as practice vehicle.

CLS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

CLS 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

Clinical Physiology and Movement Science (CPMS)

College of Education and Human Development

CPMS 8010. Introduction to Clinical Physiology and Movement Science. (3 cr [max 6 cr]; A-F or Aud) Overview of clinical physiology and clinical movement science. For students in such diverse fields as bioengineering, kinesiology, neuroscience, physical therapy, psychology, physiology, public health, occupational therapy.

CPMS 8101. Colloquium in Clinical Physiology and Movement Science. (1 cr [max 4 cr]; S-N or Aud. Prereq-Undergrad level in basic anatomy and physiology is highly recommended) Interdisciplinary course meets 1st and 3rd week of the month. Current research areas, scientific methods, and interpretation of results in the areas of clinical movement science and clinical physiology.

CPMS 8201. Seminar in Clinical Physiology and Movement Science. (1 cr [max 4 cr]; S-N or Aud) Meets 1st and 3rd week of the month. Current research areas, scientific methods, and the interpretation of results in the areas of clinical movement science and clinical physiology.

Cognitive Science (CGSC)

College of Liberal Arts


CGSC 8001. Proseminar in Cognitive Science. (2 cr; S-N or Aud. Prereq-Grad cog sci minor or #) Survey of major topics, including theoretical assumptions, methods, and samples of current research.


CGSC 8360. Seminar: Topics in Cognitive Science. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-Grad cog sci minor or #) Lectures and in-depth discussion on a topic.

CGSC 8410. Perspectives in Learning, Perception, and Cognition. (2 cr [max 24 cr]; S-N only) Lectures/discussions in cognitive sciences by local/visiting faculty.

CGSC 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser consent, DGS consent)

CGSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CGSC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer)


Collaborative Arts Interdisciplinary Program (COLA)

Department of Theatre Arts and Dance

College of Liberal Arts


For definitions of course numbers, abbreviations, and symbols, see page 3.

Collaborative Arts Interdisciplinary Program (COLA)
COLA 5993. Directed Studies. (1-3 cr [max 15 cr]; A-F only. Prereq-#) Guided independent study.

College of Food, Agricultural and Natural Resource Sciences (CFAN)

COLA 5993. Directed Studies. (1-3 cr [max 15 cr]; A-F only. Prereq-#) Guided independent study.

Communication Studies (COMM)

Department of Communication Studies

College of Liberal Arts

COMM 5101. Special Topics in Communication Theory. (3 cr [max 9 cr]; Stdnt Opt) Advanced theoretical problems. See department office for current offering.

COMM 5211. Critical Media Studies: Theory and Methods. (3 cr; A-F only, Prereq-Grad student or #) Survey of theories, research methods, and scholars dominating critical media studies since late 1920s.


COMM 5221. Media, Race, and Identity. (3 cr; Stdnt Opt. Prereq-5221, sr #) Critical media studies perspective on cultural politics of race and ethnicity. Social construction of race, politics of racism, media representations of race.

COMM 5231. Media Outlaws. (3 cr; Stdnt Opt) People working outside of mainstream media institutions who find creative/provocative ways to use media as space for cultural, political, or economic critique/resistance.

COMM 5261. Political Economy of Media Culture. (3 cr; Stdnt Opt. Prereq-5261 or #) Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/process media content.

COMM 5401. Advanced Theories of Communication. (3 cr; Stdnt Opt. Prereq-5401 or grad) Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

COMM 5402. Advanced Interpersonal Communication. (3 cr; Stdnt Opt. Prereq-5401 or 5402) Social scientific approaches to interpersonal communication. Theory, research findings.


COMM 5406. Communication and Gender. (3 cr; Stdnt Opt. S)GW55 5500. Prereq-One women's studies course. # 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 prescriptiveness. Comparisons across languages where possible.

COMM 5411. Small Group Communication Research. (3 cr; A-F or Aud. Prereq-5411 or #) Survey of small group communication research; theory and practice. Group decision-making and leadership.

COMM 5421. Quantitative Methods in Communication Research. (3 cr; A-F or Aud. Prereq-5401 or #) Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit.

COMM 5431. The Process of Persuasion. (3 cr; Stdnt Opt. Prereq-5431) Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required.

COMM 5441. Communication in Human Organizations. (3 cr; Stdnt Opt) Communication in organizational settings. Organizational structures and dynamics and their effect upon the communication process. Individual projects.

COMM 5451W. Intercultural Communication Processes. (3 cr; Stdnt Opt) Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.


COMM 5970. Directed Study. (1-3 cr [max 6 cr]; S-N or Aud. Prereq-Nine 3xx-5xxx Spch cr; #, %, [B]) Guided individual reading or study.

COMM 5994. Communication Research Practicum. (1-3 cr [max 9 cr]; S-N or Aud. Prereq-#) Students participate in research group.


COMM 8210. Seminar: Selected Topics in U.S. Electronic Media. (3 cr [max 18 cr]; Stdnt Opt. Prereq-5210 or #; offered when feasible) Literature survey; evaluating research on topics; conducting independent research project on a particular topic.

COMM 8221. Critical Communication Studies: History, Theory, Method. (3 cr; Stdnt Opt) Qualitative research methods for studying media institutions, texts, audiences, and contexts.

COMM 8335. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

COMM 8402. Seminar: Interpersonal Communication. (3 cr; Stdnt Opt. Prereq-5402 or #) Evaluate and develop new perspectives for analyzing, diagnosing, and managing interpersonal communication problems.


COMM 8441. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

COM 8452. Seminar: Methods of Intercultural/Diversity Facilitation. (3 cr; Stdnt Opt. Prereq-4451 or 5452 recommended) Theories of and techniques for managing effective intercultural communication and diversity. Intercultural training.

COM 8502. Seminar: Communication Theory Construction. (3 cr; Stdnt Opt. Prereq-5241 or #) Logic of communication theory development and modification from a social scientific perspective. Types of communication theories.

COM 8504. Seminar: Rhetorical Criticism. (3 cr; Stdnt Opt. Prereq-5615 or #) Rhetorical criticism theories and methods. Rhetoric as applied to communication and the growth of hermeneutics as vantage points for reassessing rhetorical methods.


COMM 8655. Seminar: Communication Ethics. (3 cr; A-F or Aud. Prereq-Ethics course or #) Independent research on communication ethics in interpersonal, group, organizational, intercultural, and media settings. Theories of ethics and methods of analysis.

COMM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

COMM 8777. Thesis Credits: Master’s. (1-18 cr [max 18 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

COMM 8888. Thesis Credit: Doctoral. (1-24 cr [max 24 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

COMM 8994. Directed Research. (1-5 cr [max 6 cr]; S-N or Aud) Supervised research project.

Comparative and Molecular Biosciences (CMB)

Department of Veterinary Biomedical Science

College of Veterinary Medicine

CMB 5180. Ecology of Infectious Diseases. (3 cr; A-F only. [S]PVUBH 6380. Prereq-MVB or CMB or VMED grad student or #) Ways in which host, agent, and environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/ control, evolution of virulence, analytical/molecular tools.


CMB 5200. Statistical Genetics and Genomics. (4 cr; A-F or Aud) Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis used to pudge studies for dominant dominant markers. Using radiation hybrid mapping and single cell typing. Design issues in linkage analysis, parentage testing, and marker polymorphism.


CMB 5335. Molecular Biotechnology Laboratory for the Novice. (2 cr; S-N only) Five day course. Understanding/applying basic concepts of biotechnology. Lectures, hands-on lab experiments.

CMB 5381. Pathogenesis of Infectious Zoonotic Diseases. (3 cr; A-F only. Prereq-[Microbiology, biochemistry] courses or #) Introduction to mechanisms of transmission/ pathogenesis for zoonotic infectious diseases. Lectures, review of current literature, student presentations, written reports.

CMB 5594. Directed Research in Comparative and Molecular Biosciences. (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-Jr-yr, #) Independent study as determined by instructor. Usual activity includes conducting research in instructor’s lab.


CMB 6102. Basic Concepts in Skeletal Biology. (2 cr; A-F only. Prereq-CMB grad student or #) Cells (osteoblasts, osteoclasts, chondrocytes) that make up skeleton. Transcription/signaling networks regulating cell growth/differentiation. Mechanisms of bone remodeling. Regulation of bone by agents such as hormones.

CMB 8100. Research Rotation in Comparative and Molecular Biosciences. (1 cr [max 2 cr]; S-N only. Prereq-CMB grad student) Current developments in faculty research. Topics specific to research advisor’s area of interest. Eight weeks.

CMB 8134. Ethical Conduct of Animal Research. (3 cr; A-F or Aud. [S]VMED 8134. ANSC 8134. Prereq-[Grad or professional school] student or #) Ethical considerations in the use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.


CMB 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)


CMB 8361. Neuro-Immune Interactions. (3 cr; Stdnt Opt. Prereq-[MICB 5218 or equiv], [NSC 5561 or equiv]) Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Offered fall of even-numbered years.

CMB 8371. Mucosal Immunobiology. (3 cr; A-F or Aud. [S] MICA 8371, OBO 8371. Prereq-MICB 8001 or equiv or #) Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/ responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal.

CMB 8394. Research in Comparative Biomedical Sciences. (1-6 cr [max 18 cr]; Stdnt Opt. Prereq-Grad CMB major) Directed research determined by student’s interests, in consultation with faculty mentor.

CMB 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CMB 8481. Advanced Neuropharmacology. (4 cr; A-F or Aud. [S] NSC 8481, PHM 8481. Prereq-#) Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS.

CMB 8550. Comparative and Molecular Biosciences Seminar. (1 cr [max 6 cr]; S-N or Aud. Prereq-Biol sciences grad student) Student/faculty presentations of their own research or a directed topic.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

CMB 8560. Research and Literature Reports. (1 cr; [max 6 cr]; S-N or Aud. Prereq-Grad CMB major or #) Current developments in cellular and molecular mechanisms of animal health and disease.

CMB 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CMB 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Comparative Literature (CL)
Department of Cultural Studies and Comparative Literature
College of Liberal Arts
CL 5331. Discourse of the Novel. (3 cr; Stdt Opt. [S]CSCCL 5331) Comparative study of the novel (eighteenth century to present): its relation to ordinary language practices; emergent reading publics, technologies of cultural dissemination, problems of subjectivity; its role in articulating international cultural relations.

CL 5555. Introduction to Semiotics. (3 cr; Stdt Opt. [S]CSCCL 5555) Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CL 5910. Topics in Comparative Literature. (3-4 cr [max 32 cr]; Stdt Opt) Topics specified in Class Schedule.

CL 5992. Directed Reading in Comparative Literature. (1-3 cr [max 9 cr]; Stdt Opt. Prereq-#) Guided individual reading and study.

CL 8001. Basic Seminar in Comparative Literature I. (3 cr; Stdt Opt. Prereq-CLit or Germanic Studies grad major) Key texts, positions, and problematics in field of comparative critical theory. Historical precursors, influential contemporary debates, and disciplinary genealogies.

CL 8002. Basic Seminar in Comparative Literature II. (3 cr; Stdt Opt) Key texts, positions, and problematics in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, and disciplinary genealogies.

CL 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

CL 8362. Modernity and Its Others. (4 cr; Stdt Opt) Dialectical interrogation of Western and non-Western theories of modernity. Reckoning with differences and variations in its history, providing an account of the normative category of modernity (designated as European), and alternative articulations around the globce.

CL 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Doctoral pre-thesis credits.

CL 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade)

CL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)


CL 8902. Methodologies Colloquium. (1 cr [max 2 cr]; S-N only. Prereq-CLit grad major or #) Presentations by CL/CSDS faculty. Methods in relation to field as a whole. Library component. Meetings with research librarians.

CL 8910. Advanced Topics in Comparative Literature. (3 cr [max 24 cr]; Stdt Opt) Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CL 8920. Advanced Topics in Comparative Literature. (3 cr [max 15 cr]; Stdt Opt) Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CL 8992. Directed Reading in Comparative Literature. (1-4 cr [max 12 cr]; Stdt Opt. Prereq-#)

CL 8994. Directed Research in Comparative Literature. (1-4 cr [max 12 cr]; Stdt Opt. Prereq-#)

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; Stdt Opt. [S]CSCCL 5301) Recent critical theories of relation of arts to social/ideological forces. Selected artifacts from Western culture (e.g., Renaissance to 20th century; high, popular, mass culture). Music, visual art, literature.


CSDS 5555. Introduction to Semiotics. (3 cr; Stdt Opt) Problems of the sign. Sign function/production. Signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CSDS 5910. Topics in Comparative Studies in Discourse and Society. (3-4 cr [max 32 cr]; Stdt Opt) Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics specified in Class Schedule.

CSDS 5993. Directed Study. (1-5 cr [max 9 cr]; Stdt Opt. Prereq-#) Guided individual reading and study.


CSDS 8002. Basic Seminar in Comparative Studies in Discourse and Society II. (3 cr; Stdt Opt) Key texts, positions, and problematics in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, and disciplinary genealogies.

CSDS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

CSDS 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CSDS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CSDS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)


CSDS 8902. Methodologies Colloquium. (1 cr [max 2 cr]; S-N only. Prereq-CSDS grad major or #) Presentations by CL/CSDS faculty. Methods in relation to field as a whole. Library component. Meetings with research librarians.

CSDS 8910. Advanced Topics in Comparative Studies in Discourse and Society. (3 cr [max 24 cr]; Stdt Opt) Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CSDS 8992. Directed Reading in Comparative Literature. (1-4 cr [max 12 cr]; Stdt Opt. Prereq-#)

CSDS 8994. Directed Research in Comparative Studies in Discourse and Society. (1-4 cr [max 4 cr]; Stdt Opt. Prereq-#)
Computer Engineering (CMPE)
Department of Electrical and Computer Engineering

College of Science and Engineering
CMPE 5333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)
CMPE 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Computer Science (CSCI)
Department of Computer Science

College of Science and Engineering

CSCI 5103. Operating Systems. (3 cr; Stdnt Opt. Prereq-4041 or #) Conceptual foundation of operating system designs and implementation. Introduction to system mechanisms and utilities that control and coordinate shared resources. UNIX implementation mechanisms as examples.

CSCI 5104. System Modeling and Performance Evaluation. (3 cr; Stdnt Opt. Prereq-5103 or #) Techniques for modeling computing systems for performance evaluation through analytical/simulation techniques. How to model computing systems and communication protocols to evaluate their performance under different operating conditions.

CSCI 5105. Introduction to Distributed Systems. (3 cr; Stdnt Opt. Prereq-5103 or equiv or #) Distributed system design and implementation. Distributed communication and synchronization, data replication and consistency, distributed file systems, fault tolerance, and distributed scheduling.

CSCI 5106. Programming Languages. (3 cr; Stdnt Opt. Prereq-4041 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 5109. Visualization. (3 cr; Stdnt Opt. Prereq-1902, 4041 or equiv or #) Fundamental theory/practice in data visualization. Emphasizes programming applications. Volume visualization, vector field visualization, information visualization, multivariate visualization, visualization of large datasets, visualization in immersive virtual environments, and perceptual issues in effective data representation. Projects are implemented in C++ using VTK or similar visualization API.

CSCI 5115. User Interface Design, Implementation and Evaluation. (3 cr; Stdnt Opt. Prereq-4041 or #) Theory, design, programming, and evaluation of interactive application interfaces. Human capabilities and limitations, interface design and engineering, prototyping and user interaction, interface evaluation, and topics such as data visualization and World Wide Web. Course is built around a group project.

CSCI 5117. Developing the Interactive Web. (3 cr; Stdnt Opt. Prereq-4151 or 5113 or #; upper div or grad in CSCI recommended) Hands-on design experience using modern web development tools. Students work in teams to develop software programs using each of four toolkits. Analyze developments in forum posts and classroom discussions.

CSCI 5125. Collaborative and Social Computing. (3 cr; Stdnt Opt. Prereq-5115 or #) Introduction to computer-supported cooperative work, social computing. Technology, research methods, theory, case studies, readings, hands-on experience.

CSCI 5129. e-Public Health: Online Intervention Design. (3 cr; Stdnt Opt) Planning, design, implementation, and evaluation of Internet-based public health interventions. Students work on interdisciplinary projects. Instructors and students drawn from computer science, public health, and communications disciplines.

CSCI 5311. Advanced Internet Programming. (3 cr; Stdnt Opt. [S]CSCI 4311. Prereq-5106 or 5211 or #, [4101 or 5801], 5707, grad student 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 5413. Real-Time and Embedded Systems. (3 cr; A-F only. Prereq-4106 or #, experience with C language) Real-time systems that require timely response by computer to external stimulus. Embedded systems in which computer is part of machine. Increasing importance of these systems in commercial products. How to control robots and video game consoles. Lecture, informal lab.

CSCI 5416. Introduction to Compilers. (3 cr; Stdnt Opt. Prereq-2011, 5106 or #) Techniques for translating modern programming languages to intermediate forms or machine-executable instructions, and their organization into compiler. Lexical analysis, syntax analysis, semantic analysis, data flow analysis, code generation. Compiler project for prototypical language.


CSCI 5211. Data Communications and Computer Networks. (3 cr; Stdnt Opt. [S]CSCI 4211. Prereq-4106 or #; basic knowledge of computer architecture, operating systems, probability, grad student) Concepts, principles, protocols, and applications of computer networks. Layered network architecture, data link protocols, local area networks, network layer routing protocols, transport, congestion/flow control, emerging high-speed networks, network programming interfaces, networked applications. Case studies using Ethernet, Token Ring, FDDI, TCP/IP, ATM, Email, HTTP, and WWW.


CSCI 5231. Wireless and Sensor Networks. (3 cr; Stdnt Opt. Prereq-4211 or 5211 or #) Enabling technologies, including hardware, embedded operating systems, programmable devices, communication, networking, and middleware services. Hands-on experience in programming tiny communication devices.

CSCI 5271. Introduction to Computer Security. (3 cr; Stdnt Opt. Prereq-4061 or equiv or #) Concepts of computer, network, and information security. Risk analysis, authentication, access control, security evaluation, audit trails, cryptography, network/database/application security, viruses, firewalls.


CSCI 5403. Computational Complexity. (3 cr; Stdnt Opt. Prereq-4041 or #) Computational models, complexity measures in each model, and related complexity classes.


CSCI 5471. Modern Cryptography. (3 cr; Stdnt Opt. Prereq-2011, 4041. [Familiarity with number theory or finite fields] or #) Introduction to cryptography. Theoretical foundations, practical applications. Threats, attacks, and countermeasures, including cryptosystems and cryptographic protocols. Secure systems/networks. History of cryptography, encryption (conventional, for definitions of course numbers, abbreviations, and symbols, see page 3. 43
CSCI 5501. Computational Techniques for Genomics. (3 cr; Stdnt Opt. Prereq-2041 or #)


CSCI 5512. Artificial Intelligence II. (3 cr; Stdnt Opt. [S]CSCI 5512W, Prereq-[S]STAT 3021, 4041) or #)

CSCI 5521. Pattern Recognition. (3 cr; Stdnt Opt. Prereq-[2031 or 2033, STAT 3021 or #])

CSCI 5523. Introduction to Data Mining. (3 cr; Stdnt Opt. Prereq-2041 or equiv or #)
Data pre-processing techniques, data types, similarity measures, data visualization/exploration. Predictive models (e.g., decision trees, SVM, Bayes, K-nearest neighbors, bagging, boosting). Model evaluation techniques. Clustering (hierarchical, partitional, density-based), association analysis, anomaly detection. Case studies from areas such as earth science, the Web, network intrusion, and genomics. Hands-on projects.

CSCI 5531. Machine Learning. (3 cr; Stdnt Opt. Prereq-Grad student or #)
Models of learning. Supervised algorithms such as perceptrons, logistic regression, and large margin methods (SVMs, boosting). Hypothesis evaluation. Learning theory. Online algorithms such as window and weighted majority. Unsupervised algorithms, dimensionality reduction, spectral methods. Graphical models.

CSCI 5551. Introduction to Intelligent Robotic Systems. (5 cr; Stdnt Opt. Prereq-2031 or 2033 or #)
Transformations, kinematics/inverse kinematics, dynamics, control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, microboids.

CSCI 5552. Sensing and Estimation in Robotics. (5 cr; Stdnt Opt. Prereq-[5551, Stat 3021] or #)

CSCI 5561. Computer Vision. (3 cr; Stdnt Opt. Prereq-5551 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.

CSCI 5707. Principles of Database Systems. (3 cr; Stdnt Opt. [S]INET 4707, CSCI 4707, Prereq-[4401 or #], grad student)
Concepts, database architecture, alternative conceptual data models, foundations of data manipulation/analysis, logical data models, database designs, models of database security/integrity, current trends.

CSCI 5708. Architecture and Implementation of Database Management Systems. (3 cr; Stdnt Opt. Prereq-4707 or 5707 or #)

Advanced introduction to software engineering. Software life cycle, development models, software requirements analysis, software design, coding, maintenance.

CSCI 5802. Software Engineering II. (3 cr; Stdnt Opt. Prereq-5801 or #)
Introduction to software testing, software maturity models, cost specification models, bug estimation, software reliability models, software complexity, quality control, and experience report. Student groups specify, design, implement, and test partial software systems. Application of general software development methods and principles from 5801.

CSCI 5980. Special Topics in Computer Science. (1-3 cr [max 9 cr]; Stdnt Opt. Prereq-#; may be repeated for cr)
Lectures and informal discussions on current topics in computer science.

CSCI 5991. Independent Study. (1-3 cr [max 9 cr]; Stdnt Opt. Prereq-#; may be repeated for cr)
Independent study arranged with CS faculty member.

CSCI 5994. Directed Research. (1-3 cr [max 9 cr]; Stdnt Opt. Prereq-#; may be repeated for cr)
Directed research arranged with faculty member.

CSCI 5996. Curricular Practical Training. (1 cr [max 3 cr]; S-N or Aud. Prereq-[CSCI or CompE] major, #)
Industrial work assignment involving advanced computer technology. Reviewed by faculty member. Grade based on final report covering work assignment.

CSCI 8001. Introduction to Research in Computer Science I. (1 cr; A-F only. Prereq-1st yr CS PhD student)
First of two-part course sequence. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources.

CSCI 8002. Introduction to Research in Computer Science II. (2 cr; A-F only. Prereq-8001, 1st yr CS PhD student)
Second of two-part course sequence. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources.

CSCI 8101. Advanced Operating Systems. (3 cr; Stdnt Opt. Prereq-5103 or #)
Successful research systems and existing theory of systems design. Goal is not merely to catalog systems or learn mathematics, but to develop a sense of elegance of design that leads to successful systems.

CSCI 8102. Foundations of Distributed Computing. (3 cr; Stdnt Opt. Prereq-5101 or #)
Fundamental principles underlying design of distributed and multiprocessor operating systems. Foundations of distributed computing systems; shared multiprocessor systems.

CSCI 8115. Human-Computer Interaction and User Interface Technology. (3 cr; Stdnt Opt. Prereq-3115 or #)
Current research issues in human-computer interaction, user interface toolkits and frameworks, and related areas. Research techniques, model-based development, gesture-based interfaces, constraint-based programming, event processing models, innovative systems, HCI in multimedia systems.

CSCI 8177. Understanding the Social Web. (5 cr; Stdnt Opt. Prereq-CS grad or #)
Research on the social web. Read, present, and discuss papers, do homework using social web research techniques such as data analysis and simulation. Semester research project.

CSCI 8181. Advanced Compiler Techniques. (3 cr; Stdnt Opt. Prereq-4061 or #)
Techniques for uniprocessors and parallel computers. Fundamental program analysis instruments such as data flow analysis and data dependence analysis. Variety of code generation and transformation techniques.

CSCI 8205. Parallel Computer Organization. (3 cr; Stdnt Opt. [S]CEE 8367, Prereq-5204 or EE 5364 or #)

CSCI 8211. Advanced Computer Networks and Their Applications. (3 cr; Stdnt Opt. Prereq-5211 or #)
Current research issues in traffic and resource management, quality-of-service provisioning for integrated services networks (such as next-generation Internet and ATM networks) and multimedia networking.

CSCI 8221. Security and Privacy in Computing. (3 cr; A-F or Aud. Prereq-[5211, 5103] or #; 5471 or EE 5248 or Math 5248 or equiv recommended)
Recent security/privacy issues in computer systems/networks. Threats, attacks, countermeasures. Security research, authentication, network security, wireless security, computer system security, anonymous system, pseudonym, access control, intrusion detection system, cryptographic protocols. How to pursue research in security and design secure systems.

CSCI 8314. Sparse Matrix Computations. (3 cr; Stdnt Opt. Prereq-5304 or numerical linear algebra course or #)

CSCI 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)
CSCI 8363. Numerical Linear Algebra in Data Exploration. (3 cr; S/N only or Aud.)

CSCI 8442. Computational Geometry and Applications. (3 cr; S/N only or Aud.)
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, advanced topics.

CSCI 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CSCI 8551. Intelligent Agents. (3 cr; S/N only or Aud.)
Theories of intelligent agents. Agent architectures; knowledge representation, communication, cooperation, and negotiation among multiple agents; planning and learning; issues in designing agents with a physical body; dealing with sensors and actuators; world modeling.

CSCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr.) No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CSCI 8701. Overview of Database Research. (3 cr; S/N only or Aud.)
Research papers from journals and conferences on current topics in databases, such as database research methodologies, relational implementation techniques, active databases, storage systems, benchmarking, distributed and parallel databases, new data models, prototype systems, data mining, and future directions.

CSCI 8715. Spatial Databases and Applications. (3 cr; S/N only or Aud. Prereq-4707 or 5707 or GIS 5571 or GIS 5573)
Motivation, Models of spatial information, querying spatial data, processing strategies for spatial queries, multi-dimensional storage/access methods, spatial data mining, trends (e.g., spatio-temporal databases, mobile objects, raster databases).

CSCI 8725. Databases for Bioinformatics. (3 cr; S/N only or Aud. Prereq-4707 or 5707 or GIS 5571 or GIS 5573)
DBMS support for biological databases, data models. Searching integrated public domain databases. Queries/analyses, DBMS extensions, emerging applications.

CSCI 8735. Advanced Database Systems. (3 cr; A-F or Aud. Prereq-4707 or 5707 or GIS 5571 or GIS 5573)
Database systems for emerging applications, nontraditional query processors, multi-dimensional data indexing. Current research trends.

CSCI 8760. Plan B Project. (3 cr; S/N only or Aud. Prereq-CSCI MS student, #)
Project arranged between student and faculty.

CSCI 8777. Thesis Credits: Master's. (1-18 cr; max 50 cr.) No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

CSCI 8801. Advanced Software Engineering. (3 cr; S/N only or Aud. Prereq-5801 or 6801)
Software reusability, internet/intranet programming, software reengineering, and software safety.

CSCI 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr.) No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only)

CSCI 8970. Computer Science Colloquium. (1 cr; S-N only or Aud.)
Recent developments in computer science and related disciplines. Students must attend 13 of the 15 lectures.

CSCI 8980. Special Advanced Topics in Computer Science. (3 cr; max 217 cr; S/N only or Aud. Prereq-#)
Lectures and informal discussions.

CSCI 8991. Independent Study. (1-3 cr; max 9 cr; S/N only or Aud. Prereq-#)
Independent study with professor.

CSCI 8994. Directed Research in Computer Science. (1-3 cr; max 9 cr; S/N only or Aud. Prereq-#)
Directed research with professor.

Conservation Biology (CBIO)
Department of Fisheries, Wildlife, and Conservation Biology
College of Food, Agricultural and Natural Resource Sciences

CBIO 8001. Conservation Biology Seminar. (1 cr; max 6 cr; Stan or Aud. Prereq-#)
Topics vary.

CBIO 8004. Economic and Social Aspects of Conservation Biology. (3 cr; S/N only or Aud. Prereq-#)

CBIO 8093. Directed Study Experience. (1-5 cr; max 6 cr; Stan or Aud. Prereq-#)
Directed Study Experience

CBIO 8095. Contemporary Problems in Conservation Biology. (1 cr; max 5 cr; Stan or Aud. Prereq-#)
Comprehensive review of conservation biology issue. Written exam.

CBIO 8105. Research in Support of Resource Management: A Dialog With Land Managers. (2 cr; S/N only)
Effective communication between researchers and natural resource managers. Organized around research needs of land managers. Students select topics of interest from these needs and, as small teams, prepare short research proposals to address each topic.

CBIO 8201. How to Excel in Graduate School. (2 cr; max 8 cr; S/N only)
Overview of history/philosophy of science as framework for writing thesis or dissertation. How to conduct research. Time management.

CBIO 8335. FTE: Doctoral. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

CBIO 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CBIO 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr.) No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CBIO 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr.) No grade. Prereq-Max 18 cr per semester or summer; 24 cr required; prior to passing written and oral prelims, must have 1 yr coursework in program; approval on a degree program; 1-2 pg research proposal (approved by adviser) to DGS assi.

Doctoral thesis credit.

Control Science and Dynamical Systems (CSDY)
College of Science and Engineering

CSDY 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

CSDY 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr.) No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CSDY 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr.) No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

CSDY 8899. Seminar in Control Science and Dynamical Systems. (1-3 cr; max 9 cr; Stan or Aud. Prereq-CSDY or PhD grad)
Current research and advanced topics.

Coptic (COPT)

COPT 5001. Elementary Coptic. (3 cr; S/N only or Aud.)
Introduction to Coptic grammar and vocabulary, chiefly in the Sahidic dialect.

COPT 5002. Elementary Coptic. (3 cr; S/N only or Aud.)
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 5147. Teaching as Dialogue. (3 cr; S/N only or Aud.)
Teaching and the teacher are the subject. Entering into dialogue is the method. Issues with the politics of teaching, the means of entering into dialogue, questions of judgment, and the idea of self-teaching as the goal of teaching.

CSCL 5154W. Theoretical Constructions of Space. (3 cr; S/N only or Aud.)
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.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

CSCL 5256W. Suburbia. (3 cr; Stdnt Opt) 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; Stdnt Opt. [S]CSDS 5301) Recent critical theories on the relation of the arts to social and ideological forces; selected artifacts 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; Stdnt Opt. [S]CSDS 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.

CSCL 5305. Vision and Visuality: An Intellectual History. (3 cr; A-F only) Central role of vision/visuality in modernity. Modern age as scopic regime. Ways that ideas/ideologies of perception have shaped aesthetic experience within social existence.

CSCL 5331. Discourse of the Novel. (3 cr; Stdnt Opt. [S]CL 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 5411. Avant-Garde Cinema. (4 cr; A-F or Aud. Prereq 1921 or ARTH 1921W or equiv) History/theory of avant-garde cinema, from classical period (1920s) to post-WWII.

CSCL 5501. Origins of Cultural Studies. (3 cr; Stdnt Opt) Intellectual map of the creation of cultural studies as a unique approach to studying social meanings. Key figures and concepts, including nineteenth- and early twentieth century precursors.

CSCL 5555. Introduction to Semiotics. (3 cr; Stdnt Opt. [S]CL 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 5666. Film Music: Theory, History, Practice. (0-2 cr [max 4 cr]; A-F only) Role of music in American/European film from early 20th century silent cinema to present near. Narrative features, shorts, documentary, horror, thriller, science fiction, comedy, cartoon. Film music as social/cultural practice and as part of political economy within culture industry.

CSCL 5711. Sociocriticism. (3 cr; Stdnt Opt) 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 5810H. Topics in Cultural Studies. (2-4 cr [max 8 cr]; A-F only. Prereq-Honor student) Topics on special subjects.

CSCL 5833. Marx, Freud, Nietzsche: Intellectual Foundations. (3 cr; Stdnt Opt) Three thinkers who defined modernity: Marx, Freud, and Nietzsche. Central tenets of their thought and theories associated with their theories. Their careers portrayed against the background of their times; their place in intellectual history.

CSCL 5910. Topics in Cultural Studies and Comparative Literature. (3-4 cr [max 32 cr]; Stdnt Opt) Topics specified in Class Scheduled.

CSCL 5910H. Topics in Cultural Studies. (2-4 cr [max 8 cr]; A-F only) Topics on special subjects.

CSCL 5993. Directed Study. (1-3 cr [max 9 cr]; Stdnt Opt. Prereq-q, [B]) Guided individual reading or study.

Curriculum and Instruction (CI)

Department of Curriculum and Instruction
College of Education and Human Development

CI 5008. Theory and Practice of Teaching Art in Elementary Schools. (1-2 cr [max 3 cr]; A-F or Aud) Art concepts, skills, processes appropriate for elementary school. Methods of art instruction. Children’s production of responses to art.

CI 5045. Advanced Contemporary Crafts. (2 cr; A-F or Aud) In-depth experiences in craft techniques, including ceramics, fibers, jewelry, and metal design, with emphasis on design analysis, understanding of materials, and mastery of processes.

CI 5049. Art Media Techniques. (1-4 cr [max 4 cr]; A-F or Aud) Lectures, demonstrations, studio labs and critique session on creative processes; handling specific media. Topic varies.

CI 5050. Issues in Art Education. (1-4 cr [max 12 cr]; Stdnt Opt) Issues/trends, current practices, recent research.

CI 5065. Improving Art Programs in the Schools. (3 cr; A-F or Aud. Prereq-Initial lic students majoring in art ed) Issues of art instruction, including teaching methods and evaluation, philosophical frameworks of pedagogy, and institutional issues concerning art programs in primary and secondary schools; social and cultural structures of schooling, practical issues of teaching art.

CI 5069. Curriculum Innovations in Art Education. (3 cr; A-F or Aud) Study and analysis of innovations; evaluation of materials for teaching units and projects. 

CI 5075. The Social and Historical Foundations of Art Education. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad student) Issues of culture in education; examination of various forms of art as representations of knowledge, belief, and cultural capital. Epistemology, the meaning of function, and the conceptual location of visual culture in education and general culture. Seminar discussions include problems of cross-cultural and multicultural art education.

CI 5078. Application of Aesthetic Theory in Education. (2 cr; A-F or Aud) Contemporary theories of art; psychological and philosophical foundations. Open to teachers, supervisors, and administrators concerned with art in general education at all levels.

CI 5096. Art Education: Practicum. (1-6 cr [max 6 cr]; A-F or Aud) Issues of art instruction, including teaching methods and evaluation, philosophical frameworks of pedagogy, and institutional issues concerning art programs in primary and secondary schools. Practicum requiring students to work in a public school setting.

CI 5097. Student Teaching in Art Education. (8 cr; S-N or Aud. Prereq-Licensure student in art ed) Observation of, participation in, and supervisory experiences with various types and levels of art classes.

CI 5111. Introduction to Elementary School Teaching. (3 cr; A-F or Aud. Prereq-Foundations of ed major or elem ed initial lic) Curriculum organization, instruction, management, assessment, professional decision making.

CI 5113. Classroom Management in the Elementary School. (3 cr; Stdnt Opt) For teachers, administrators, and support staff working in elementary school programs. Focus on management of student behavior, instruction as it relates to student behavior, and teacher organizational tasks in the classroom.


CI 5137. Multicultural Gender-Fair Curriculum. (3 cr; A-F or Aud) Issues in diversity and culture in educational contexts. Rationale for multicultural gender-fair curriculum. Cultural issues inherent in curricular change. Language, culture, sexual preference, special needs students. Conflicts between culture and curriculum.

CI 5138. Multicultural and Moral Perspectives on Classroom Instruction. (5-4 cr [max 4 cr]; Stdnt Opt. Prereq-MED or PhD student) Factors leading to effective communication in ethnically diverse classroom, preschool to adult. Communication techniques and classroom structures that have cultural and moral implications.

CI 5141. Reflective Teaching and Professional Ethics. (5-4 cr [max 4 cr]; Stdnt Opt. Prereq-Teaching license and one yr teaching exper) Students develop their professional identities as educators by considering their world views and values in relation to their professional role and responsibilities in the context of a diverse society. Encourages reflective practice and critical review of research.

CI 5145. Critical Pedagogy. (3 cr; A-F or Aud) Examination of critical pedagogy; critique of power relations regarding race, culture, class, gender, and age in various educational contexts. Exploration of improved practice in education for children, youth, and adults.

CI 5150. Curriculum Topics. (1-6 cr [max 12 cr]; Stdnt Opt) Special topics, current trends in curriculum. Subject integration, curriculum contexts, development, implementation, evaluation.

CI 5155. Contemporary Approaches to Curriculum: Instruction and Assessment. (3 cr; A-F or Aud. Prereq-Grad students only) Current research/ issues that cross disciplinary boundaries in curriculum development, instructional practices, and assessment methods. Interrelations among curriculum, instruction, and assessment within framework of constructivist learning theory. Individual classroom practices/theories.

CI 5156. Popular Culture, Teaching, and Learning. (3 cr; A-F only. Prereq-Grad student or sr in a program that values teaching as a component of the discipline) Approaches to the study of popular culture and education. Intersection between everyday life and broader historical contexts. Sporting events, toys, clothing, shopping malls, vampire mania, music festivals, video, and comics are the kinds of popular forms of culture we will engage as we develop teaching/learning strategies.
CI 5162. Peer Coaching for Teachers. (1-2 cr [max 2 cr]; A-F or Aud. Prereq-Teaching experience or #) Teachers coaching teachers; acquiring concepts, skills, and dispositions necessary for observing classroom instruction and providing constructive feedback.

CI 5177. Practical Research. (3 cr; A-F or Aud. Prereq-CI MEd student, or CI or EDPA Teacher Leadership MEd student) Preparation for identifying a research and development topic, reviewing the existing knowledge on the topic, planning and carrying out a project, further investigating the topic, and writing a report on the project.

CI 5178. Project in Teacher Leadership. (3-6 cr; Stdnt Opt. [SI]OLPD 5361. Prereq-CI or EDPA teacher leadership MEd student) Create, implement, evaluate, and present a leadership project designed to initiate positive change in educational environments. Review related literature, proposal development, project development, implementation/evaluation, critical reflection. Share learning outcomes.

CI 5181. Clinical Experience in Elementary School Teaching. (2-8 cr [max 16 cr]; S-N or Aud. Prereq-Foundation: education and elem ed initial licensure only) Students spend full days in the classroom elementary classroom, gradually assuming responsibility for teaching the class. Students prepare a portfolio based on criteria given. One seminar per week.

CI 5183. Applying Instructional Methods in the Elementary Classroom. (1-2 cr [max 6 cr]; S-N or Aud. Prereq-Foundation: ed major or elem ed initial licensure only) Supervised experience in elementary classrooms.

CI 5186. School-Related Projects. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-MEd student) Research or evaluation project related to teaching, curriculum, or other aspect of school. Approved and supervised by faculty advisor.

CI 5187. Practicum: Improvement of Teaching in Elementary or PreKindergarten Schools. (2-3 cr [max 3 cr]; S-N or Aud. Prereq-Students in [early childhood educ M Ed or elem educ M Ed or teaching M Ed]) Elementary school classroom teaching project designed to improve specific teaching skills. Approved and directed by advisor.


CI 5254. Kindergarten Methods. (2 cr; A-F or Aud. Prereq-Foundations of Education/Elementary Education or M.Ed./ILP Elementary Education) Purpose of kindergarten, its place in elementary program. Curriculum appropriate for needs of age group, including children with special needs. Assessment procedures, role of classroom teacher.

CI 5283. Practicum: Applying Instructional Methods in the Elementary Classroom. (3 cr [max 6 cr]; S-N only, Prereq-M.Ed./Elementary education initial licensure student, enrolled in elementary education methods course) Field-based practicum in elementary school setting. In-class discussions about application of classroom learning to school setting.

CI 5285. Clinical Experience in Elementary School Teaching. (12 cr [max 24 cr]; S-N only. Prereq-M.Ed/Elementary education initial licensure students) Students spend full days in elementary classroom, gradually assuming responsibility for teaching, and prepare portfolio based on criteria given. One seminar per week.

CI 5286. Student Teaching Seminar: Elementary Education. (3 cr [max 6 cr]; A-F only. Prereq-M.Ed./Elementary education initial licensure only) Weekly seminar supplementing student teaching experience. Class discussions, sharing of artifacts from the classroom, reflections, and readings.

CI 5300. Teaching Introductory Computer Concepts and Skills. (1-3 cr [max 3 cr]; A-F or Aud) Pedagogical strategies for teaching keyboarding and word processing.

CI 5301. Foundations of Computer Applications for Business and Education. (3 cr; Stdnt Opt) Instructional uses of computers and representative business, education, and marketing applications, including word processing, databases, spreadsheets, and graphic design.

CI 5303. Data Analysis and Information Design for Business and Education. (3 cr; Stdnt Opt) Using spreadsheets, information visualization, and data management to create analytical models in business, education, and research settings.

CI 5304. Data Management for Online Integration. (3 cr; Stdnt Opt) Using database software to organize, manage, and display online data, to create content management systems, and to integrate into existing Web sites.

CI 5305. Integrated Computer Applications in Business and Marketing Education. (3 cr; Stdnt Opt) Case-based authentic business computing problems requiring integration of two or more application packages. Pedagogical issues of learning/teaching advanced computer applications.

CI 5321. Foundations of Distance Education. (3 cr; A-F or Aud) History, philosophies, technologies, and best practices related to distance learning environments. Distance education theories. Issues in distance education.

CI 5323. Online Learning Communities. (3 cr; A-F or Aud) Students design/research an online learning environment that promotes community. What community is, how it fosters learning in educational learning environments. Theories of distance learning instruction. Community models. Technological tools to develop online communities.

CI 5325. Designing and Developing Online Distance Learning. (3 cr; A-F or Aud. Prereq-5325 or 5362 recommended) Students research, use, and evaluate technologies for distance learning and design their own learning environments.

CI 5327. Designing Online Adventure Learning. (3 cr; A-F or Aud) Designing, developing, and integrating adventure learning environments in K-16. Examples of effective adventure learning environments.

CI 5330. Topics in Instructional Systems and Technology. (1-3 cr [max 12 cr]; Stdnt Opt) Topics related to needs of in-service teachers. Topics, location, credits, and duration are flexible.

CI 5331. Introduction to Learning Technologies. (3 cr; Stdnt Opt) Orientation to examination of various issues affecting use of technology. Students identify research topics for investigation in future courses and identify key literature in preparation for masters/doctoral examinations.


CI 5337. Planning for K-12 Technology Design and Integration. (3 cr; A-F or Aud) Developing technology-enhanced learning (TEL) lessons/units for K-12 instructional contexts (e.g., content areas across PK-12 grades). Contemporary perspectives on instruction/learning, TEL lesson categorization techniques.

CI 5344. Facilitating Technology Integration in Classrooms I. (1 cr; A-F or Aud) Intersection of student learning theories and research base on effective technology practices. Video cases of technology-supported teaching, peer teaching exercise.


CI 5351. Technology Tools for Educators. (3 cr; A-F or Aud) Develop skills in using technology applications to support teaching and learning. Internet applications, presentation software, Web 2.0 technologies, and Web site development.

CI 5361. Teaching and Learning with the Internet. (3 cr; Stdnt Opt) Implications/challenges in using Internet-based technologies in classroom. Pedagogical models.

CI 5362. Foundations of Interactive Design for Web-based Learning. (3 cr; Stdnt Opt) Processes of designing/developing interactive learning media and online applications from ground up. Focuses on usability/aesthetics in online learning.


CI 5364. Computer-Based Instruction: Games and Simulation. (3 cr; A-F or Aud. Prereq-5385) Principles and procedures of computer simulation and game design. Types of computer simulation, the components common to simulation design, and the theory underlying educational simulation design.

CI 5367. Interactive Multimedia Instruction. (3 cr; A-F or Aud. Prereq-Knowledge of principles and procedures of CBI design and multimedia authoring system)
Principles of effective computer-based design; tools in multimedia development; contemporary issues and skills in design, development, and implementation of interactive multimedia instruction. Use multimedia development tools, create a multimedia portfolio, and investigate the issues surrounding their effective use.

CI 5390. Learning Technologies Field Experiences. (1-3 cr [max 3 cr]; S-N only. Prereq-Students in teachers of computers/keyboarding/related technology applications additional licensure program)
Field-based experience for students enrolled in computers, keyboarding, and related technology applications methods classes. Apply learning from University courses to the K-12 school setting. In-class discussions about the application of classroom learning to the school setting.

CI 5401. Literature for the Elementary School. (3 cr; A-F or Aud. Prereq-Children’s lit course or #)

CI 5402. Introduction to Special Collections. (3 cr; A-F or Aud. Prereq-Children’s lit course)
Uses Children’s Literature Research Collection as research material. Study of manuscripts, original art, and letters.

CI 5403. Creative Writing For and By Children. (3 cr; A-F only. Prereq-Children’s lit course or #)
Aspects of writing/illustrating children’s literature or children’s own writing. May feature authors/illustrators of children’s books.

CI 5404. Culturally Diverse Books for Children and Adolescents. (3 cr; A-F or Aud. Prereq-MEd, MA, PhD, EdD)
Reading of literature for children/adolescents about diverse cultures. Critique of literary quality and cultural depiction. Development of ways to use culturally diverse literature.

CI 5405. Middle School Language Arts Methods. (2 cr; A-F only. Prereq-Elem ed licensor course)
Introduction to the unique needs of middle school students in the language arts classroom. Language arts content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school language arts classroom.

CI 5410. Special Topics in the Teaching of Literacy. (1-3 cr [max 12 cr]; Stndt Opt)
Topics related specifically to the needs of in-service teachers. Topics, location, credits, and duration will be highly flexible.

CI 5411. Teaching Reading in the Elementary School. (3 cr; A-F or Aud)
Aids the inservice elementary classroom teacher in the development of knowledge of theory and practice in the teaching of reading.

CI 5412. Reading Difficulties: Instruction and Assessment. (3 cr; A-F or Aud. Prereq-5411 or 5451)
Causes, diagnosis and assessment, prevention and correction; intervention practices useful to the classroom teacher and special teacher of reading.

CI 5413. Foundations of Reading. (3 cr; A-F or Aud)
Reading processes, development of readers. Assessment/tutoring of individual children in reading and other literacy practices.

CI 5415. Literacy Development in the Primary Grades. (3 cr; A-F or Aud. Prereq-Elem ed licensor course or #)
Theory/practice of integrated teaching of reading, literature, writing, and language in primary classroom settings. Uses national/state language arts standards and assessment protocols to examine primary literacy curricula.

CI 5417. Elementary literacy Instruction for ESL Students. (3 cr; A-F or Aud. Prereq-Bachelor’s degree completed)
Teaching reading/writing in elementary grades to students from diverse languages. Second-language literacy development. Phonomemic awareness, phonics, fluency, vocabulary, comprehension. Ways to connect students background knowledge to literacy curriculum.

CI 5418. Whole Language Teaching and Learning in the Elementary School. (3 cr; A-F or Aud. Prereq-MEd or grad student, minimum one yr of teaching exper)
Theory, research, and politics of whole language teaching. Applications for developing an elementary school whole language curriculum.

CI 5422. Teaching Writing in Schools. (3 cr; A-F or Aud)

CI 5424. Reading, Language Arts, and Literature: Primary. (3 cr; A-F or Aud. Prereq-Elem ed licensor course)
Curricular/methodological issues of reading, language arts, and children’s literature. Evaluating children’s literature, emergent literacy, response to literature, reading/writing processes, strategy instruction for word recognition/comprehension, authentic assessment strategies, teaching diverse students.

CI 5425. Reading Instruction in the Elementary Grades. (3 cr; A-F only. Prereq-[Elementary or early childhood] licensure student)
Curricular/methodological issues in teaching of reading. Reading/orthographic processes, strategy instruction for word recognition/comprehension, authentic assessment strategies, and teaching diverse students.

CI 5426. Language Arts Instruction in the Elementary Grades. (3 cr; A-F only. Prereq-Elementary or early childhood licensure student)

CI 5431. Introduction to Instructional Leadership in K-12 Reading. (3 cr; A-F or Aud. Prereq-Minnesota license valid for classroom teaching in pre-kindergarten, [adult basic education or grades kindergarten through 6 or 1 through 6 or 4 through 8 or 4 through 9 or 4 through 12 or kindergarten through 12])
K-12 curriculum in reading, major theories/research that motivate curriculum. Major instructional principles, alignments needed, resources available.

CI 5432. Instructional Leadership in Reading in Kindergarten and the Elementary Grades. (3 cr; A-F or Aud. Prereq-5431)

CI 5433. Instructional Leadership in Reading for the Middle and Secondary Grades. (3 cr; A-F or Aud. Prereq-5432)
Curriculum/instruction for middle/secondary school students.

CI 5434. Professional Development and Evolving Practice in K-12 Reading. (3 cr; A-F or Aud. Prereq-5433)

CI 5435. Instructional Leadership in Preventing Reading Difficulties. (3 cr; A-F or Aud. Prereq-5434)

CI 5441. Teaching Literacy in the Secondary School. (2-3 cr [max 3 cr]; A-F or Aud)

CI 5442. Literature for Adolescents. (3 cr; A-F or Aud)
Characteristics of literature written for adolescents; rationale for using adolescent literature; adolescents’ reading interests and attitudes; analysis of quality and appeal; individualized reading programs; methods of promoting reading; multicultural literature; developing teaching activities.

CI 5451. Teaching Reading in Middle and Secondary Grades. (3 cr; A-F or Aud)
Methods of accommodating to students’ abilities and facilitating reading in regular content classes.

CI 5461. Teaching Composition in the Secondary School. (2 cr; A-F or Aud)

CI 5462. Evaluating and Assessing Writing. (3 cr; A-F or Aud)

CI 5463. Minnesota Writing Project Annual Invitational Summer Institute. (3 cr; A-F only. Prereq-Licensed teacher or administrator or [space available, faculty letter of recommendation])
Workshop. Participants reflect on their own literacy processes, participate in a writing group, discuss current reading texts, and demonstrate best practices in classroom.

CI 5469. Minnesota Writing Project Directed Studies. (1-3 cr [max 3 cr]; A-F only. Prereq-Teaching license. [CI 5463 or enrolled in the Certificate for Teaching Writing and Critical Literacy])
Directed study for teachers involved in MWP. Capstone course for those enrolled in the Certificate in Teaching Writing and Critical Literacy. Teachers investigate current theory and practice of literacy instruction. Ongoing cohort for those enrolled in the Certificate.

CI 5472. Teaching Film, Television, and Media Studies. (3 cr; A-F or Aud)
Methods of teaching film, video, and media studies at the secondary and college level; methods for eliciting critical responses; analysis of film/video techniques; analysis of cultural representations and genre


CI 5496. Directed Experiences in Teaching English. (8 cr; S-N or Aud. Prereq-MEd/initial licensure students only) Student teaching/clinical experience for English post-baccalaureate students only.

CI 5502. Science Instruction in the Elementary Grades. (3 cr; A-F or Aud. Prereq-Early Childhood or Elementary Education (LP)) Methods/materials for teaching science/health at elementary school level.


CI 5531. Teaching Middle School Science. (5 cr; A-F or Aud. Prereq-Initial licensure student in science ed) Methods of planning/teaching science to middle school students.


CI 5533. Current Developments in Science Teaching. (3 cr; A-F or Aud. Prereq-MEd, initial licensure [grad student] or #) Using curriculum standards to design science courses.

CI 5534. Studies in Science Education. (3 cr; A-F or Aud. Prereq-M.Ed., init lic, or #) Improvement of science teaching through the application of research findings.

CI 5535. Foundations of Science Education. (3 cr; A-F or Aud. Prereq-M.Ed., grad student, or #) Analysis of preservice practices in light of historical and philosophical foundations of science education.

CI 5536. Equity, Policy, and Assessment in Science Education. (3 cr; A-F only. Prereq-MEd or grad student or #) Nature of equity, policy matters that influence schools/teachers involved in science teaching and scientific literacy. Classroom presentations, discussions, readings in current research.

CI 5537. Principles of Environmental Education. (3 cr; A-F or Aud. Prereq-Undergrad in NRES or M.Ed. or grad student in education or #) Critical review of Environmental Education, its history, theories, curricula, teaching methods, and assessment practices. Development of an exemplary unit plan for teaching environmental studies.

CI 5538. Research-based Decision-making in Science Education. (3 cr; A-F only. Prereq-MEd or grad student or #) Nature of research and data-driven decision-making in science education. Focuses on analysis, interpretation, and impact of research on science education. Developing/conducting research. Students discuss, analyze, and present research.

CI 5539. Improving Secondary Science Instruction: Surviving the First Two Years. (3 cr; A-F only. Prereq-MEd science education student, in first three years of teaching) Students reflect on their instruction and student learning during first years of teaching. Monthly meetings, observations, online discussion. Classroom management, planning, inquiry-based teaching, assessment, equity in the classroom.

CI 5540. Special Topics: Science Education. (1-2 cr; max 12 cr; S-N or Aud) Detailed examination and practice of the teaching of one area of science (e.g. geology, health, physical science) or one method of instruction (e.g. laboratories, demonstrations, Internet, simulations).

CI 5541. Teaching History and Nature of Science. (3 cr; A-F or Aud. Prereq-MEd ILP or professional studies student in science education or #) Understanding nature of science(NOS). Integrate/reflect on NOS in secondary science classroom. Historical cases/integrating NOS with science content/scientific inquiry.

CI 5596. Clinical Experience in Middle School Science. (4 cr; A-F or Aud. Prereq-initial licensure in science ed) Supervised clinical experience in middle school science teaching.

CI 5597. Clinical Experience in Secondary School Science Teaching. (4-6 cr; max 8 cr; S-N or Aud. Prereq-initial licensure or #) Supervised clinical experience in secondary school science teaching.

CI 5619. Teaching World Languages and Cultures in Elementary Settings. (3 cr; S-N or Aud. Prereq-MEd ILP) Methods/materials for elementary world language instruction; development of oral communication; literacy in world languages; world language program design; global awareness/cross-cultural experience; children’s language; children’s literature, games, and songs; planning/development of units and lessons.

CI 5620. Introduction to Second Language Acquisition for Language Teachers. (3 cr max 6 cr; S-N or Aud. Prereq-MEd ILP) Current research and theory in the area of second language acquisition (SLA). Topics include the similarities and differences across first and second language acquisition; the role of individual differences in language learning (including age, first language, aptitude among others). Implications for sociolinguistic diversity in the United States.

CI 5621. Culture as the Core in the Second Language Classroom. (2 cr) How language teachers foster development of intercultural communicative competence through a pedagogical approach that addresses the nature of culture and culture learning, and the interrelatedness of language and culture learning.

CI 5622. Second Language Acquisition Basics for Teachers. (2 cr) Participants expand their repertoire of tasks/activities, gather samples of learner language, and practice analyzing those samples to identify language features that learners do/do not know.

CI 5623. Improving Language Learning: A Practical Course in Styles- and Strategies-based Instruction. (2 cr) Learner-focused approach to teaching that helps students understand and make the most of their own learning styles/strategies. Participants create materials/lessons and explore ways to incorporate strategies into their language curriculum.

CI 5624. Content-Based Language Instruction and Curriculum Development. (2 cr) Intensive professional development to help foreign language teachers learn to implement the CBI curricular approach in the language classroom. Introduces all phases of CBI for the development and provides resources necessary to ensure successful implementation.

CI 5625. Developing Assessments for the Second Language Classroom. (2 cr) Assessment fundamentals and various topics, including assessment frameworks, performance assessment models, national standards, effective evaluation, and authentic materials. Participants use backward design to develop rating criteria and rubrics, and a standards-based performance assessment unit.

CI 5626. Developing Learners’ Sociocultural Competence. (2 cr) Overview of how to incorporate a pragmatics component into second/foreign language curriculum to enhance learners’ sociocultural competence. Includes approaches to teaching/collaborating/pragmatics.


CI 5632. Literacy and Language Development in Second Language Classrooms. (3 cr; A-F or Aud. Prereq-SLC initial licensure only) Processes/instructional approaches in developing second language proficiencies in the modalities of reading, writing, speaking, and listening and communicative modes (interpretive, presentational, interpersonal); development of literacy in a second language; planning L2 literacy instruction based on research on L1 and L2 literacy development; integration of instruction/assessment in language teaching.

CI 5634. Content-Based Instruction in Second Language Settings. (3 cr; A-F or Aud. Prereq-SLC initial licensure only) Building on foundation from other courses in the sequence. Instruction/assessment of ESL and World Languages at the secondary level. Prepares students to connect language teaching with other content areas, analyze/address the academic language needs of English learners, and advocate for second language programs and students.
CI 5635. Culture and Diversity in Second Language Classrooms. (3 cr; Stdnt Opt. Prereq-Initial licensure student only)
Teaching culture as content and including students' home cultures in the curriculum and diverse student needs. Needs of students of various educational, social, and cultural backgrounds, and strategies to develop academic success through instruction in learning strategies and other approaches to differentiation.

CI 5641. Language, Culture, and Education. (3 cr; A-F or Aud. Prereq-HMed or grad student)
Applies current sociolinguistic and discourse theory/research to study of relationships between language and culture in educational settings: language curriculum and instruction; classroom language use; borders between school and home/community language use; and educational policies on literacy/second-language instruction.

CI 5642. Assessing English Learners. (3 cr; A-F or Aud)
Current practices concerning language and academic content assessment of English learners (ELs) at the school site, state, and national level; factors affecting academic learning needs of ELs/where assessment fits into that picture.

CI 5643. Teaching English Learners in the Elementary Classroom. (3 cr; A-F only. Prereq-Elementary Education ILP)


CI 5648. Advanced Practices in Teaching Academic Language. (3 cr; A-F only. Prereq-Grad student, #)
Prepares K-12 teachers for student development of academic language proficiency. Read/discuss current research, implement innovative teaching practices.

CI 5651. Foundations of Second Languages and Cultures Education. (3 cr; A-F or Aud) Historical overview of second language teaching/learning in U.S. introduction to second language acquisition. Second language instructional concepts across elementary, secondary/university options for foreign language, bilingual education, immersion language programs, and English as a second language programs. Theoretical frameworks for language instruction are also taught.

CI 5656. Teaching Literacy in Second Language Classrooms. (3 cr; A-F or Aud) Reading comprehension/composing processes in a second language; relationship between first and second literacy development; relationship between reading and writing; relationship of culture to reading comprehension and writing; politics of literacy; assessment of second language literacy; using technology to enhance literacy instruction.

CI 5657. Teaching Speaking and Listening in Second Language Classrooms. (3 cr; A-F or Aud) Theoretical/methods in teaching language as communication in oral/aural modes; planning student interaction; classroom organization for oral language learning/acquisition; using technology to enhance interaction; assessment of listening comprehension and oral communication.

CI 5658. Foreign Language Testing and Assessment. (3 cr; A-F or Aud) For world language/ESL teachers. Aligning foreign language classroom instruction/assessment; language testing/assessment; classroom-based and large-scale proficiency testing/assessment; assessing proficiency in speaking, listening, reading, writing and communicative modes (interpretive, presentational, interpersonal); construction of formative/summative assessments; critique of contemporary assessment instruments.

CI 5660. Special Topics in the Teaching of Second Languages and Cultures. (1-4 cr; max 12 cr; Stdnt Opt) Topics related specifically to the needs of the in-service teacher. Topics, location, credits, and duration are flexible.

CI 5662. Second Language Curriculum Design. (3 cr; A-F or Aud) Historical overview of curriculum development in second language education; contexts that influence curriculum development; models for curriculum development in second language settings; politics of curricular reform; national/state standards and implications for curriculum development; effects of technology on second language curriculum.

CI 5670. Foundations of Dual Language and Immersion Education. (3 cr; Stdnt Opt. Prereq-Enrollment in certificate program in dual language/immersion educ or #) Research foundations and program principles for dual language/immersion. Second language acquisition; critical features of program design/implementation; benefits/challenges of dual language/immersion; program assessment; advocacy. Theory/research for dual language/immersion tied to practical application.

CI 5671. Curriculum Development and Assessment in Dual Language/Immersion Classrooms. (3 cr; Stdnt Opt. Prereq-#) Content-based language instruction and curriculum development for dual language, bilingual, and immersion contexts; balancing content/language goals/objects in curriculum and instruction; integration of language, literacy content, and culture in curriculum; standards-based instruction; backwards design; assessment that aligns with content-based curriculum and instruction.

CI 5672. Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms. (3 cr; Stdnt Opt. Prereq-#) Counterbalancing content with integrated focus on language and literacy development for dual language, bilingual, and immersion classrooms. Materials development; proactive/reactive instructional techniques; noticing and awareness-raising strategies; structuring student language production; differentiating for content, ability, and language.

CI 5673. Immersion 101: An Introduction to Immersion Teaching. (2 cr [SCI 5574]) Research-based introduction to issues for teachers, administrators, and district personnel in K-12 immersion education. One-way (foreign language), two-way (bilingual), and indigenous programs. Principles/practices that inform language-attentive curriculum development/instruction.

CI 5674. Immersion 102: An Introduction to English Teaching in Character-based Languages. (2 cr [SCI 5573]) Research-based introduction to issues for teachers, administrators, and district personnel in K-12 immersion education. One-way (foreign language) and two-way (bilingual). Prizes/practices that inform language-attentive curriculum development/instruction.

CI 5693. Directed Study in Second Languages and Cultures. (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-#) Individual or group work on curricular, instructional, or assessment problems.

CI 5696. Practicum: Teaching World Languages and Cultures in Elementary Schools. (2-6 cr [max 6 cr]) Stdnt Opt. Prereq-5619, adviser approval; credits cannot be counted on a graduate degree program for endorsement candidates
Teaching and learning experiences in Second Languages and Cultures at the elementary-school level. Requires students to work in a public school setting.


CI 5698. Student Teaching in Second Languages and Cultures. (2-6 cr [max 14 cr]; Stdnt Opt. Prereq-Adviser approval; credits cannot be counted on a graduate degree program)
Student teaching in Second Languages and Cultures at the secondary level for teachers already licensed in another field. Requires students to work in a public school setting.

CI 5699. Clinical Experiences in Second Languages. (3-12 cr [max 16 cr]; A-F or Aud. Prereq-SLC initial licensure program only) Teaching and learning experiences in elementary and secondary second language instructional settings. Includes a seminar held concurrently to support the student teaching experience.

CI 5702. Social Studies Instruction in the Elementary Grades. (3 cr; A-F only. Prereq-Elementary Education ILP) Content/organization of elementary social studies programs. Programs of understanding. Improving learning situation.

CI 5705. Middle School Social Studies Methods. (2 cr; A-F only. Prereq-Element ed licensure student) Introduction to the unique needs of middle school students in the social studies classroom. Social studies content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school social studies classroom.

CI 5731. Special Topics in Second Languages and Cultures. (2-6 cr [max 12 cr]; A-F or Aud) Content/organization of social studies programs. Improving teaching/learning situation through analysis of trends/issues. Integration with other subject areas.

CI 5741. Introduction to Social Studies Education. (3 cr; A-F only. Prereq-social studies initial licensure student) Broad issues and themes related to social studies education, including societal context, rationale, and scope and sequence. Analysis and evaluation of selected teaching strategies, methods, and resources.

CI 5742. Advanced Methods of Teaching the Social Studies. (3 cr; A-F only. Prereq-Secondary social studies initial licensure student) Focus on developing a repertoire of instructional methods that support authentic pedagogy and assessment. Enhancing reading comprehension and writing skills in the social studies.

CI 5743. The Social Sciences and the Social Studies. (3 cr; A-F only. Prereq-Secondary social studies initial licensure student) Development of instructional strategies and contexts for exploring the social sciences as disciplines at the secondary level; central concepts and generalizations; tools of inquiry; competing structures and theories;
and the relative impact of multicultural and gender-fair perspectives on the nature of history and the social sciences.

CI 5744. Seminar: Reflecting on Professional Development in Social Studies Education. (3 cr; A-F only. Prereq-Secondary social studies initial licensure student) Reflecting on teaching experience, examining social/cultural context of teaching/learning, developing a professional identity. Refining teaching and teacher research skills.

CI 5745. Engaging Youth With Social Studies Texts. (3 cr; A-F only) Ways to engage students (grades 5-12) in social studies (textbooks, literature, speeches, editorials, political cartoons, tables, graphs, maps, film). Developing middle/high school students' disciplinary literacy.

CI 5746. Global and Multicultural Education in the Secondary Classroom. (3 cr; A-F only) Issues, classroom practices, and controversies surrounding global/multicultural perspective-taking in social studies education. Strategies for helping secondary social studies students develop global/multicultural worldviews.

CI 5747. Global and Environmental Education: Content and Pedactice. (3 cr; A-F or Aud) Prepares educators for leadership responsibilities in the area of global environmental education. Focus on the knowledge and process skills necessary to carry out a leadership role in the curriculum.


CI 5762. Developing Civic Discourse in the Social Studies. (3 cr; A-F or Aud) Philosophies, strategies, and research on developing civic discourse in secondary social studies classroom. Selecting issues. Democratic classroom climate. Relating to social/cultural contexts.


CI 5922. Family and Consumer Sciences Curriculum in Grades 5-12. (3 cr; A-F only. Prereq-ILP student) Examination, development, and implementation of family and consumer sciences curriculum in grades 5-12.

CI 5923. Educational Strategies in Family Education. (3 cr; A-F only) Examination, development, and implementation of a variety of educational strategies.

CI 5924. Family and Consumer Sciences Student Teaching I. (1 cr; S-N only. Prereq-ILP student) Initial experiences in family/consumer sciences teaching profession. Observations of school organization/administration, seminars, relationship building with cooperating teachers, reflections on personal involvement as beginning student teachers.


CI 5927. Family and Consumer Sciences Student Teaching IV. (1 cr; Stdnt Opt. Prereq-5926) Full-time supervised student teaching experience in family/consumer sciences programs.

CI 5993. Directed Study in Family, Youth, and Community. (1-3 cr [max 9 cr]; A-F only. Prereq-#) Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.

CI 5996. Internship in Family, Youth, and Community. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-#) Involvement in work experience focused on educational competencies in family, youth, and community settings. Nature/extent of responsibilities are defined by position the student assumes.

CI 8079. Research in Art Education. (3 cr; A-F or Aud. Prereq-Grad stud student or #) Current research agenda. Helps students identify research questions and choose appropriate methodologies.

CI 8095. Problems: Art Education. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-Grad stud educ major or #) Independent research under faculty guidance. May include advanced studio practice and educational issues requiring a research methodology.

CI 8107. Seminar: Reflecting on Professional Practice. (2 cr; A-F or Aud. Prereq-Grad stud student or #) Focuses on conceptual issues surrounding the design and use of mixed methods in addressing problems and research questions in education. Critique of select mixed design exemplars published in respected research publications and practical application of analyses of data using mixed inquiry methods.

CI 8146. Critical Ethnography in Education. (3 cr; A-F or Aud. Prereq-8133, 8148, WHRE 8912 or equiv. CI PhD stud or #) Theoretical/methodological foundations. Possibilities and problems for understanding inequality/disparities in education. Research design, data collection, analysis, writing.

CI 8147. Critical Discourse Analysis in Educational Research. (3 cr; A-F or Aud. Prereq-MA or PhD stud) Students apply CDA methods to analysis of written, visual, and spoken texts in social settings such as schools, families, and communities.

CI 8148. Conducting Qualitative Studies in Educational Contexts. (3 cr; Stdnt Opt. Prereq-MA or PhD stud or #) Introduction to use of qualitative research methods. Ethnography, sociolinguistics, symbolic interactionism. Emphasizes observation.

CI 8149. Qualitative Research: Coding, Analysis, Interpretation, and Writing. (3 cr; A-F or Aud. Prereq-8148, EDPA 5061, WOST 5101 or #) How to code/analyze field notes. Individual/group interviews, multimedia using NUDIST NVivo software. Students interpret analyzed material and complete an article length document that includes a review of related research/methodology.

CI 8150. Research Topics Curr & Instruc. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-[M.A. or Ed.D or Ph.D.] stud student or #) Special topics, current research trends in curriculum/instruction. Research review, subject integration, curriculum contexts, development, implementation, data collection, analysis, evaluation.

Courses

CI 8152. Teacher Learning and Professional Development. (3 cr; A-F or Aud. Prereq-Grad student)
Theoretical/empirical work on teacher learning, professional communities, teacher inquiry, perspectives on outcomes of professional development, and policy recommendations for supporting teacher learning. Research methodologies.

CI 8154. Culturally Relevant Pedagogy. (3 cr; A-F or Aud)
Research on relationship between home and school cultures. Education of students of color. Culture, including experiences/practices of students’ homes. Cultural approaches for improving teaching, transforming society.

CI 8155. Immigrant Families and U.S. Schools. (3 cr; A-F or Aud)

CI 8156. Asian American Education. (3 cr; A-F or Aud)

CI 8159. Culture and Teaching Colloquium. (3 cr [max 6 cr]; A-F or Aud)
Doctoral seminar. Interdisciplinary perspectives on theme central to cultural study of teaching. Theme varies year to year.

CI 8161. Research Experience I: Study Design and Planning. (3 cr [Prereq: [8153, 6-12 cr of research methodology, CI PhD student] or #) Students identify research topic, conduct literature review, refine research questions, design study, obtain IRB approval as needed, and begin data collection. Readings, seminar discussions, peer critique of work.

CI 8162. Research Experience II: Data Analysis and Manuscript Preparation. (3 cr [Prereq: 8161] Students complete data collection/analysis, prepare research manuscript. Seminar discussions, critical examination of their own and peers’ work.

CI 8181. Seminar in Teaching in Colleges of Education. (3 cr; Stdnt Opt. Prereq-ClPhD student or #) Goals, instructional strategies, evaluation procedures, and professional considerations.

CI 8195. Problems: Improvement of Instruction. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-#) Independent research in curriculum and instruction.

CI 8196. Practicum in Teaching in Colleges of Education. (1 cr; Stdnt Opt. Prereq-8181) Supervised teaching in an education course at the University of Minnesota or other college or university.

CI 8197. Problems: Curriculum Studies. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-MA or PhD student) Directs students to completing Plan B paper for M.A. degree.

CI 8198. Problems: Teacher Education. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#) Independent research.

CI 8333. FTE: Master’s. (1 cr; No grade. Prereq: Master’s student, adviser approval, DGS approval)

CI 8350. Special Topics in Learning Technologies. (1-3 cr [max 6 cr]; A-F or Aud) Topics in learning technologies. Topics and credits are flexible.

CI 8351. Advanced Courseware and Design: Issues. (3 cr; A-F or Aud. Prereq: 8350) Examination and critique of existing research. Students identify a research topic, write a literature review, plan a study, and present a research proposal.

CI 8391. Learning Technologies Seminar. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-Cl grad student or #) Topics related to needs of the in-service teacher; topics, location, credits, and duration are highly flexible.

CI 8395. Directed Study: Learning Technologies. (1-6 cr [max 12 cr]; A-F only. Prereq-#) Students work with faculty member on a directed project or study focused on exploring literature, organizing and engaging in research, developing and developing projects, etc.

CI 8400. Special Topics in Children’s and Young Adult Literature. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-grad course in children’s or young adult lit) Overview of research and issues. Study of original manuscripts and artwork for children’s books; research in child and young adult response to literature. Topics vary by offering.

CI 8410. Special Topics in Reading Research and Instruction. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-[MA or PhD] student) Research at all levels. Topics vary. May include research designs, trends, and specific studies.

CI 8412. Research in Reading. (3 cr [max 6 cr]; Stdnt Opt. Prereq-[MA or PhD] student) Theory of and research on writing process. Applications to developing writing curriculum/instruction.


CI 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser approval, DGS approval)


CI 8470. Special Topics on Literacy. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-[MA or PhD] student) Current theories/research on literacy and literacy development. Alternative methods of conducting literacy research. Implications for literacy instruction.

CI 8492. Readings in English Education and Reading. (1-3 cr [max 10 cr]; Stdnt Opt. Prereq-#) Independent study course.

CI 8495. Problems: Teaching English and Reading. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-#) Individual research.

CI 8511. Seminar: Research in Science Cultures Education. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-Cl grad student or #) Examination/critique of current research topics, methods, and issues.

CI 8517. Equity, Policy, and Social Justice in Science Education. (3 cr [Prereq-Science ed grad student or #) Interactions of issues of diversity, equity, policy, and social justice as related to science education. Diverse perspectives on purposes/scopes of science education. Consequences for diversity, equity, access, social justice, empowerment, and educational policy.

CI 8573. Nature of Inquiry in STEM Education. (3 cr; A-F only. Prereq-MA or PhD student or #) STEM Education. Mathematics, science, engineering. Teaching/learning/teacher education through evaluation of national teaching standards, current research, current cognitive theories of learning.

CI 8594. Conducting Research in Science Education. (3 cr; Stdnt Opt. Prereq-sci educ research course) Application of research methodology to a specific science education issue.

CI 8595. Problems: Science Education. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-Cl grad student or #) Independent research.

CI 8650. Seminar: Special Topics in Second Languages and Cultures Research. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-Cl grad student or #) Research topics vary.

CI 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CI 8691. Readings in Second Languages and Cultures Education. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Independent reading.

CI 8695. Problems: Second Languages and Cultures Education. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#) Independent research.

CI 8742. Seminar: Research in Social Studies Education. (3 cr; A-F or Aud. Prereq-Cl grad student or #) Critical review and analysis of seminal research studies; criteria for appraising research findings; educational implications.

CI 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade)

CI 8795. Problems: Social Studies Education. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-Cl grad student or #) Independent research.

CI 8796. Research Internship in Social Studies Education. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Cl grad student) Internship with social studies education faculty member; experience in collecting and analyzing data; drafting and presenting reports; writing for publication.

CI 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required) Thesis credits: Doctoral

CI 8900. Family, Youth, and Community Colloquium. (1-4 cr [max 4 cr]; S-N only. Prereq-[MA or PhD] student) Theories, philosophies, practices, pedagogies, epistemologies, and public policies not dealt with in regular courses. Content varies by offering.
Sociology (SOC)

Sociology (SOC)
SOC 2111. Applied Social Research. (3 cr; A-F only. Prereq-Grad student) Principles of social science research. Hypothesis formulation, research design, data collection, analysis, and interpretation. Use of qualitative and quantitative methods.

Sociology (SOC)
SOC 2211. Social Research Methods II. (3 cr; A-F only. Prereq-Grad student) Advanced research methods. Focus on secondary data analysis, advanced descriptive and inferential statistics, qualitative methods, and critical evaluation of research.

Dance (DNCE)
DNCE 5200. Modern Dance Technique 8. (2 cr; Stdnt Opt, Prereq-5010, %, audition) Advanced technique, improvisation, choreography, music, design, and technical production as they relate to dance performance. Continuation of modern dance techniques. Graduates will be prepared to teach dance at the college level. Lab.

Dance (DNCE)

Dance (DNCE)

Dance (DNCE)
DNCE 5500. Topics in Dance. (1-3 cr [max 10 cr]; Stdnt Opt) Topics specified in Class Schedule.

Dance (DNCE)

Dental Therapy (DT)

Dental Therapy (DT)
DT 5140. Preventive Pediatric Dental Clinic. (1 cr; A-F only)
Oral health promotion of pediatric patients. Brushing techniques, fluoride application, dietary analysis/ counseling. Students interact with parents of pediatric patients.

DT 5141. Clinical Pediatric Dentistry III. (2 cr; A-F only. Prereq-Must be in the dental therapy program, passed basic foundation competencies)
Early childhood development, dental care for children.

DT 5210. Head and Neck Anatomy. (1 cr; A-F only. Prereq-Accepted into master’s dental therapy program)
Anatomical nomenclature in head/neck anatomy as they relate to dental therapy treatment.

DT 5211. Applied Pharmacology for the Dental Therapist. (2 cr; A-F only)
Principles of pharmacological drugs used in dentistry, modes of drug administration, therapeutic/adverse effects of drugs. Preparation for pharmacology of local anesthetics. Nitrous oxide sedation, prescription writing.

DT 5212. Local Anesthesia and Pain Management. (2 cr; A-F or Aud. Prereq-DT grad program)

DT 5230. Oral and Maxillofacial Radiology. (2 cr; A-F only. Prereq-DT grad program)
Production/utilization of radiographs in accordance with good professional judgement, as well as state/federal radiation regulations. Processing radiographs in darkroom. Processing a digital image.

DT 5231. Oral and Maxillofacial Radiology II. (1 cr; A-F only)
Use of X-rays in accordance with state/federal radiation regulations. Radiographic assessment of developmental and acquired anomalies of teeth, osseous structures, and maxillary sinus.

DT 5232. Oral and Maxillofacial Radiology Preclinical Laboratory. (0 cr; S-N only)
Preclinical demonstration-participation phases using mounted human skulls.

DT 5240. Oral Radiology Clinic II. (1 cr; A-F only. Prereq-Must be in dental therapy masters program)
Clinical instruction in oral radiography. Intraoral/extraradial radiographic procedures, evaluations.

DT 5250. Oral Histology and Embryology. (2 cr; A-F only. Prereq-Enrolled in master’s dental therapy program)

DT 5251. General and Oral Pathology. (1 cr; A-F only)
Principles of general and oral pathology with focus on etiology, progression, recognition, and treatment. Overview of diagnostic process and normal clinical findings.

DT 5320. Comprehensive Care Clinic. (4 cr; S-N only)
Assessment, treatment, and management of patients. Concepts/principles of evidence-based dentistry as applied to clinical practice.

DT 5330. Clinical Application I. (3 cr; A-F only. Prereq-Accepted into master’s dental therapy program)
Assessment principles related to medical/oral health status. Dental therapy clinical procedures, instrumentation skills. Health assessment, parts of periodontium, dental deposits, toothwear, dental disease/prevention, plaque control.

DT 5331. Provider Patient Relationships. (2 cr; A-F only)

DT 5332. Cariology and Applied Nutrition in Dental Therapy Care. (3 cr; A-F only)
Dental caries etiology, pathology/prevention. Applying principles of diet/nutrition to dental therapy patient care/counseling.

DT 5333. Dental Public Health and Academic Service Learning I. (3 cr; A-F only)
Dental therapist as engaged with diverse communities and as professionally responsible and ethical health care provider. Public health approach to disease. Ways in which U.S. oral health care is delivered. Facts, values, impacting supply/demand. Outreach experiences, service learning.

DT 5334W. Dental Therapy Care Process: Clinical Application II. (4 cr; A-F only)
Providing dental care for gerodontic patients and patients with disabilities.

DT 5335. Dental Practice Management. (3 cr; A-F only. Prereq-2nd yr dental therapy student)
Interprofessional course. Organizational, managerial, and financial systems that affect successful dental practice.

DT 5336. Ethics and Jurisprudence for the Dental Therapist. (1 cr; A-F only)

DT 5337. Dental Public Health and Service Learning II. (2 cr; A-F only)
How to assess, plan, implement, obtain funding for, and evaluate a public health program.

DT 5338W. Research Methods in Dental Therapy. (3 cr; A-F only. Prereq-Dental Therapy student)

DT 5359. Introduction to Outreach Experiences. (0 cr; S-N only)
Provide dental care to underserved populations in various clinical settings throughout Minnesota.

DT 5360. Outreach Experiences I. (1 cr; S-N only)
Students work in clinics outside of U of M with underserved patients.

DT 5361. Outreach Experiences II. (2 cr; S-N only)
Experiences that reinforce principles of delivering dental health care/services to patients, including underserved patient populations, in contemporary off-site clinical settings.

DT 5410. Applied Dental Biomaterials. (1 cr; A-F only. Prereq-2nd yr DT student)
Application of scientific principles to selection/ utilization of dental materials.

DT 5429. Introduction to Psychomotor Skill Development. (1 cr; S-N only. Prereq-In dental therapy program)
Virtual reality based training for psychomotor skills required in prosthodontic/operative courses. Eye-hand/mirror skills, ergonomics used while preparing teeth for restoration.

DT 5430. Oral Anatomy. (2 cr; A-F only. Prereq-Accepted into dental therapy masters program)
Morphological characteristics of human dentition, associated contiguous structures. Foundational knowledge applied to situations encountered in general dental clinical practice.

DT 5431. Oral Anatomy Laboratory. (3 cr; A-F only. Prereq-Accepted into masters in dental therapy program)
Manual dexterity skills, anatomy of human dentition.

DT 5432. Operative Dentistry I. (2 cr; A-F only)

DT 5433. Operative Dentistry I Pre-Clinic Laboratory. (2 cr; A-F only. Prereq-2nd yr masters in dental therapy student)

DT 5434. Operative Dentistry II Lecture. (1 cr; A-F only. Prereq-Enrolled in master’s in dental therapy program)
How to surgically manage more advanced caries lesions. Transition from pre-clinic lab to clinic setting.

DT 5435. Operative Dentistry II for the Dental Therapist, Lab. (1 cr; A-F only)

DT 5436. Operative Dentistry III. (1 cr; A-F only)
Transition of students from the pre-clinic laboratory to the clinic setting. Demonstrate competency in the surgical treatment of dental caries prior to being certified ready for patient care.

DT 5443. Operative Clinic III. (4 cr; A-F only)
How to place restorations. Students place single-tooth restorations on patients.

DT 5460. Essentials of Clinical Care I For the Dental Therapist. (1-12 cr; max 12 cr; S-N only)
Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, pediatric care, and health promotion. Limited care may be given on rotations to oral surgery clinics.

DT 5471. Prosthodontics Topics for Dental Therapy. (2 cr; S-N only)
Lectures, lab projects of selected prosthodontic techniques to enable the dental therapist to provide/ cement quality pre-fabricated metal or resin provisional crowns and other prosthodontic procedures in the scope of DT practice.

DT 5521. Foundations of Interprofessional Professionalism, Communication, and Collaboration . (1 cr; S-N only)
Professionalism, communication/collaboration across health professions. Online independent/group work followed by facilitated interprofessional small group discussions of case narratives.

DT 5960. Essentials of Clinical Care II for the Dental Therapist. (5-10 cr; max 20 cr; S-N only)
Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, pediatric care, and health promotion. Limited care may be given on rotations to oral surgery clinics.
Dentistry (DENT)

School of Dentistry

DENT 5050. Summer Student Selectives. (1-2 cr; max 2 cr; S-N only)
Clinical, laboratory, and practice issues. Faculty directed topics.

DENT 5102. Patient Management and Radiographic Interpretation. (2 cr; A-F or Aud. Prereq-Oral Rad I)

DENT 5103. Oral Radiology Preclinical Lab I. (1 cr; S-N or Aud)
This course consists of preclinical demonstration-participation phases in radiographic technique using mounted human skulls.

DENT 5104. Oral Radiology Preclinical Lab II. (1 cr [max 2 cr]; S-N or Aud)
This course consists of preclinical demonstration-participation phases of radiographic technique using mounted human skulls.

DENT 5121. Physical Evaluation I. (2.9 cr; A-F or Aud)
General concepts of diagnosis and patient evaluation for use during examination of patients in various adult clinical programs in the School of Dentistry.

DENT 5301. Introduction to Oral Biology. (8.1 cr [max 2.2 cr]; S-N or Aud)
Introduce the scientific foundation of dentistry. Oral microbiology, biochemistry, tissues, diseases, and pain will be related to clinical practice through lectures and discussions of current literature.

DENT 5302. Topics in Dental Biochemistry. (1.1 cr; A-F or Aud)
Biological, chemical, and biochemical phenomenon occurring in the oral cavity and the interrelationships between these phenomenon. Biological and chemical basis of dental caries and how saliva, dental plaque, and plaque fluid interact and impact on the caries process. Metabolic handling and antacaries mechanisms of fluoride.

DENT 5303. Microbiology for Dental Students. (6 cr; A-F or Aud. Prereq-(Dental) Biochemistry/ Histology)
General microbiology, bacterial pathogenesis, virology with specific emphasis on oral microbial ecology, dental caries and periodontal diseases. Evaluation of current literature will be done by student essays. Discussions are based on assigned literature and focus on methodology.

DENT 5322. Applied Dental Biomaterials. (1.6 cr; A-F or Aud. Prereq-5321)
Lectures on applications of dental materials, including areas of restorative dentistry, prosthodontics, orthodontics, and endodontics. Instruction in the scientific basis for selection and utilization of materials. Areas of current controversy, including replacement of traditional materials with new materials. Literature review seminars cover the evaluation principles for information sources on dental materials.

DENT 5351. Introduction to Dental Biomaterials. (1.7 cr; A-F or Aud)

DENT 5352. Applied Dental Biomaterials. (2 cr; A-F or Aud)
Principles of biomaterials science applied to practical usage. Prosthodontics, operative dentistry. Students apply scientific principles to selection/utilization of biomaterials and evaluate a recent research publication.

DENT 5401. Dental Care Delivery and Oral Epidemiology. (1.9 cr; A-F or Aud. [S]DH 4131)

DENT 5402. Prevention and Oral Health Promotion. (2.3 cr; A-F or Aud)

DENT 5411. Professional Problem Solving. (0 cr; A-F or Aud)
Critical thinking in ethical/professional problems in dentistry. How to organize, analyze, and reflect on issues, rights, responsibilities, codes of behavior/ethics, and consequences.

DENT 5412. Professional Problem Solving. (1 cr; A-F or Aud)
Critical thinking in ethical/professional problems in dentistry. How to organize, analyze, and reflect on issues, rights, responsibilities, codes of behavior/ethics, and consequences.

DENT 5601. Introduction to Clinical Preventive Dentistry. (2 cr; S-N or Aud)
Application of principles of prevention through case-based small group learning format and clinical experiences. Clinical observation of preventive protocols/techniques. Students prepare/deliver presentation on preventive topic.

DENT 5612. Periodontology Technique. (2 cr; A-F or Aud)
Presurgical procedures in periodontics. Development of clinical skills to examine, diagnose, prevent, and treat periodontal patients.

DENT 5613. Periodontology Technique II. (1 cr; S-N or Aud. Prereq-5612)
Extension of DENT 5612. Closely supervised, students treat at least three periodontal patients during the summer semester. Students develop clinical skills to examine, diagnose, prevent, and treat periodontal patients before assuming responsibility for their comprehensive care.

DENT 5800. Introduction to Psychomotor Skill Development. (6 cr; A-F only. Prereq-DDS student)
Virtual-reality-based training for psychomotor skills. Mirror skills, proper ergonomics. Preparation of intra-coronal activity.

DENT 5803. Operative Dentistry II Laboratory. (2 cr; A-F or Aud. Prereq-Operative Dentistry I)
Diagnosis, treatment planning, and treatment of moderate to severe phase of dental caries. Use of dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modifications to teeth.

DENT 5804. Operative Dentistry II Lab. (5 cr; A-F or Aud. Prereq-Operative Dentistry I Lab)
Exercises in treatment of moderate to severe phase of dental caries utilizing dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modifications to teeth.

DENT 5806. Introduction to Psychomotor Motor Skills II. (1.1 cr; S-N only. Prereq-5815 yr DDS Program)
Maintaining r psychomotor skills for tooth preparation work.

DENT 5907. Preclinical Prosthodontics Technique Lecture IV. (3 cr; A-F or Aud. Prereq-5901, 5903, 5904, 5905, 5906)
Fixed, removable, and occlusion topics.

DENT 5908. Preclinical Prosthodontic Technique Laboratory IV. (3 cr; A-F or Aud. Prereq-5901, 5902, 5903, 5904, 5905, 5906)
Fixed, removable, and occlusion topics.

DENT 8031. Topics and Problems in Dental Education. (1-3 cr [max 3 cr]; Stdent Opt)
Independent study in student learning, instructional development, curriculum planning, student testing and evaluation, and academic administration, where these areas and their interfaces are applied directly to professional dental education. Provides opportunity for applying and extending concepts learned in Dent 7033.

DENT 8090. Evidence-based Clinical Pediatric Dentistry. (2 cr; A-F or Aud)
Selected pediatric dentistry topics. In-depth literature review, seminar discussion.

DENT 8091. Interdisciplinary Care of the Cleft Palate Patient. (1 cr; S-N or Aud)
Comprehensive surgical, dental, and speech and hearing evaluation and management of patients with cleft lip and palate.

DENT 8100. Topics in Advanced Periodontology: Literature Review. (2 cr; Stdent Opt)
State-of-the-art information on a variety of topics concerning risk factors and therapeutic modalities for periodontal disease.

DENT 8101. Dental Implantology: A Multidisciplinary Approach. (2 cr; Stdent Opt)
Dental implant therapy from perspective of several dental disciplines.

DENT 8120. Advanced Principles and Techniques of TMJ and Orofacial Pain Disorders. (3 cr; A-F or Aud. Prereq-Participation in TMJ and orofacial pain advanced education program)
Interdisciplinary study of theory, principles, epidemiology, and mechanisms associated with TMJ and craniofacial pain disorders and a basis for scientific understanding of diagnostic and management strategies for them.

DENT 8121. Current Literature in TMJ and Craniofacial Pain. (1 cr; A-F or Aud)
Review of current literature and of how it relates to past literature, theories on pain, and philosophies of management.

DENT 8123. Advanced Topics in Orofacial Pain. (3 cr; A-F or Aud. Prereq-Grad student in dentistry or other health sciences grad student or #)
Review of cutting edge research and clinical findings regarding etiology/treatment of acute/chronic orofacial pain conditions and related disorders.

DENT 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DDS consent)

DENT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Design (DES)

College of Design

DES 5160. Topics in Design. (1-4 cr [max 24 cr]; A-F only)
Topics in design

DES 5165. Design and Globalization. (5 cr; A-F or Aud. [S]DES 4165. Prereq-Grad student)
Movement of people, products, and ideas. Challenges brought by differences among us.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

**DES 5168. Evidence-Based Design.** (3 cr; A-F or Aud. Prereq-CDes grad student or #) Origins of evidence-based design/possible benefits and detractors. Students learn various components as a process/ explore methods of integrating process via application to a design project in their area of expertise. Process, impact, influences, and anticipated outcomes are documented/ analyzed as compared to a typical design process approach.

**DES 5710. Topics in Design.** (1-4 cr [max 8 cr]; A-F or Aud) In-depth investigation of single specific topic, announced in advance.

**DES 5810. Split Rock Arts Topics.** (1-2 cr [max 4 cr]; A-F or Aud) In-depth investigation of a specific topic, announced in advance.

**DES 5815. Human Factors in Design.** (3 cr; A-F or Aud. Prereq-Grad student or sr or #) Theories/methods that influence the assessment of physical, social, and psychological human factors. Development of user needs with application to designed products that interact with human body.

**DES 5193. Directed Study in Design.** (1-6 cr [max 36 cr]; A-F only. Prereq-%) Active learning. Teaching with technology. Lecture, seminar courses. Learning styles, best practices for educational processes/methods in design studio/ field investigations.

**DES 8101. Philosophical Foundations.** (4 cr; A-F or Aud) The nature of thought underlying/within professional areas of field.

**DES 8102. Quantitative Research Methods.** (3 cr; A-F only) Quantitative research methods for issues related to humans, their behaviors, and everyday living in the designed environment.

**DES 8103. Qualitative and Mixed Methods Research.** (3 cr; A-F or Aud) A scientific approach to qualitative research. Methods/ strategies combined to explore complex research questions.

**DES 8112. Design Theory.** (3 cr; A-F or Aud) Theories used in design disciplines. Existing designed environments. Designer’s purpose. Problem-solving processes. Interaction between humans and design. Field investigations.


**DES 8114. Design Studio.** (4 cr; A-F or Aud. Prereq-Design grad student or #) Advanced problem analysis, design solution.

**DES 8115. Grant Writing.** (2 cr; A-F or Aud) Interdisciplinary course.

**DES 8151. Product Development.** (3 cr; A-F only) Product development theories/methods as applied in many design fields. Emphasizes retail setting. Seminar format discussion, case studies, observation/ critique of hands-on industry product development project.

**DES 8164. Innovation Theory and Analysis.** (3 cr; A-F or Aud) Theories and factors that influence adoption and diffusion of designed products. Methodologies used in analysis of diffusion process.

**DES 8166. Material Culture and Design.** (3 cr; A-F or Aud. Prereq-[DHA or DES] grad student or #) Research approaches to material culture study using artifacts from Goldstein Museum of Design.

**DES 8167. Aesthetics of Design.** (3 cr; A-F or Aud) How we perceive, analyze, value, and evaluate design outcomes/results.

**DES 8170. Topics in Design.** (1-3 cr [max 6 cr]; A-F or Aud) In-depth investigation of topic announced in advance.

**DES 8181. Research Ethics.** (1 cr; S-N or Aud. Prereq-Grad student) Overview of ethical concerns/questions in conducting/ disseminating research. Mentoring relationships, use of human subjects, data handling, plagiarism, authorship, publishing, research funding, social responsibility of researchers, code of conduct.

**DES 8533. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

**DES 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**DES 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer registration to fulfill up to four times, up to 60 combined cr) Doctoral pre-thesis credits.

**DES 8777. Thesis Credits: Master’s.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**DES 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

**Development Studies and Social Change (DSSC)**

**Interdisciplinary Ctr for Study of Global Change**

**College of Liberal Arts**

**DSSC 8111. Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change.** (2 cr; S-N or Aud. Prereq-Grad DSSC minor or #) Approaches practiced by physical, biological, social science, and humanities scholars. “Ways of knowing” in different cultures/groups. Issues/methodological challenges facing interdisciplinary/international studies. Team taught by faculty from biological, social sciences, and humanities.


**DSSC 8211. Doctoral Research Workshop in Development Studies and Social Change.** (2 cr; S-N or Aud. Prereq-Grad DSSC minor or #) Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Taken during the year before undertaking field research, typically the third year of graduate study.

**DSSC 8212. Doctoral Research Workshop in Development Studies and Social Change.** (1 cr; S-N or Aud. Prereq-Grad DSSC minor or #) Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Taken during the year before undertaking field research, typically the third year of graduate study.

**DSSC 8310. Topics in Development Studies and Social Change.** (1 cr [max 3 cr]; S-N only. Prereq-Grad DSSC minor or #) Seven-week seminar. Topical issues in development and social change.

**Dutch (DTCH)**

**Department of German, Scandinavian, and Dutch**

**College of Liberal Arts**

**DTCH 5993. Directed Studies.** (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-#, %, [B]) Guided individual reading or study.

**Early Modern Studies (EMS)**

**Department of History**

**College of Liberal Arts**

**EMS 8100. Workshop in Early Modern Studies.** (1-3 cr [max 3 cr]; S-N only. Prereq-#) Lectures/workshops offered by various centers, departments, institutes, and libraries across disciplines on Twin Cities campus. Online reports/discussion.


**EMS 8500. Topics in Early Modern Studies.** (3 cr [max 6 cr]; Stdnt Opt. Prereq-Grad student) Selected topics in early modern studies from various disciplinary perspectives and world regions.

**EMS 8993. Directed Study.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Grad student) Students work on tutorial basis. Guided individual reading or study.

**Earth Sciences (ESCI)**

**Department of Earth Sciences**

**College of Science and Engineering**

**ESCI 5102. Climate Change and Human History.** (3 cr; Stdnt Opt. [S]ESCI 3002. Prereq-1001 or equiv or #) Causes of long-/short-term climate change. Frequency/magnitude of past climate changes, their geologic records. Relationship of past climate changes to development of agrarian societies and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years.

**ESCI 5201. Time-Series Analysis of Geological Phenomena.** (3 cr; A-F or Aud. Prereq-Math 2265 or #) Time-series analysis of linear and nonlinear geological and geophysical phenomena. Examples drawn from ice age cycles, earthquakes, climate 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.
Courses

Ecology, Evolution, and Behavior (EEB)

Department of Ecology, Evolution and Behavior

College of Biological Sciences

EEB 5042. Quantitative Genetics. (5 cr; A-F only, Prereq-[BIOL 4003 or GCD 3022] or #; a course in statistics is recommended) Fundamentals of quantitative genetics. Genetic/environmental influences on expression of quantitative traits. Approaches to characterizing genetic basis of trait variation. Processes that lead to change in quantitative traits. Applied evolutionary aspects of quantitative genetic variation.


EEB 5068. Plant Physiological Ecology. (3 cr [S]) EEB 4068. Prereq: BIOL 2022 or BIOL 3022 or BIOL 3407 or BIOL 4087 or BIOL 5022 or BIOL 5407 W or #) Plant function, its plasticity/diversity in ecological context. Impact of environmental stresses on major physiological processes of plants, including photosynthesis, respiration, water uptake/transport, and nutrient uptake/assimilation. Lab, field trip to Cedar Creek.


EEB 5221. Molecular Evolution. (5 cr; A-F or Aud, Prereq-[BIOL 4003 or GCD 3022, grad student]) or #) Molecular basis of evolutionary change. Selection, neutral evolutionary processes at molecular level. Evolution from gene to genome level: protein structure/function, multigene families, organelle genomes, genome organization. Lectures, current literature, workshops.

EEB 5322. Evolution and Animal Cognition. (3 cr, Stdnt Opt. Prereq: Biol 3411 or PSGY 3061 or #) Animal cognitive abilities. Learning, perception, memory, navigation, and communication from evolutionary/comparative perspective. Cognitive abilities as adaptations that solve specific environmental problems. Empirical methods for assessing cognitive abilities. Emphasizes parsimonious interpretations of data. Controversial topics such as animal intelligence, animal language and whether non-human animals have a “theory of mind.”

EEB 5323. Neural and Endocrine Mechanisms Underlying Vertebrate Behavior. (2 cr; A-F or Aud, Prereq: Biol 3411 or Biol 3011 or NSEC 301 or Phsl 3101 or #) Selected aspects of the physiological basis of vertebrate behavior with emphasis on neural and endocrine integration and the effects of evolutionary pressures on it. Hormones and sex behavior, sensory perception, neuroethology of communication.


EEB 5601. Limnology. (3 cr, Stdnt Opt. Prereq: Grad student or #) Advanced introduction to description/analysis of interaction of physical, chemical, and biological factors that control functioning of life in lakes and other freshwater aquatic environments.

EEB 5605. Limnology Laboratory. (2 cr; A-F or Aud, Prereq: 5603 or #) Field/lab methods to obtain information on environmental conditions in aquatic environments and measure abundance of aquatic organisms, especially plankton. Field/lab instruments, sampling devices, microscopy, water chemistry, data analysis.

EEB 5609. Ecosystem Ecology. (3 cr; Stdnt Opt. Prereq: Biol 5407 or Biol 5407 or #) Regulation of energy and elements cycling through ecosystems. Dependence of cycles/numbers of species within ecosystems. Effects of human-induced global changes on functioning of ecosystems.

EEB 5953. Modeling Nature and the Nature of Modeling. (3 cr; Stdnt Opt. [S] EEB 5953, Prereq: Math 1281, Math 1282 or equiv or #) Hands-on modeling experiences in context of biological applications. Reviews calculus concepts. Students carry out modeling steps, from developing the model, to analytical analysis, to developing computer code, to running the models.

EEB 8010. Seminar in Paleoecology. (1 cr [max 4 cr]; S-N or Aud. Prereq: #) Reading and discussion of recent literature on Quaternary paleoecology.

EEB 8020. Community Ecology Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq: #) Research topics in selected areas.

EEB 8050. Population Biology Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq: #) Research topics in selected areas.

EEB 8051. Empirical Ecology. (4 cr; Stdnt Opt. Prereq: stat or biome course or #) Overview of analytical methods in interpreting data collected from observational and experimental studies in ecology in related fields of evolution, behavior, and conservation biology. Univariate, bivariate, and multivariate methods, including computationally intensive methods, ordination, and hypothesis testing.

EEB 8060. Evolutionary Genetics Seminar. (5 cr [max 5 cr]; S-N or Aud. Prereq: #) Research topics in selected areas.

EEB 8080. Sustainability Science Distributed Graduate Seminar. (3 cr; A-F only) Theories of sustainability science. Interactions between human/environmental systems. Improving present/future generations. Presentations/papers. Contemporary research from earth systems science, resource economics, institutional analysis, ecology, geography, development studies, health sciences, engineering.


EEB 8333. FTE: Master’s. (1 cr; No grade. Prereq: Master’s student, adviser and DGS consent)

EEB 8360. Behavioral Biology Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq: #) Research topics in selected areas.

EEB 8444. FTE: Doctoral. (1 cr; No grade. Prereq: Doctoral student, adviser and DGS consent)

EEB 8500. NSF GRF Graduate Research Fellowship Proposal Writing Seminar. (1 cr [max 2 cr]; S-N only. Prereq: EEB grad student only) Prepare EEB students to submit competitive fellowship proposal to an external organization (e.g., NSF Graduate Research Fellowship program). In addition to announced meeting times, students meet once a week in small groups to discuss proposals/provide each other with feedback.

EEB 8550. Graduate Research Fellowship Proposal Writing Seminar. (1 cr [max 2 cr]; S-N only) How to submit competitive fellowship proposal to external organization (e.g., National Science Foundation Graduate Research Fellowship program). Besides scheduled class, students meet weekly in small groups to discuss proposals/give feedback.

EEB 8601. Introduction to Stream Restoration. (3 cr; Stdnt Opt. [S] ESCI 8601. Prereq: Grad student in [CE or GEO or EEB or WRS or FW or BAE or FR or HORT or ENR or LA or SRSE or #] Science/policy behind stream restoration. How to evaluating/criticizing a stream restoration project. Assistive geomorphic, hydrologic, and ecological data at watershed and reach scales to plan a restoration project. Developing a monitoring/assessment program for an existing or future restoration project.

EEB 8602. Stream Restoration Practice. (2 cr; S-N only. [S] ECSI 8602, ESCI 8602. Prereq: CE 8601 or GEO 8601) Field experience, group design project. Students provide a stream restoration context for each other’s elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site.


EEB 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq: Doctoral student who has not passed prelim oral, no required consent for 1st/2nd registrations, up to 12 combined cr; 4% for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

EEB 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only])

EEB 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq: Max 18 cr per semester or summer; 24 cr required)

EEB 8980. Seminar on Current Topics. (1-3 cr [max 50 cr]; S-N only. Prereq: [1st yr or 3rd sem] grad student, #) Current research in ecology, evolution, and behavior.

EEB 8990. Graduate Seminar. (1-3 cr [max 30 cr]; Stdnt Opt. Prereq: #) Research topics in selected areas.


ECON 8105. Macroeconomic Theory. (2 cr; Stdnt Opt. Prereq-5112 or equiv, Math 2243, Math 2263 or equiv or #) Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4165.


Courses

ECON 8203. Econometric Analysis. (2 cr; Stdent Opt. Prereq-ECON 8202)
Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models.

ECON 8204. Econometric Analysis. (2 cr; Stdent Opt. Prereq-ECON 8203)
Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models.

Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

ECON 8211. Econometrics. (2 cr; Stdent Opt. Prereq-5151, 5152, Math 4242 or equiv, Stat 5102 or #)
Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course.

ECON 8212. Econometrics. (2 cr; Stdent Opt. Prereq-8211)
Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course.

ECON 8213. Econometrics. (2 cr; Stdent Opt. Prereq-8212)
Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course.

ECON 8281. Advanced Topics in Econometrics. (2 cr [max 4 cr]; Stdent Opt. Prereq-8213 or #)
Faculty and student presentations based on recent literature. This is a 7-week course.

ECON 8291. Workshop in Econometrics. (1-3 cr; max 10 cr; Stdent Opt. Prereq-8213 or #)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8292. Workshop in Econometrics. (1-3 cr; max 10 cr; Stdent Opt. Prereq-8213 or #)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8311. Economic Growth and Development. (2 cr; Stdent Opt. Prereq-8104, 8106 or #)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course.

ECON 8312. Economic Growth and Development. (2 cr; Stdent Opt. Prereq-8311 or #)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course.

ECON 8313. Economic Growth and Development. (2 cr; Stdent Opt. Prereq-8312 or #)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course.

ECON 8333. FTE: Master's. (1 cr; No grade.
Prereq-Master's student, adviser and DGS consent)
ECON 8381. Advanced Topics in Economic Development. (2 cr [max 4 cr]; Stdent Opt. Prereq-8312 or #, offered when feasible)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8391. Workshop in Economic Growth and Development. (1-3 cr [max 10 cr]; Stdent Opt. Prereq-#)
Workshop in Economic Growth and Development.

ECON 8392. Workshop in Economic Growth and Development. (1-3 cr [max 10 cr]; Stdent Opt. Prereq-#)

ECON 8401. International Trade and Payments Theory. (2 cr; Stdent Opt. Prereq-8103, 8105 or #)

ECON 8402. International Trade and Payments Theory. (2 cr; Stdent Opt. Prereq-8401 or #)
Tariffs, quotas, and other barriers to trade; gains from trade; trading blocs; increasing returns; growth. This is a seven-week course.

ECON 8403. International Trade and Payments Theory. (2 cr; Stdent Opt. Prereq-8402 or #)
International business cycles, exchange rates; capital movements, international liquidity. This is a 7-week course.

ECON 8404. International Trade and Payments Theory. (2 cr; Stdent Opt. Prereq-8402, 8403 or #)
Theoretical models of international trade. Trade data, empirical work on trade. Seven week course.

ECON 8444. FTE: Doctoral. (1 cr; No grade.
Prereq-Doctoral student, adviser and DGS consent)
ECON 8481. Advanced Topics in International Trade. (2 cr [max 4 cr]; Stdent Opt. Prereq-8403 or #)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8482. Advanced Topics in International Trade. (2 cr [max 4 cr]; Stdent Opt. Prereq-8403 or #)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8491. Workshop in Trade and Development. (1-3 cr [max 10 cr]; Stdent Opt. Prereq-#)
Workshop in Trade and Development.

ECON 8492. Workshop in Trade and Development. (1-3 cr [max 10 cr]; Stdent Opt. Prereq-#)

ECON 8501. Wages and Employment. (2 cr; Stdent Opt. Prereq-8102, 8106 or #)
Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage and employment theories and practices. Economic impacts of unions. Seven-week course.

ECON 8502. Wages and Employment. (2 cr; Stdent Opt. Prereq-8501)
Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage/employment theories/practices. Economic impacts of unions. Seven-week course.

ECON 8503. Wages and Employment. (2 cr [max 4 cr]; Stdent Opt. Prereq-8502 or #)

ECON 8581. Advanced Topics in Labor Economics. (2 cr [max 4 cr]; Stdent Opt. Prereq-8502 or #)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8582. Advanced Topics in Labor Economics. (2 cr [max 4 cr]; Stdent Opt. Prereq-8502 or #)
Faculty and student presentations based on recent literature. Seven-week course.

ECON 8504. International Trade and Payments Theory. (2 cr; Stdent Opt. Prereq-8401 or #)
Theory of trade and factor movements. Factor price equalization theorems. Trade balance. Seven-week course.

ECON 8505. International Trade and Payments Theory. (2 cr; Stdent Opt. Prereq-8504 or #)
International trade theories/practices. Economic impacts of unions. Seven-week course.

ECON 8506. Industrial Organization and Government Regulation. (2 cr; Stdent Opt. Prereq-8102 or #)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course.

ECON 8507. Industrial Organization and Government Regulation. (2 cr; Stdent Opt. Prereq-8102 or #)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course.

ECON 8508. Industrial Organization and Government Regulation. (2 cr; Stdent Opt. Prereq-8102 or #)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course.
ECON 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ECON 8681. Advanced Topics in Industrial Organization. (2 cr [max 4 cr]; Stdnt Opt. Prereq-8603 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8691. Workshop in Applied Microeconomics. (1-3 cr [max 10 cr]; Stdnt Opt. Prereq-#) Workshop in Applied Microeconomics

ECON 8692. Workshop in Applied Microeconomics. (1-3 cr [max 10 cr]; Stdnt Opt. Prereq-#) Workshop in Applied Microeconomics

ECON 8701. Monetary Economics. (2 cr; Stdnt Opt. Prereq-8103, 8106 or #) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8702. Monetary Economics. (2 cr; Stdnt Opt. Prereq-8701 or #) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8703. Monetary Economics. (2 cr [max 4 cr]; Stdnt Opt. Prereq-8702 or #) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8704. Financial Economics. (2 cr; Stdnt Opt. Prereq-8103, 8106 or #) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course.

ECON 8705. Financial Economics. (2 cr; Stdnt Opt. Prereq-8704 or #) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course.

ECON 8706. Financial Economics. (2 cr; Stdnt Opt. Prereq-8705 or #) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course.

ECON 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

ECON 8781. Advanced Topics in Monetary Economics. (2 cr [max 4 cr]; Stdnt Opt. Prereq-8702 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8791. Workshop in Macroeconomics. (1-3 cr [max 10 cr]; Stdnt Opt. Prereq-#) Workshop in Macroeconomics

ECON 8792. Workshop in Macroeconomics. (1-3 cr [max 10 cr]; Stdnt Opt. Prereq-#) Workshop in Macroeconomics


ECON 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

EDHD 5000. Cultures, Schools, and Communities (Human Relations). (1 cr; A-F only. Prereq-[ ]SED 5020. Prereq-Enrolled in teacher initial licensure program) Addressing social/cultural dimensions of education. Challenges/dilemmas facing contemporary educators. Speakers, simulations, presentations, professional learning communities, field assignments.


EDHD 5003. Developmental and Individual Differences in Educational Contexts. (2 cr; A-F or Aud. Prereq-Prereq-Teacher preparation program in [CEHD or music education or agriculture education or DirectTrack] or #; licensure students must take this course for a grade) Exceptionalities in educational settings as defined in federal/state rules/regulations. Historical perspectives, definitions, etiology, needs, characteristics. Service delivery systems for each exceptionality.

EDHD 5004. Teaching Students With Special Needs in Inclusive Settings. (2 cr; A-F or Aud. Prereq-Teacher preparation program in [CEHD or music education or agriculture education or DirectTrack] or #; licensure students must take this course for a grade) Exceptionalities in educational settings as defined in federal/state rules/regulations. Historical perspectives, definitions, etiology, needs, characteristics. Service delivery systems for each exceptionality.

EDHD 5005. School and Society. (2 cr; A-F or Aud. Prereq-Prereq-Teacher preparation program in [CEHD or music education or agriculture education or DirectTrack] or #; licensure students must take this course for a grade) Exceptionalities in educational settings as defined in federal/state rules/regulations. Historical perspectives, definitions, etiology, needs, characteristics. Service delivery systems for each exceptionality.

EDHD 5007. Technology for Teaching and Learning. (1.5 cr; A-F or Aud. Prereq-[MED/initial licensure or CLA music ed major or preteaching major or #] Diversified educational technology in K-12 classrooms. Effective use of technology. Computer technologies used to stimulate personal productivity/communication and to enhance teaching/learning processes.

EDHD 5008. Reading in the Content Areas for Initial Licensure Candidates. (1-2 cr [max 2 cr]; A-F only. Prereq-Concurrent enrollment in licensure area methods course(s), enrolled in Initial Licensure Program, Internet access, basic understanding of [computer use, Web browsers, email, word processing software]) Web-based course. Fostering students’ reading related to learning from text.

For definitions of course numbers, abbreviations, and symbols, see page 3.
EDHD 5009. Human Relations: Applied Skills for School and Society. (1 cr; A-F or Aud. Prereq-MED/int'l lic or CLA music ed/preteaching or #) Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/decision making, prejudice reduction, conflict resolution, teaching in diverse educational settings.

EDHD 5010. Cultures, Schools, and Communities (Human Relations). (2 cr; A-F only. Prereq-Enrollment in initial licensure program) Addressing social/cultural dimensions of education. Challenges/dilemmas facing contemporary educators. Speakers, simulation, presentations, professional learning communities, field assignments.

EDHD 5013. Child and Adolescent Development for Teaching and Learning. (1 cr; A-F only. Prereq-Enrolled in teacher initial licensure program) Attending to constant transitions/development in which children and adolescents negotiate their road to adulthood. How to foster learning/positive development.

EDHD 5014. Child and Adolescent Development for Teaching and Learning. (2 cr; A-F only. Prereq-Enrolled in teacher initial licensure program) Attending to constant transitions/development in which children and adolescents negotiate their road to adulthood. How to foster learning/positive development.

EDHD 5015. Teaching Students with Special Needs in Inclusive Settings. (1 cr; A-F only. Prereq-Enrolled in a teacher initial licensure program) Areas of exceptionality defined in federal/state regulations. Historical perspectives, definitions, etiology, characteristics, needs, and service delivery systems. Collaborating with special education personnel.

EDHD 5016. Teaching Students with Special Needs in Inclusive Settings. (1 cr; A-F only. Prereq-Enrolled in teacher initial licensure program) Attending to constant transitions/development in which children/adolescents negotiate their road to adulthood. How to foster learning/positive development.

EDHD 5017. Academic Language and English Learners. (1 cr; A-F only. Prereq-Enrolled in teacher initial licensure program) Working with English learners and other linguistically diverse students across content areas to develop academic language proficiency.

EDHD 5018. Academic Language and English Learners. (1 cr; A-F only. Prereq-Enrolled in teacher initial licensure program) Working with English learners and linguistically diverse students across all content areas to develop academic language proficiency.

EDHD 5200. Special Topics: Professional Development for Educators. (1-3 cr [max 12 cr]; Stdnf Opt) Special topics course that permits offering a variety of research-based and scholarly content to meet the needs of educators from P-12 settings.

EDHD 5300. Special Topics in Education and Human Development. (1-6 cr [max 12 cr]; Stdnf Opt) Special topics in education and human development.

Educational Psychology (EPSY)

Department of Educational Psychology

College of Education and Human Development

EPSY 5101. Intelligence and Creativity. (3 cr; A-F or Aud. [EPSY 3101]) Contemporary theories of intelligence and intellectual development and contemporary theories of creativity and their implications in educational practices and psychological research.

EPSY 5112. Knowing, Learning, and Thinking. (4 cr; A-F or Aud) 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. (5 cr; Stdnf Opt) 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 or Aud. [EPSY 3101]) 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; Stdnf Opt) Survey of adult learning/education. Emphasizes instructional design, learning theories, experience, individual differences, evaluation, tests/measurement, technology. Implications for curricular/instructional design in higher education, continuing education, professional/business related training.

EPSY 5119. Mind, Brain, and Education. (3 cr; Prereq-3301 or equiv) How educationally relevant skills/concepts develop in both typical/atypical children.

EPSY 5135. Human Relations Workshop. (4 cr; Stdnf Opt) 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 5142. Play in Development and Education. (3 cr; A-F only. Prereq-Course in child or developmental psychology) Development/functions of play in humans with comparisons made to other species, especially non-human primates. Play as it relates to developmentally appropriate practice.

EPSY 5151. Cooperative Learning. (3 cr; Stdnf Opt) 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 5153. Social Development in PreK to Secondary Schools. (3 cr; A-F only. Prereq-Course in psychology) Social development in educational settings, from preschool through high school.

EPSY 5157. Social Psychology of Education. (3 cr; A-F or Aud) Overview of social psychology and its application to education. Participants study the major theories, research, and major figures in field. Class sessions include lectures, discussions, simulations, role-plays, and experiential exercises.

EPSY 5191. Education of the Gifted and Talented. (3 cr; A-F or Aud) 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]; Stdnf Opt) 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 and Human Development. (3 cr; A-F or Aud. Prereq-5261 or intro statistics course) Designing/conducting a research study. Reviewing literature, formulating research problem, using different approaches to gather data, managing/analyzing data, reporting results.

EPSY 5220. Special Topics: Quantitative Methods. (1-4 cr [max 30 cr]; Stdnf Opt) Focus on special topics in methodological concepts involving theory, research, and practice in statistics, measurement, evaluation, and statistics education not covered in other courses.

EPSY 5221. Principles of Educational and Psychological Measurement. (3 cr; Stdnf Opt) Concepts, principles, and methods in educational/psychological measurement. Reliability, validity, item analysis, scores, score reports (e.g., grades). Modern measurement theories, including item response theory and generalizability theory. Emphasizes construction, interpretation, use, and evaluation of assessments regarding achievement, aptitude, interests, attitudes, personality, and exceptionality.

EPSY 5243. Principles and Methods of Evaluation. (3 cr; Stdnf Opt. [S]OLPD 5501) Introductory course in program evaluation, planning an evaluation study, collecting and analyzing information, reporting results; overview of the field of program evaluation.

EPSY 5244. Survey Design, Sampling, and Implementation. (3 cr; Stdnf Opt. Prereq-[5221 or 5231 or 5261 or equiv]. [CEHD grad student or MED student]) Survey methods, including mail, phone, and Web-based e-mail surveys. Principles of measurement, constructing questions/forms, pilot testing, sampling, data analysis, interpreting results. Students develop a survey proposal and a draft survey, pilot the survey, and develop sampling/data analysis plans.

EPSY 5246. Evaluation Colloquium: Psychological Foundations. (1 cr [max 8 cr]; S-N or Aud. [S]OLPD 5524. Prereq-5243 or EDPA 5501) Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation.

EPSY 5247. Qualitative Methods in Educational Psychology. (3 cr; Stdtnt Opt. Prereq-Grad student) Introduction to qualitative methods of inquiry. Contrasting different research traditions (e.g., case study, phenomenology, ethnography, social interactionism, critical theory). Practice with field notes, observations, and interviewing. Use of NVIVO to track/code data.


EPSY 5272. Statistics Teaching Internship. (1-3 cr [max 3 cr]; S-N only. Prereq-Grad student, #) Supervised teaching experience.

EPSY 5281. Introduction to Computer Operations and Data Analysis in Education and Related Fields. (3 cr; Stdtnt Opt. Prereq-Statistics course) How to use the computer to access/analyze information. National, state, local, and specialty Web sites that contain data of interest to social scientists. Using EXCEL, SPSS, SAS, and R for data analysis.

EPSY 5300. Special Topics in Educational Psychology. (1-9 cr [max 9 cr]; Stdtnt Opt) Current issues in educational psychology or related areas not normally available through regular curriculum offerings.

EPSY 5400. Special Topics in Counseling Psychology. (1-4 cr [max 8 cr]; Stdtnt Opt) Theory, research, and practice in counseling and student personnel psychology. Topics vary.

EPSY 5401. Counseling Procedures. (3 cr; Stdtnt Opt. Prereq-Upper div student) Emphasis on the counseling relationship and principles of interviewing. Case studies, role playing, and demonstration. For individuals whose professional work includes counseling and interviewing.


EPSY 5421. Leadership and Administration of Student Affairs. (3 cr; Stdtnt Opt. [S]OLPD 5724) Theoretical approaches, administrative structure, and evaluation methods used in college/university student affairs.

EPSY 5432. Foundations of Individual/Organizational Career Development. (3 cr; Stdtnt Opt) 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 5604. Transition From School to Work and Community Living for Persons With Special Needs. (3 cr; Stdtnt Opt) Use of strategies/models for improving transition of youth from school to work and community living. Course content that specifically addresses all phases of student assessment, individualized transition planning. Parent, family, and student involvement in designing post school options. Community-based services (employment, residential living, social and recreational services, etc). Comprehensive interagency approaches.


EPSY 5612. Understanding of Academic Disabilities. (3 cr; A-F or Aud) Introduction to issues related to the education of students with academic disabilities (learning disabilities, mild mental intellectual disabilities, and emotional/behavioral disabilities) including history, definition, assessment, classification, legislation, and intervention approaches.

EPSY 5613. Foundations of Special Education I. (3 cr; A-F or Aud. Prereq-Child development course, 5601 or equiv) Emphasis on the organization of educational programs and services for people with disabilities and their families. First course for students seeking to become licensed teachers in special education.

EPSY 5614. Foundations of Special Education II. (3 cr; A-F or Aud. Prereq-5613) Emphasis on assessment, planning, and implementing educational programs for people with disabilities. Second course for students seeking to become licensed teachers in special education.

EPSY 5615. Advanced Academic Interventions. (3 cr; A-F or Aud. Prereq-5612) Designing, implementing, and evaluating individual educational plans (IEPs) for special education service in learning disabilities, emotional/behavioral disorders, and mild mental/intellectual disabilities.

EPSY 5616. Behavior Analysis and Classroom Management. (3 cr; Stdtnt Opt) Introduction to assumptions/principles, and procedures of behavioral approach to analyzing behavior and programs for classroom management. Emphasis on specifying problems, conducting observations, intervening, and evaluating behavioral change.

EPSY 5618. Specialized Interventions for Students With Disabilities in Reading and Written Language. (3 cr; A-F or Aud. Prereq-Enrollment in [EBD or LD or DD or D/HH] or #) Historical/contemporary perspectives, empirical evidence relating to reading/written language instruction/assessment designed to improve outcomes of students with disabilities. Field work in tutoring.

EPSY 5621. Academic Instruction for Students with Mild to Moderate Intellectual Disabilities. (3 cr; A-F or Aud. Prereq-5613, 5614) Methods and materials course. Functional approaches to promoting academic learning in students with mild to moderate or moderate to severe intellectual disabilities.

EPSY 5622. Programs and Curricula for Learners with Severe Disabilities. (3 cr; Stdtnt Opt. Prereq-5616) Emphasis on developing programs and curricula for students with moderate, severe, and profound developmental delays, as well as severe multihandicapping conditions. Special consideration given to preparing children and youth for integrated community environments.


EPSY 5626. Seminar: Developmental Disabilities and Instructional Management. (3 cr; Stdtnt Opt. Prereq-[5621, 5622] or #) Data-based strategies for school and non-school instruction of learners with developmental disabilities including assessment, design, implementation, and evaluation of curriculum and instruction: curriculum content, concept and task arrangement, classroom management, natural and instructional cues, corrections, and consequences.

EPSY 5636. Sensory Impairments of Learners With Intellectual Disabilities. (2 cr; Stdtnt Opt. Prereq-5613, 5614) Characteristics of learners with visual and auditory impairments; design of instructional programs to remediate or circumvent circumstances, including use of prosthetic devices; related areas of performance affected by sensory impairments.

EPSY 5641. Foundations of Education for Individuals Who Are Deaf/Hard of Hearing. (3 cr; Stdtnt Opt) 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.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses


EPSY 5646. Reading and Writing Practices with Deaf/Hard of Hearing Children. (3 cr; Stdnt Opt. Prereq-5644 or general educ methods in tchg reading and writing skills, or #) Gain knowledge and skills to assess, plan, and implement instruction for children and youth with hearing loss. Emphasis is placed on research, theoretical, and programmatic issues in developing reading and writing skills, curricular adaptations, and effective instructional approaches.

EPSY 5647. Aural and Speech Programming for Persons Who Are Deaf/Hard of Hearing. (3 cr; Stdnt Opt) 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 5649. Models of Instructional Programming With Deaf and Hard of Hearing Students. (3 cr; Stdnt Opt. Prereq-[5644, 5647]) or #) Design/development of portfolios for various models of educational service delivery systems for individuals with hearing loss. Emphasizes consultation skills, curriculum management/modifications, material/technology applications, and support service adaptations.

EPSY 5656. Social and Interpersonal Characteristics of Students with Disabilities. (3 cr; A-F or Aud) Emphasis on children and youth of school age and on the ways in which their emotional, social, and behavioral disorders affect their functioning in school and on ways in which their behaviors disturb others.

EPSY 5657. Interventions for Social and Emotional Disabilities. (3 cr; A-F or Aud. Prereq-5616, 5656) Developing comprehensive behavioral programs for students with social and emotional disabilities. Instructional students with social and emotional disabilities.

EPSY 5661. Introduction to Autism Spectrum Disorder. (3 cr; A-F only) Knowledge/skills needed to promote learning/success for school age children with Autism Spectrum Disorder (ASD) including characteristics of ASD. Current research/issues. Collaborative problem solving, family-professional partnerships, educational programming.

EPSY 5681. Education of Preschool Children With Disabilities: Methods and Materials. (3 cr; A-F only) Prereq-[5651, 5625] or #) Methods and materials available to maximize developmental and educational outcomes for young children with disabilities, age 3 to 5, and their families in home, community, and school-based settings. Develop, implement, and evaluate individualized education and family service plans.

EPSY 5682. Education of Infants and Toddlers with Disabilities: Methods and Materials. (3 cr [max 6 cr]; A-F only. Prereq-[5616, 5625] or #) Methods/materials available to maximize developmental and educational outcomes for young children with disabilities, birth to age 3, and their families in home, community, and school-based settings. Students develop, implement, and evaluate individualized education/family service plans.

EPSY 5701. Practicum: Field Experience in Special Education. (1-6 cr [max 12 cr]; A-F or Aud. Prereq-[5614, [FOE or SpEd grad or licensure student]] or #) Observations and supervised support of teaching practice in schools or agencies serving children with disabilities in integrated programs.

EPSY 5702. Practicum in Autism Spectrum Disorder. (3 cr; A-F only. Prereq-5616, 5621, 5609, one of [5622 or 5644 or SLHS 5606], enrolled in Autism Spectrum Disorder certificate program, or #) Four hundred hours of supervised work in settings where individuals with Autism Spectrum Disorder are served. On-site supervision is provided by qualified professionals. A University supervisor conducts on-site observations. Bi-weekly seminars.

EPSY 5703. Practicum in Applied Behavior Analysis. (3 cr; A-F only. Prereq-5616, 5657, Psy 4011, Applied Behavior Analysis Certificate student, #) Four hundred hours of supervised experience in applied behavior analytic intervention with individuals with significant challenging behavior and learning difficulties. On-site supervision is provided by qualified professionals. A University supervisor conducts on-site observations. Bi-weekly seminars.


EPSY 5751. Student Teaching: Deaf and Hard of Hearing. (1-6 cr [max 10 cr]; Stdnt Opt. Prereq-#) Students participate in educational programming for infants, children, and youth who are deaf or hard of hearing. On-site, directed experiences under supervision of master teachers of deaf/hard of hearing students.

EPSY 5752. Student Teaching: Learning Disabilities. (1-6 cr [max 10 cr]; S-N or Aud. Prereq-#) Supervised experience in teaching or related work in schools or other agencies serving children and adolescents with learning disabilities.

EPSY 5753. Student Teaching: Early Childhood Special Education. (1-6 cr [max 8 cr]; S-N or Aud. Prereq-#; completion of all course requirements for license in ECSE) Supervised experience in teaching or related work in schools, agencies, or home settings with infants, toddlers, and preschoolers with disabilities and their families.

EPSY 5754. Student Teaching: Social and Emotional Disabilities. (1-6 cr [max 8 cr]; A-F or Aud. Prereq-Completion of all licensure courses for social and emotional disorders, or #) Supervised student teaching, or special practicum project, in schools or other agencies serving students at elementary/secondary levels who have mild to moderate developmental disabilities.

EPSY 5755. Student Teaching: Developmental Disabilities, Mild/Moderate. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Completion of all licensure coursework, or #) Supervised student teaching, or special practicum project, in schools or other agencies serving students at elementary/secondary levels who have moderate to severe developmental disabilities.

EPSY 5756. Student Teaching: Developmental Disabilities, Moderate/Severe. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Completion of all licensure coursework, or #) Supervised student teaching, or special practicum projects, in schools or other agencies serving students at elementary/secondary levels who have moderate to severe developmental disabilities.

EPSY 5761. Student Teaching in Early Childhood Special Education: Setting for Children Age Three to Five Years. (3 cr [max 6 cr]; S-N only. Prereq-Licensure candidate in Early Childhood/Early Childhood Licensure Program, completion of all other licensure requirements for ECSE, #; completion of Birth-3 student teaching should be completed after age 3-5 student teaching when possible) Student teachers work closely with their cooperating teacher and University supervisor to design/implement programming for children in classrooms. Course includes a seminar with discussion, cooperative learning experiences, and some lectures.

EPSY 5762. Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years. (3 cr [max 6 cr]; S-N only. Prereq-Licensure candidate in Early Childhood/Early Childhood Licensure Program, completion of all other licensure requirements for ECSE, #; completion of Birth-3 student teaching should be completed after age 3-5 student teaching when possible) Student teachers work closely with cooperating teacher and University supervisor to design/implement programming for children with ages birth-two in their homes. Course includes a seminar with discussion, cooperative learning experiences, and some lectures.

EPSY 5800. Special Topics in School Psychology. (1-9 cr [max 9 cr]; Stdnt Opt) Current issues in school psychology or areas not normally available through regular curriculum offerings.

EPSY 5801. Assessment and Decision Making in School and Community Settings. (3 cr; A-F or Aud) Introduction to psychological and educational assessment for individuals who work with children, especially those experiencing academic and behavior problems. Study of standardized group and individual tests of intelligence, achievement, socio-emotional functioning, perception, reading, mathematics, adaptive behavior, and language.

EPSY 5849. Observation and Assessment of the Preschool Child. (3 cr; Stdnt Opt) 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. Engaging Diverse Students and Families. (3 cr; Stdnt Opt. Prereq-Honors senior or grad student) Theoretical, practical, scientific issues involved in school psychological practice/training/research. Theoretical/empirical bases for developing appropriate dispositions, practices, and theories. Illustrative lectures, discussions, group activities, case studies, presentations.

EPSY 5991. Independent Study in Educational Psychology. (1-8 cr [max 20 cr]; A-F or Aud. Prereq-*#) Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.


EPSY 8114. Seminar: Cognition and Learning. (3 cr [max 9 cr]; Stdnt Opt) Advanced study in critical analysis and application of contemporary psychological theory and research in cognition and learning for education.

EPSY 8115. Psychology of Instruction and Technology. (3 cr; Stdnt Opt) Seminar including, but not limited to, learning and instructional theories, advanced and emerging technologiestheory and design and evaluation.

EPSY 8117. Writing Empirical Paper and Research/Grant Proposals in Education and Psychology. (3 cr; Stdnt Opt. Prereq-*) Scientific writing skills. Focuses on logic/argumentation. Each student produces an empirical paper or research proposal. Breaks down the writing process into components: one component per week. Each week, students write a section of their paper/proposal and critique others'.

EPSY 8132. Personality Development and Socialization. (3 cr; Stdnt Opt. Prereq-Personality or child psych course) Major research and theoretical work. Developmental and educational influences on personality.


EPSY 8216. Seminar: Research Processes in Psychological Foundations of Education. (3 cr; A-F or Aud. Prereq-[5216, admitted to doctoral program in psych foundations] or *) Advanced examination of research processes in educational psychology. Invited faculty discuss specific research designs. Students refine/implement research projects and present them in class.

EPSY 8220. Special Topics: Seminar in Quantitative Methodologies. (1-6 cr [max 15 cr]; Stdnt Opt) Seminars focus on specialized current topics in methodology in statistics, measurement, evaluation, and statistics education, including primary-source readings and in-depth exploration of advanced methodologies.

EPSY 8221. Psychological Scaling. (3 cr; Stdnt Opt. Prereq-[5221 or equiv], [(5251, 5252) or (8261, 8262)] or equiv) Topics in unidimensional scaling. Measurement theory and statistics. Rating scales, category scaling methods. Magnitude estimation, paired comparisons, multi-attribute scaling, multidimensional scaling.

EPSY 8222. Advanced Measurement: Theory and Application. (4 cr; Stdnt Opt. [5265, Prereq-[5221 or equiv], [(5251, 5252) or (8261, 8262)] or equiv]) Generalizability theory, item response theory, factor models for test items, binomial model. Application to problems of designing, linking assessments. Includes computer lab.

EPSY 8224. Performance Assessment Design and Analysis. (3 cr; Stdnt Opt. Prereq-5221, [(5261 or 8261) or 8262]) Conceptualization, design, implementation, and evaluation of performance assessments as employed in both small-scale (e.g., classrooms), large-scale (e.g., statewide, national testing programs), and professional (e.g., teacher assessment, professional certification) settings.


EPSY 8226. Item Response Models: Theory and Applications. (3 cr; Stdnt Opt. Prereq-[5251 or Psy 5602 or equiv], 8261 and 8262 or [5251 and 8252 or equiv]) Item response theory. Application in education/psychology/social science. 1-, 2-, and 3-parameter models for dichotomous/graded response models. Partial credit models for polytomous data.

EPSY 8247. Advanced Interviewing and NVIVO. (3 cr; Stdnt Opt. Prereq-5247 or qualitative course or *) Practice in designing, conducting, and analyzing interviews. Students design interview protocols, video/audio tape themselves conducting interviews, analyze their techniques, and critique others. Students use NVIVO to analyze data they have collected.

EPSY 8251. Methods in Data Analysis for Educational Research I. (3 cr; Stdnt Opt. Prereq-[5251 or equiv] or undergrad statistics course) Entry-level doctoral course. Two-semester sequence. In-depth coverage of widely used statistical methods and models. Prepares students for advanced statistical coursework including HLM and SEM.

EPSY 8252. Methods in Data Analysis for Educational Research II. (3 cr; Stdnt Opt. Prereq-5251 or equiv) Second in two-semester sequence of entry-level doctoral coursework for students in education. In-depth coverage of widely used statistical methods and models. Prepares students for advanced statistical coursework including HLM and SEM.


EPSY 8262. Statistical Methods II: Regression and the General Linear Model. (3 cr; Stdnt Opt. Prereq-[8260, 8261] or equiv) Analysis of variance designs (two-three ways), repeated measures, correlation, simple/multiple regression methods, non-parametric procedures, multivariate analyses.

EPSY 8264. Advanced Multiple Regression Analysis. (3 cr; Stdnt Opt. Prereq-[5251, 5252] or 5251, 8252]), regression/ANOVA course, familiarity with a statistical analysis package) General linear model used as context for regression. Matrix algebra, multiple regression, path analysis, polynomial regression, standardized regression, stepwise solutions, analysis of variance, weighted least squares, and logistic regression.


EPSY 8266. Statistical Analysis Using Structural Equation Methods. (3 cr; Stdnt Opt. Prereq-5263 or 8264) Quantitative techniques using manifest and latent variable approaches for analysis of educational and social science data. Introduction to structural equation modeling approaches to multiple regression, factor analysis, and latent variable modeling. Developing, estimating, and interpreting structural equation models.


EPSY 8271. Statistics Education Research Seminar: Studies on Teaching and Learning Statistics. (3 cr [max 9 cr]; Stdnt Opt) Introduction to classic/current research related to teaching/learning of statistics. Research from psychology, education, and statistics. Students focus on a particular research question and review the literature related to that question.

EPSY 8272. Nonparametric Statistics in Education. (3 cr; Stdnt Opt. Prereq-5251, 5252 or 8261, 8262) or equiv) Estimation/inferential techniques outside normal-theory tests. One-, two-, and K-sample procedures for between/within-subject differences, including factorial analysis of variance/covariance. Contingency table analysis (tests of independence, homogeneity).

EPSY 8281. Advanced Statistical Computing and Data Analysis. (3 cr; Stdnt Opt. Prereq-5261 or equiv, 5251 or 8261) Cross-disciplinary course. Students learn to use SAS statistical package to perform data management, data analysis, and report writing.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

Traditional/modern approaches to analyzing longitudinal data. Dependent t-test, repeated measures ANOVA and MANOVA. Linear mixed models, multilevel models, generalized models. Required labs using SAS computer program.

EPSY 8290. Special Topics: Seminar in Psychological Foundations. (1-6 cr [max 15 cr]; Stdnt Opt. Prereq-)
Students formulate research designs. Learning and cognition, social psychology, measurement, and statistics.

EPSY 8299. Quantitative Methods in Education Internship. (1-3 cr [max 3 cr]; S-N only. Prereq- EPsy MA or PhD student, QME track)
Practical experience in applying concepts and skills in measurement, statistics, and evaluation in a real-world setting under supervision of a research professional.

EPSY 8300. Special Topics in Educational Psychology. (1-4 cr [max 9 cr]; Stdnt Opt)
Issues or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8311. Education Sciences Proseminar. (1 cr [max 3 cr]; A-F only. Prereq-Doctoral student, #)

EPSY 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

EPSY 8400. Topics: Counseling and Student Personnel Psychology. (1-3 cr [max 9 cr]; Stdnt Opt)
Current issues in counseling and student personnel psychology, or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8402. Individual Counseling: Theory and Applications. (3 cr; A-F or Aud. Prereq-Grad ed psy major with CSPP subprog or #)
Traditional and contemporary theories of counseling and psychotherapy. Applications to various settings and populations.

EPSY 8403. Social/Cultural Contexts: Counseling & Skills. (3 cr; A-F or Aud. Prereq-Grad ed psy major with CSPP subprog or #)
Broad personal dimensions of race, ethnicity, gender, class, beliefs, disability, age, sexual orientation, and geographic origin. Societal and personal biases and stereotypes; multicultural concepts and culturally appropriate counseling procedures.

EPSY 8404. Group Counseling: Theory, Applications, and Skills. (3 cr; A-F or Aud. Prereq-Ed psy MA or PhD student with CSPP subprog or #)
Theories, research, and procedures of group counseling and of groups such as psychoeducational groups. Applications to various settings and populations. Ethical issues in group work. Practice of group skills and techniques, including group participation and observation.

EPSY 8405. Career Development: Theory, Skills, and Counseling Applications. (3 cr; A-F or Aud. Prereq-CSPP grad student)
Career development theory/practice over life span. Emphasizes career counseling for individuals/organizations, systems approach to career programs in education/business. Traditional/contemporary theories/practices.

EPSY 8406. Professional Ethics for Counselors and Psychologists. (3 cr; A-F only. Prereq-CSPP grad student)
Theory, research, and practice in counseling ethics. Scope/impact of professional ethics. Ethical decision making. Ethics and the law. Ethical practice in special settings. Scholarship/research in counseling ethics. Lectures, discussions, case studies, individual/group examination of original research.

EPSY 8407. Assessing and Counseling Clients With Psychological Disorders. (4 cr; A-F only. Prereq-CSPP PhD or MA student or #)

EPSY 8411. Advanced Counseling Research. (4 cr; A-F or Aud. Prereq-Ed psy PhD student with CSPP subprog or #)
Focus on critically reviewing counseling research, qualitatively and quantitatively integrating research, and designing valid research.

EPSY 8412. Seminar: Advanced Counseling Theory and Ethics. (4 cr; A-F or Aud. Prereq-Ed psy PhD student with CSPP subprog or #)
Comparative analysis of theoretical models and methods used in contemporary counseling and psychotherapy; ethical standards and models of ethical decision making for professional roles.

EPSY 8413. Personality Assessment of Adolescents and Adults. (3 cr, A-F only. Prereq-[8407 or PSY 5604H or PSY 8111 or PSY 8112], doctoral student, #)
Assessment interviews, objective personality assessments (e.g., MMPI-2), projective tests (e.g., Thematic Apperception Test), and assessment report writing.

EPSY 8431. Master’s Research Seminar: CSPP. (4 cr; A-F or Aud. Prereq-[8251 or equiv, 5221 or equiv, EPsy MA student with CSPP subprog or #)
Survey of research methods, data-based decision making, basic research design skills, and research simulation.

EPSY 8433. Organization of School Counseling Comprehensive Programs. (3-6 cr [max 6 cr]; A-F or Aud. Prereq-CSPP grad student in school counselor program or #)
Integrates learning from all courses in MA program with research in comprehensive guidance programming. Critiques of research, analyses of current trends/issues. Theories of management /organization in educational and other service settings. Literature review of comprehensive guidance programs. Students develop/demonstrate knowledge of comprehensive school counseling programming in K-12 school settings.

EPSY 8436. Crisis Management and Consulting in School Counseling. (3 cr; A-F or Aud. Prereq-CSPP grad student in school counselor program or #)

EPSY 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

EPSY 8452. Psychological Aspects of Counseling Supervision. (3 cr; Stdnt Opt. Prereq-Ed psy Phd student with CSPP subprog or #)
Theories, review of relevant research, demonstration, and in-class practice of supervision skills.

EPSY 8501. Counseling Pre-Practicum. (5 cr; A-F or Aud. Prereq-[CSPP or genetic counseling] grad student)
Overview of basic helping skills through demonstration, in-class practice.

EPSY 8502. Field Placement in Counseling and Student Personnel Psychology. (2 cr; S-N or Aud. Prereq-8501 or #)
Students participate under supervision in practitioner activities within a counseling work environment.

EPSY 8503. Counseling Practicum I. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-8502 or #)
Beginning-level supervised practice in counseling with individuals and groups; emphasizes systematic evaluation of student’s counseling practice through direct observations, video, and audio tapes.

EPSY 8504. Counseling Practicum II. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-8503 or #)
Intermediate supervised practice in counseling with individuals and groups; emphasizes ethical issues with systematic evaluation of student’s practice through direct observations, video, and audio tapes.

EPSY 8509. Supervision Practicum: CSPP. (1-2 cr [max 5 cr]; Stdnt Opt. Prereq-[Ed psy PhD student with CSPP subprog or #)
Doctoral students meet weekly with master’s prepracticum or practicum students for didactic supervision activities. Specific activities determined by master’s prepracticum or practicum instructor. Doctoral students meet weekly with master’s prepracticum or practicum instructor and other doctoral student supervisors for consultation/supervision.

EPSY 8512. Internship: CSPP. (1-12 cr [max 12 cr]; S-N only. Prereq-EdPsy PhD student with CSPP subprog)
Supervised internship in counseling psychology.

EPSY 8521. Practicum in Student Affairs and Student Development. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-EdPsy MA or PhD student with CSPP subprog or #)
Supervised practice in university and college student development offices.

EPSY 8522. Counseling Practicum: Advanced. (3 cr [max 12 cr]; A-F only. Prereq-[Grad EPsy PhD student with CSPP subprog or #]; instructor consent required after 2 repeats)
Advanced skills practicum in counseling, counseling psychology, or student development.

EPSY 8600. Special Topics: Special Education Issues. (1-3 cr [max 9 cr]; Stdnt Opt)
Current trends (e.g., student’s counseling, models of collaboration, and diversity) investigated by formulating research projects. Students write a media piece describing an issue and its impact on the community.

EPSY 8612. Seminar: Students with Academic Difficulties. (3 cr; A-F or Aud)
Survey, analysis, and application of relevant theories and research related to current issues. Students in course develop skills in scholarly inquiry, writing, and debate.

EPSY 8651. Seminar on Social and Emotional Disabilities. (3 cr; A-F or Aud)
Review and critical analysis of current trends and future directions of education of students with social and emotional disabilities.

EPSY 8666. Doctoral Pre-Thesis Credits. (1-0 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
Doctoral Pre-Thesis Credits
Electrical and Computer Engineering (EE)

College of Science and Engineering
 EE 5121. Transistor Device Modeling for Circuit Simulation. (3 cr; Stdnt Opt. Prereq-3115, 3161, CSE grad student) or % Basics of MOS, bipolar theory. Evolution of popular device models from early SPICE models to current industry standards.

EE 511. Introduction to Microsystem Technology. (4 cr; Stdnt Opt. Prereq-3161, 3160, CSE grad student) or %
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.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses


EE 5171. Microelectronic Fabrication. (4 cr; Stdnt Opt. Prereq-CSE grad student or #) 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 5172. Basic Microelectronics Laboratory. (1 cr; Stdnt Opt. Prereq-[[5171 or [P]5171], CSE grad student] or #) 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 examine technology performance.


EE 5235. Robust Control System Design. (5 cr; Stdnt Opt. Prereq-CSE grad, 5015, 5231 or #) Development of control system design ideas; frequency response techniques in design of single-input/single-output (and MI/DO) systems. Robust control concepts. CSE grad student.


EE 5324. VLSI Design II. (3 cr; Stdnt Opt. Prereq-[5321, CSE grad student] or #) CMOS arithmetic logic units, high-speed carry chains, fast CMOS multipliers. High-speed performance parallel shifters. CMOS memory cells, array structures, read/write circuits. Design for testability, including scan design and built-in self test. VLSI case studies.

EE 5327. Design Laboratory. (3 cr; Stdnt Opt. Prereq-[4301, 5321 or [P]5331], CSE grad student or #) Complete design of an integrated circuit. Designs evaluated by computer simulation.


EE 5333. Analog Integrated Circuit Design. (3 cr; Stdnt Opt. Prereq-[3115, CSE grad student] or #) Fundamental circuits for analog signal processing. Design issues associated with MOS/BJT devices. Design/testing of circuits. Selected topics (e.g., modeling of basic IC components, design of operational amplifier or comparator or analog sampled-data circuit filter).

EE 5364. Advanced Computer Architecture. (3 cr; Stdnt Opt. Prereq-[4363 or CSCI 4203], CSE grad student or #) Instruction set architecture, processor microarchitecture. Memory and I/O systems. Interactions between computer software and hardware. Methodologies of computer design.

EE 5371. Computers Systems Performance Measurement and Evaluation. (3 cr; Stdnt Opt. [S]EE 5863, Prereq-[4363 or 5361 or CSCI 4205 or 5201], CSE grad student or #) Tools/techniques for analyzing computer hardware, software, system performance. Benchmark programs, measurement tools, performance metrics. Deterministic/probabilistic simulation techniques, random number generation/testing. Bottleneck analysis.

EE 5381. Telecommunications Networks. (3 cr; Stdnt Opt. Prereq-[4501, 5351, CSE grad student] or #) Fundamental concepts of modern telecommunications networks, mathematical tools required for their performance analysis. Layered network architecture, point-to-point protocols/links, delay models, multiaccess communication/routing.


EE 5581. Information Theory and Coding. (3 cr; Stdnt Opt. Prereq-[5551, CSE grad student] or %) Source/channel models, codes for sources/channels. Entropy, mutual information, capacity, rate-distortion functions. Coding theorems.


EE 5602. RF/Microwave Circuit Design. (3 cr; Stdnt Opt. Prereq-[5601 or equiv], [CSE grad student or #]) Transmission lines, network analysis concepts. CAD tools for passive/active designs. Diode based circuit designs (detectors, frequency multipliers, mixers). Transistor based circuit design (amplifiers, oscillators, mixer/doublers).

EE 5611. Plasma-Aided Manufacturing. (4 cr; A-F or Aud. [S]ME 5361, Prereq-[[[ME 3321, ME 3322] or equiv], [upper div CSE or grad student]] or %) Manufacturing using plasma processes. Plasma properties as a processing medium. Plasma spraying, welding and microelectronics processing. Process control and system design; industrial speakers. Cross-disciplinary experience between heat transfer design issues and manufacturing technology.

EE 5613. RF/Microwave Circuit Design Laboratory. (2 cr; A-F only. Prereq-[5601 or [P]5601], CSE grad student] or %) Scattering parameters, planar lumped circuits, transmission lines, RF/microwave substrate materials, matching networks/tuning elements, resonators, filters, combiners/dividers, couplers. Integral lab.

EE 5616. Antenna Theory and Design. (3 cr; Stdnt Opt. Prereq-[5601 or [P]5601], CSE grad student] or %) Antenna performance parameters, vector potential/radiation integral, wire antenna structures, broadband antenna structures, microstrip/aperture theory, antenna measurements.

EE 5621. Physical Optics. (3 cr; Stdnt Opt. Prereq-[3015, CSE grad student] or %) Physical optics principles, including Fourier analysis of optical systems/images, scalar diffraction theory, interferometry, and coherence theory. Diffraction optical elements, holography, astronomical imaging, optical information processing, microoptics.


EE 5624. Optical Electronics. (4 cr; Stdnt Opt. Prereq-[5601 or Phys 3002], CSE grad student] 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, phase conjugation.


EE 5628. Fiber Optics Laboratory. (6 cr; Stdnt Opt. Prereq-[5627 or [P]5627], CSE grad student] or #) Experiments in fiber optics. Dielectric waveguides, modes in optical fibers, fiber dispersion/attenuation, properties of light sources/detectors, optical communication.


EE 5655. Magnetic Recording. (3 cr; Stdnt Opt. Prereq-CSE grad student or %) Magnetic fundamentals, recording materials, idealized models of magnetic records/reproduction, analytic models of magnetic record heads, sinusoidal magnetic recording, digital magnetic recording, magnetic recording heads/media, digital recording systems.


EE 5940. Special Topics in Electrical Engineering I. (1-4 cr [max 12 cr], Stdnt Opt) Special topics in electrical and computer engineering. Topics vary.

EE 5950. Special Topics in Electrical Engineering II. (1-4 cr [max 12 cr], Stdnt Opt) Special topics in electrical and computer engineering. Topics vary.

EE 5960. Special Topics in Electrical Engineering III. (1-4 cr [max 12 cr], Stdnt Opt) Special topics in electrical and computer engineering. Topics vary.

EE 5970. Special Topics in Electrical Engineering IV. (1-4 cr [max 12 cr], Stdnt Opt) EE Prereq or CompE grad student or %; only available for Rochester Campus). Special topics in electrical and computer engineering. Topics vary.

EE 5990. Curricular Practical Training. (1-2 cr [max 6 cr], S-N or Aud. Prereq-Grad student, %) Industrial work assignment involving advanced electrical engineering technology. Review by faculty member. Final report covering work assignment.

EE 8100. Advanced Topics in Electronics. (1-3 cr [max 12 cr], Stdnt Opt. Prereq-#) Topics vary according to needs and staff availability.

EE 8141. Advanced Heterojunction Transistors. (3 cr; Stdnt Opt. Prereq-[5664 or #]) Recent developments in device modeling with emphasis on bipolar junction transistors. High-level effects in base and collector regions and their interrelationship.


EE 8190. Electronics Seminar. (1 cr [max 3 cr]; S-N or Aud) Prereq-#) Current literature, individual assignments.

EE 8210. System Theory Seminar. (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.
**Courses**

**EE 8213. Advanced System Theory.** (3 cr; Stdnt Opt. Prereq-17 grad student) Generalized linear systems; applications, structural properties, computational approaches, classification, functional behavior, and synthesis.

**EE 8215. Nonlinear Systems.** (3 cr; Stdnt Opt. Prereq-#) Current topics in stability analysis of nonlinear systems, design of controllers for nonlinear systems, discrete-time and stochastic nonlinear systems.

**EE 8230. Control Theory Seminar.** (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.

**EE 8231. Optimization Theory.** (3 cr; Stdnt Opt. Prereq-#) Introduction to optimization in engineering; approximation theory. Least squares estimation, optimal control theory, and computational approaches.


**EE 8300. Advanced Topics in Computers.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#) Topics vary according to needs and staff availability.

**EE 8301. Advanced Topics in VLSI.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#) Topics vary according to needs and staff availability.

**EE 8302. Advanced Topics in Design Automation.** (1-3 cr [max 12 cr]; A-F or Aud. Prereq-Grad student or #) State-of-the-art automated design tools for electronic system design. Topics vary.

**EE 8311. CMOS Data Converters:** A/D and D/A. (3 cr; Stdnt Opt. Prereq-5333 or #) Data converters, low power low voltage analog circuits. Basic background in design of CMOS analog-to-digital and digital-to-analog converters. Special circuit design techniques for low power design. Students design/test several design problems.

**EE 8333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

**EE 8337. Analog Circuits for Wireless Communications.** (3 cr; A-F or Aud. Prereq-5333) Basic background, advanced design concepts necessary to design integrated CMOS RF circuits. Emphasizes CMOS and RF. Where appropriate, mention is made of bipolar circuits and applications to other communications areas.

**EE 8340. Computer Systems Seminar.** (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.


**EE 8370. Computer Aided Design Seminar.** (1 cr [max 3 cr]; S-N or Aud. Prereq-[EE or CompE or CSci] grad major, #) Current literature, individual assignments.

**EE 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**EE 8500. Seminar: Communications.** (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.

**EE 8510. Advanced Topics in Communications.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#) Topics vary according to needs and staff availability.

**EE 8520. Advanced Topics in Signal Processing.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#) Topics vary according to needs and staff availability.

**EE 8581. Detection and Estimation Theory.** (3 cr; Stdnt Opt. Prereq-5531 or #) Risk theory approach to detection and estimation, random process representation, signal parameter estimation. Waveform estimation; detection of phase, frequency, and delay in signals. Applications to communications and radar-sonar signal design and processing.

**EE 8591. Predictive Learning from Data.** (3 cr; Stdnt Opt. Prereq-CSE grad student or #) Basic elements and application areas of artificial intelligence (AI) related to design and implementation of expert systems (ES). Knowledge representation, reasoning under uncertainty, ES and their environment, planning, natural language processing (NLP), intelligent computer-aided instruction (ICAI), and AI tools (software and hardware).

**EE 8601. Advanced Electromagnetic Theory.** (3 cr; A-F or Aud. Prereq-4601 or equiv) Aspects of electromagnetic theory, introduction to the study of the electromagnetic field, basic ideas, and techniques of the field. Class activity includes fundamental mathematical techniques, circuit analysis, analysis of linear systems, and applications of the material to various physical problems.

**EE 8610. Seminar: Electronics, Fields, and Photonics.** (1 cr [max 3 cr]; S-N or Aud. Prereq-EE grad major or #) Students are assigned readings from current literature and make individual presentations to class. From time to time outside speakers present research papers.


**EE 8620. Advanced Topics in Magnetics.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-5653 or #) Topics vary according to needs and staff availability.

**EE 8630. Advanced Topics in Electromagnetics.** (1-3 cr [max 12 cr]; Stdnt Opt) Topics vary according to needs and staff availability.

**EE 8660. Seminar: Magnetics.** (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.

**EE 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed preliminary exam; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**EE 8725. Advanced Power System Analysis and Economics.** (3 cr; Stdnt Opt. Prereq-4721, CSE grad student or #) Solving sets of equations that involve large sparse matrices. Sparse matrix storage, ordering schemes, application to power flow, short circuit calculation, optimal power flow, and state estimation.


**EE 8777. Thesis Credits: Master’s.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or max 50 cr total required [Plan A only])

**EE 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade) Thesis credit.

**EE 8920. Teaching Experience in Electrical and Computer Engineering.** (1 cr [max 3 cr]; S-N only. Prereq-PhD candidate in electrical engineering, passed written preliminary exam) Co-teach class under guidance of faculty mentor. Students directly teach approximately half of the classes. Feedback to improve teaching effectiveness. Meet regularly with peers and instructor to discuss teaching concerns/issues.

**EE 8925. Ethics in Electrical and Computer Engineering.** (1 cr [max 3 cr]; Stdnt Opt. Prereq-Grad student in electrical engineering) Topics on issues such as data integrity, professional conduct, authorship, plagiarism, patents, copyrights, conflicts, and disclosures. Students study cases, present findings, and write report.

**EE 8940. Special Investigations.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-1-3 cr may be repeated for cr; IT grad student or #) Studies of approved theoretical or experimental topics.

**EE 8950. Advanced Topics in Electrical and Computer Engineering.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-Cr ar may be repeated for cr; #) Topics vary according to needs and staff availability.

**EE 8965. Plan C Project I.** (1 cr; Stdnt Opt. Prereq-Grad EE major) Project topics arranged between student and adviser. Written reports.

**EE 8967. Plan C Project II.** (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-EE grad student) Project topics arranged between student and adviser. Written reports.

**EE 8970. Graduate Seminar I.** (1 cr [max 3 cr]; S-N or Aud. Prereq-Grad student) Recent developments in electrical engineering, related disciplines.

**EE 8980. Graduate Seminar II.** (1 cr [max 3 cr]; S-N or Aud) Recent developments in electrical engineering, related disciplines.

---

**Endodontics (ENDO)**

Department of Restorative Sciences

School of Dentistry


**ENDO 5304. Advanced Clinical Endodontics.** (1-6 cr [max 6 cr]; A-F or Aud) Diagnosis/treatment of clinical cases. Complex cases, new techniques.

**ENDO 5305. Advanced Clinical Endodontics.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-5304) Diagnosis/treatment of clinical cases. Complex cases, new techniques.

**ENDO 5306. Advanced Clinical Endodontics.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-5306) Diagnosis/treatment of clinical cases. Complex cases, new techniques.

**ENDO 5307. Advanced Clinical Endodontics.** (1-6 cr [max 6 cr]; A-F or Aud) Diagnosis/treatment of clinical cases. Complex cases, new techniques.
ENDO 5308. Advanced Clinical Endodontics. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-5307, %) Diagnosis/treatment of clinical cases. Complex cases, new techniques.

ENDO 5309. Advanced Clinical Endodontics. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-5308) Diagnosis/treatment of clinical cases. Complex cases, new techniques.

ENDO 5310. Advanced Clinical Endodontics. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-5309) Diagnosis/treatment of clinical cases. Complex cases, new techniques.

ENDO 5311. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-%) Each student is assigned weekly periods (8 hours/week) and is responsible for all emergencies in the endodontic clinic during this time.

ENDO 5312. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-5311) Students assigned 8 hrs/wk, are responsible for emergencies in clinic.

ENDO 5313. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-5312) Students assigned 8 hrs/wk, are responsible for emergencies in clinic.

ENDO 5314. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-5313) Students assigned 8 hrs/wk, are responsible for emergencies in clinic.

ENDO 5315. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-5314, %) Students assigned 8 hrs/wk, are responsible for emergencies in clinic.

ENDO 5316. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-5315) Students assigned 8 hrs/wk, are responsible for emergencies in clinic.

ENDO 5317. Advanced Endodontic Emergency. (1 cr; S-N or Aud. Prereq-5316) Students assigned 8 hrs/wk, are responsible for emergencies in clinic.

ENDO 5319. Review of Cases. (1 cr; A-F or Aud. Prereq-%) Oral/visual presentation of endodontic cases with follow up. Presentation of surgery cases before surgery.

ENDO 5320. Review of Cases. (1-2 cr [max 2 cr]; A-F or Aud. Prereq-5320) Oral/visual presentation of endodontic cases with follow up. Presentation of cases before surgery.

ENDO 5331. Review of Cases. (1 cr; A-F or Aud. Prereq-5330) Oral/visual presentation of endodontic cases with follow up. Presentation of cases before surgery.

ENDO 5332. Review of cases. (1 cr; A-F or Aud. Prereq-%) Oral and visual presentation of endodontic cases with follow up. Presentations of surgery cases before surgeries.

ENDO 5400. Advanced Endodontics for the General Dentist. (1 cr; S-N or Aud. Prereq-%) Advanced diagnosis/treatment of endodontics in clinic/office setting. Internship.


ENDO 8005. Research in Endodontics. (1-2 cr [max 2 cr]; A-F only. Prereq-%) Organized literature review in area of student’s interest, selection of thesis project, and completion of research and thesis.

ENGW 8130. Literature Review. (2 cr; A-F or Aud. Prereq-%) Critical review of classic and current endodontic literature.

ENGW 8131. Literature Review. (2 cr; A-F or Aud. Prereq-8310) Critical review of classic/current endodontic literature.


ENGW 8320. Advanced Endodontic Lecture. (1 cr; A-F or Aud. Prereq-%) Pulpal and periapical pathology, diagnosis, and treatment planning.

ENGW 8321. Advanced Endodontic Lecture. (1 cr; A-F or Aud. Prereq-8320) Pulpal and periapical pathology, diagnosis, and treatment planning.

ENGW 8322. Advanced Endodontic Lecture. (1 cr; A-F or Aud. Prereq-8321) Pulpal and periapical pathology, diagnosis, treatment planning.

ENGW 8323. Advanced Endodontic Lecture. (1 cr; A-F or Aud. Prereq-8322) Pulpal and periapical pathology, diagnosis, treatment planning.

ENGW 8330. Endodontics/Periodontics Seminar. (1 cr; S-N or Aud. Prereq-%) Discussions of endo-perio problems.

English: Creative Writing (ENGW)

English: Creative Writing (ENGW)
Courses

ENGW 8150. Thesis Seminar: Fiction. (3 cr [max 8 cr]; Stdnt Opt. Prereq-Creative writing MFA student #) Students work on their creative project.

ENGW 8160. Thesis Seminar: Nonfiction. (3 cr [max 8 cr]; Stdnt Opt. Prereq-Creative writing MFA student #) Students work on their creative project.

ENGW 8170. MFA Practicum: EngW 1101W. (5 cr; S-N only. Prereq-Creative writing MFA student #) Teaching Practicum for Teaching Assistants assigned to EngW 1101W.

ENGW 8180. Thesis Seminar: Multi-Genre. (4 cr; A-F only. Prereq-Creative writing program grad student) Thesis preparation course for advanced graduate students in the creative writing MFA program.

ENGW 8310. Topics in Creative Writing. (4 cr [max 8 cr]; Stdnt Opt. Prereq-[English or creative writing] grad major or %) Special topics in fiction, literary nonfiction, poetry. Topics specified in Class Schedule.

ENGW 8333. FTE: Master's. (1 cr) No grade. Prereq-Master's student, adviser and DGS consent

ENGW 8890. MFA Creative Thesis. (1-8 cr [max 8 cr]; Stdnt Opt. Prereq-8140, 8150, 8160, creative writing MFA student #) For students working on their creative project.

English: Literature (ENGL)

Department of English Language and Literature

College of Liberal Arts

ENGL 3001. Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University. (3 cr; Stdnt Opt) Where and what is literary study vis-à-vis the history of the discipline, of the humanities, and of the university—all in the context of a graduate education. Literary theory focusing on key theoretical works that address the discipline, the humanities, and the university.


ENGL 5021. Captivity in Literature and Film: From the Barbary Coast to Guantanamo Bay. (3 cr; Stdnt Opt. [S]ENGL 5021. Prereq-Grad student or #) Whether there is a captivity genre in English/GLOBAL literature, from early modern period to 21st century. Texts/films from numerous civilizations/histories.

ENGL 5030. Readings in Drama. (3 cr [max 9 cr]; Stdnt Opt. [S]ENGL 5030. ENGL 3030H. Prereq-Grad student or #) Wide reading in literature of a given period or subject. Prepares students for work in other courses/seminars. Relevant scholarship/criticism. Topics specified in Class Schedule.

ENGL 5040. Theories of Film. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) Advanced topics regarding film in a variety of interpretive contexts, from the range and historic development of American, English, and Anglophone film (e.g., “Fascism and Film,” “Queer Cinemas”). Topics and viewing times announced in Class Schedule.


ENGL 5110. Readings in Middle English Literature and Culture. (3 cr [max 8 cr]; Stdnt Opt. [S]ENGL 5110. Prereq-Grad student or #) Readings in Middle English literature and culture which address the discipline, the humanities, and the university—all in the context of a graduate education. Selected readings in post-colonial literature. Topics specified in Class Schedule.

ENGL 5121. Readings in Early Modern Literature and Culture. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) Readings in early modern poetry, prose, fiction, and drama. Attention to relevant scholarship or criticism. Preparation for work in other courses or seminars.

ENGL 5140. Readings in 18th Century Literature and Culture. (3 cr [max 9 cr]; Stdnt Opt. [S]ENGL 5140. Prereq-Grad student or #) Literature written in English, 1660-1798. Topics may include British literature of Reformation and 18th century, 18th-century American literature, a genre (e.g., 18th-century novel).

ENGL 5150. Readings in 19th-Century Literature and Culture. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) Topics may include British Romantic or Victorian literatures, American literature, important writers from a particular literary school, a genre (e.g., the novel), Readings.

ENGL 5170. Readings in 20th-Century Literature and Culture. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) British, Irish, or American literatures, or topics involving literatures of two nations. Focuses either on a few important writers from a particular literary school or on a genre (e.g., drama). Topics specified in Class Schedule.

ENGL 5175. 20th-Century British Literatures and Cultures I. (3 cr; Stdnt Opt. [S]ENGL 5175. Prereq-Grad student or #) Principal writers, intellectual currents, conventions, genres, and themes in Britain/Ireland, 1900-45. Fiction/nonfiction by Conrad, Richardson, Forster, Joyce, Mansfield, Rye, Woolf, Lawrence and Hussey. Poetry by Hardy, Hopkins, Yeats, Pound and Eliot. Drama by Synge and Shaw.


ENGL 5200. Readings in American Literature. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) General background/preparation for advanced graduate study. Readings cover either a wide historical range (e.g., 19th century), a genre (e.g., the novel), or a major literary movement (e.g., modernism).


ENGL 5597. Harlem Renaissance. (3 cr; Stdnt Opt. [S]AFRO 5597. Prereq-Grad student or #) Multidisciplinary review of Jazz Age’s Harlem Renaissance: literature, popular culture, visual arts, political journalism, major black/white figures.

ENGL 5630. Theories of Writing and Writing Instruction. (3 cr; Stdnt Opt. Prereq-Grad student or #) Introduction to major theories that inform teaching of writing in college and upper-level high school curriculums. Topics specified in Class Schedule.

ENGL 5711. Introduction to Editing. (3 cr; Stdnt Opt) Editor-writer relationships, manuscript reading, author querying, rewriting, style. Some discussion of copy editing. Students develop editing skills by working on varied writing samples.


ENGL 5743. History of Rhetoric and Writing. (3 cr; Stdnt Opt. Prereq-[5401, 5711]) Grad student or #) Assumptions of classical/contemporary rhetorical theory, especially as they influence interdisciplinary field of composition studies.

ENGL 5790. Topics in Rhetoric, Composition, and Language. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) Topics specified in Class Schedule.

ENGL 5800. Practicum in the Teaching of English. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-Grad student or #) Discussion of and practice in recitation, lecture, small-groups, tutoring, individual conferences, and evaluation of writing/reading. Emphasizes theory informing effective course design/teaching for different disciplinary goals. Topics vary. See Class Schedule.


ENGL 5992. Directed Readings, Study, or Research. (1-3 cr [max 45 cr]; Stdnt Opt. Prereq-Grad student or #) Sample topics: literature of World War II, writings of the Holocaust, literature of English Civil War, advanced versification.
ENGL 8110. Seminar: Medieval Literature and Culture. (3 cr; max 12 cr; Stdnt Opt) Sample topics: Chaucer; “Piers Plovnman”; Middle English literature, 1300-1475; medieval literary theory; literature/class in 14th-century; texts/heresies in late Middle Ages.

ENGL 8120. Seminar in Early Modern Literature and Culture. (3 cr [max 12 cr]; A-F or Aud) British prose, topics, from Reformation to French Revolution. In first half of period (which divides at 1640), a typical topic is Spenser and epic tradition; in second half, women historians before Wollstonecraft.

ENGL 8150. Seminar in Shakespeare. (3 cr [max 9 cr]; Stdnt Opt) Perspectives vary with offering and instructor. Text, performance, interpretation, criticism, feminism, intellectual history. Recent topics: Shakespeare at comedy, “Elegy by W.S.” (is it Shakespeare’s?), Roman political tragedies. Topics specified in Class Schedule.


ENGL 8180. Seminar in 20th-Century British Literature and Culture. (3 cr [max 12 cr]; A-F or Aud) Sample topics: modernism, Bloomsbury Group, working-class/immigrant literature. Topics specified in Class Schedule.


ENGL 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

ENGL 8400. Seminar in Post-Colonial Literature, Culture, and Theory. (3 cr [max 12 cr]; Stdnt Opt) Sample topics: Marxism and nationalism; modern India; feminism and decolonization; “the Empire Writes Back”; Islam and the West. Topics specified in Class Schedule.

ENGL 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

ENGL 8510. Studies in Criticism and Theory. (3 cr [max 12 cr]; Stdnt Opt) Developments within critical theory that have affected literary criticism, by altering conceptions of its object (“literature”) or by challenging conceptions of critical practice. Topics specified in Class Schedule.

ENGL 8520. Seminar: Cultural Theory and Practice. (3 cr [max 12 cr]; Stdnt Opt) Sample topics: semiotics applied to perspective paintings, numbers, and money; analysis of a particular set of cultural practices by applying various theories to them. Topics specified in Class Schedule.


ENGL 8600. Seminar in Language, Rhetoric, Literacy, and Composition. (3 cr [max 9 cr]; Stdnt Opt) Students read/conduct research on theories/literature relevant to cross-disciplinary fields committed to writing and to teaching writing.


ENGL 8625. Dissertation Seminar: Preparing the Book List and Post-Specters. (2 cr; Stdnt Opt. Prereq-Eng Ph.D student in [3rd or 4th yr]; at least 12 cr completed) Assembling book list, defining field of study, and articulating a rationale for list. How to conceptualize/develop dissertation prospectus. Students work with faculty instructor, advising committee, and peer writing group.


ENGL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ENGL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

ENGL 8992. Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing. (1-9 cr [max 15 cr]; Stdnt Opt. Prereq-#, %)

For definitions of course numbers, abbreviations, and symbols, see page 3. 73
Courses


ENT 5341. Biological Control of Insects and Weeds. (3-4 cr [max 4 cr]; Stdnt Opt. Prereq-3001, Biol 1009, EEB 3001 or grad) Biological control of arthropod pests and weeds. Analysis of relevant ecological theory and case studies; biological control agents. Lab includes natural enemy identification, short experiments, and computer exercises.


ENT 5361. Aquatic Insects. (4 cr; A-F or Aud. Prereq-) Taxonomy, natural history of aquatic insects including their importance in aquatic ecology, water resource management, recreation, and conservation. Emphasizes family-level identification of immature/adults. Field trips scheduled to local aquatic habitats. A collection is required.


ENT 5900. Basic Entomology. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq--) For graduate students who need to make up certain deficiencies in their biological science background.

ENT 5910. Special Problems in Entomology. (1-6 cr [max 10 cr]; Stdnt Opt. Prereq--) Individual field, lab, or library studies in various aspects of entomology.

ENT 5920. Special Lectures in Entomology. (1 cr [max 3 cr]; Stdnt Opt) Lectures or labs in special fields of entomological research. Given by visiting scholar or regular staff member.

ENT 8006. Supervised Laboratory or Extension Teaching Experience. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-2005 or equiv or #) Training/experience conducting lab or extension based educational activities in Entomology. Students select a faculty member to serve as their sponsor, and develop lecture outlines or instructional aids such as Web sites, Web-based training sites, print materials, demonstration aids, and demonstration projects. Students prepare/conduct lab or extension presentations. Overviews of Web-based instructional aids.

ENT 8041. Advanced Insect Genetics. (2 cr; Stdnt Opt. Prereq-[5011, basic genetics course or #; offered alt yrs]) Molecular genetic techniques and their applications. Emphasizes insect species other than Drosophila. Application of genetic techniques to physiological processes.


ENT 8061. Scientific Communication and Ethics. (1 cr; S-N or Aud) Students develop/critique elements of scientific communication, within an ethical framework. Elements in writing scientific manuscripts and research proposals. Oral communication for scientific, outreach, and classroom presentations.

ENT 8200. Colloquium in Social Insects. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-3020 or 3200) Current research on bees, wasps, ants, and termites. Student critiques and research reports.

ENT 8210. Colloquium in Insect Evolution. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-5371 or #) Research issues in systematics and evolution. Comparative biology, biogeography, and molecular evolution. Students may re-enroll as topics alternate. Students critique papers from primary literature.

ENT 8240. Colloquium in Insect Ecology. (1-2 cr [max 2 cr]; Stdnt Opt. Prereq-5041 or 5045 or #) Advanced topics.

ENT 8300. Graduate Seminar. (1 cr; S-N or Aud. Prereq--) Oral and written reports on and discussion by students of selected topics from current literature.

ENT 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

ENT 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

ENT 8594. Research in Entomology. (1-16 cr [max 36 cr]; S-N or Aud) Directed research.

ENT 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ENT 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 per semester or summer; 10 cr total required [Plan A only])

ENT 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Environmental Sciences, Policy, and Management (ESPM)

Division of Environmental Sciences, Policy, and Management

College of Food, Agriculture and Natural Resource Sciences


ESPM 5031. Applied Global Positioning Systems for Geographic Information Systems. (3 cr; A-F or Aud. [S]ESPM 5031. Prereq-Grad student or #) GPS principles, operations, techniques to improve accuracy. Datum, projections, and coordinate systems. Differential correction, accuracy assessments discussed/applied in lab exercises. Code/career phase GPS used in exercises. GPS handheld units, PDA based ArcPad/GPS equipment. Transferring field data to/from desktop systems, integrating GPS data with GIS.

ESPM 5061. Water Quality and Natural Resources. (3 cr; Stdnt Opt. Prereq-Grad student or #) Recent literature in field. Complements 4061. Ecology of aquatic ecosystems, how they are valued by society and changed by landscape management. Case studies, impaired waters, TMDL process, student engagement in simulating water quality decision making.

ESPM 5071. Ecological Restoration. (4 cr; Stdnt Opt. Prereq-Grad student or #) One college course in ecology, one college course in [plant science or botany] or #) Ecological/physiological concepts for revegetation of grasslands, wetlands, forests, and landscapes. Plant selection, stand establishment/evaluation. State/federal programs that administer restoration/reclamation. Field trips.

ESPM 5101. Conservation of Plant Biodiversity. (3 cr; A-F or Aud. [S]ESPM 5101. Prereq-Grad student or #) Introduction to principles underlying assessment/conservation of plant biodiversity at individual, population, and community levels. Case studies in management of biodiversity to restore or maintain ecosystem function. Genetics, timber harvesting, invasive species, plant reproduction.


ESPM 5202. Environmental Conflict Management, Leadership, and Planning. (3 cr; A-F or Aud. [S]ESPM 5202W. Prereq-Grad or #) Negotiation of natural resource management issues. Use of collaborative planning. Case study approach to conflict management, strategic planning, and building leadership qualities. Emphasizes analytical concepts, techniques, and skills.


ESPM 5241. Natural Resource and Environmental Policy. (3 cr; Stdnt Opt. [S]ESPM 5241W. Prereq-Grad student or #) Political processes at play in management of environment and how disagreements are addressed by different stakeholders, private-sector interests, government agencies and institutions, communities, and nonprofit organizations.
ESPM 5242. Methods for Natural Resource and Environmental Policy. (3 cr; A-F or Aud. [S] ESPM 4242. Prereq-[3241 or equiv], [3261 or equiv], [sr or grad student]) Methods, formal and informal, for analyzing environmental/natural resource policies. How to critically evaluate environmental/natural resources policies using economic/non-economic decision-making criteria. Application of policy analysis principles/concepts to environmental/natural resource problems. Recognizing politically-charged environmental issues in which decisions over use, management, and protection of these resources often occur.

ESPM 5245. Sustainable Land Use Planning and Policy. (3 cr; A-F or Aud. [S] ESPM 5245. Prereq-Grad student or #) Planning theories, concepts, and constructs. Policies, processes, and tools for sustainable land use planning. Scientific/technical literature related to land use planning. Skills needed to participate in sustainable land use planning.

ESPM 5251. Natural Resources in Sustainable International Development. (3 cr; A-F or Aud. [S] LAS 3251, ESPM 5251. Prereq-Grad student or #) International perspectives on resource use in developing countries. Integration of natural resource issues with social, economic, and policy considerations. Agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, development issues. Latin American case studies.


ESPM 5295. GIS in Environmental Science and Management. (4 cr; A-F or Aud. Prereq-Grad student or #) Application of spatial data inventory/analysis in complex environmental planning problems. Spatial data collection. Database development methods, including GIS, DLG, TIGER, NWI data, and spatial analysis. Topics identified by non-University partners.

ESPM 5402. Biomeeteorology. (3 cr; Stdnt Opt. Prereq-MATH 1217, PHYS 1201, STAT 3011, [Grad or #]) Calculus-based introduction to atmospheric boundary layer (ABL), interaction between earth’s surface and the atmosphere. ABL development/turbulence, surface energy balance, ABL clouds, air quality, microclimate, observational/modeling methods.

ESPM 5480. Topics in Natural Resources. (1-4 cr [max 6 cr]; Stdnt Opt. Prereq-5r or grad student) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

ESPM 5555. Wetland Soils. (3 cr; A-F or Aud. [S] SOIL 5555. Prereq-1125 or 2125 or equiv or #; [P] 5511 recommended) Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project.


ESPM 5602. Regulations and Corporate Environmental Management. (3 cr; A-F only. [S] MGMT 3602. ESPM 3602. Prereq-APEC 1011 or ECON 1101 or #) Concepts, major issues relating to industrial ecology and industry as they are influenced by current standards/regulations at local, state, and national levels.

ESPM 5603. Environmental Life Cycle Analysis. (3 cr; A-F only. Prereq-[Math 1142 or [Math 1271, Math 1282]], [Econ 1101 or APEC 1011]) Concepts, major issues relating to inventory and subsequent analysis of production systems. Production system from holistic point of view, using term commonly used in industrial ecology: “the metabolic system.”

ESPM 5604. Environmental Management Systems and Strategy. (3 cr; A-F only. [S] ESPM 3604) Environmental problems such as climate change, ozone depletion, and loss of biodiversity.


ESPM 5606. Pollution Prevention: Principles, Technologies, and Practices. (3 cr; A-F only. [S] ESPM 3606) Pollution prevention, green chemistry, cleaner production, Design for the Environment (DfE), life cycle management. Pollution prevention practices and technologies that reduce industrial emissions/costs by preventing pollution.

ESPM 5607. Industrial Biotechnology and the Environment. (3 cr; A-F only. [S] ESPM 4607. Prereq-BIOL 1009, CHEM 2121, grad student) Biotechnology pertaining to bio-based products development and their environmental impact.

ESPM 5608. Bioremediation. (3 cr; A-F only. [S] ESPM 4608. Prereq-[BIOL 1001 or BIOL 1009], CHEM 1011) Use of microbes or their enzymes to detoxify contaminants in the field or in containment facilities. Contaminants, sources, fates. Biological organisms, pathways, and catalysts utilized in bioremediation. Site inspection practices, bioremediation technologies, application in real-world situations.

ESPM 5609. Air Pollution Impacts, Management, and Ethical Challenges. (3 cr; A-F or Aud. [S] ESPM 4609. Prereq-[CHEM 1021 or CHEM 1015], [BIOL 1001 or BIOL 1009 or CHEM 1017]) Air pollutants, sources, and impacts on humans, plants, animals, soil, water, atmosphere, and planet. Emission rates, measurement, control technologies, air pollution laws/ regulations. Perspectives and personal ethics related to air pollution, how they impact professional/civic life.

ESPM 5703. Agroforestry in Watershed Management. (5 cr; Stdnt Opt. [S] ESPM 3703. Prereq-Grad student or #) Biological, physical, and environmental attributes of agroforestry as pertains to watershed management. Coupling production with watershed protection benefits. Implications for policy, economics, and human dimensions in sustainable development. Examples/case studies from North America and developing countries.


Experimental and Clinical Pharmacology (ECP)

Department of Experimental and Clinical Pharmacology

College of Pharmacy

ECP 5220. Regulatory Issues in Drug Research. (1-2 cr [max 2 cr]; Stdnt Opt. Prereq-ECP grad student or Pharm. D. professional student or #) Regulatory issues encountered in conducting drug research trials. Performing different aspects of clinical trials. Lectures, readings, small group discussions, homework assignments.

ECP 5290. Clinical Clerkship. (1-8 cr [max 16 cr]; Stdnt Opt. Prereq-Grad experimental and clinical pharmacology) Supervised study of pharmaceutical services at University of Minnesota Medical Center, Fairview or affiliated institutions.

ECP 5620. Drug Metabolism and Disposition. (3 cr; A-F or Aud. Prereq-Grad student or #) Oxidative/conjugative enzymes systems involved in human drug metabolism/disposition. Various in vitro models used to evaluate drug metabolism or chemical entity, pros/cons of each. Factors involved in conducting in vivo studies. Components used to predict in vivo drug disposition from in vivo studies.

ECP 5993. Directed Study in Experimental and Clinical Pharmacology. (0-4 cr [max 8 cr]; Stdnt Opt) Student working with faculty member designs a directed study course, including a complete syllabus, appropriate time commitment, and workload for number of credits.

ECP 5994. Directed Research in Experimental and Clinical Pharmacology. (0-4 cr [max 4 cr]; Stdnt Opt) Student works with faculty adviser to design a scientific research project.

ECP 8100. Seminar. (1 cr [max 8 cr]; Stdnt Opt. Prereq-ECP grad student or #) Selected topics in experimental/clinical pharmacology.
Courses

ECP 8200. Research Problems. (1-8 cr [max 16 cr]; Stdnt Opt. Prereq-Grad SACP major (ECP Track) or #) Topic varies depending on faculty teaching course.

ECP 8210. Clinical Therapeutics. (3 cr; Stdnt Opt. Prereq-SACP grad major in ECP track or #) Topics in clinical pharmacology that illustrate continuum of pathophysiology of a disease state, its contemporary treatment, problems or controversial issues with treatment approaches, strategies to advance therapy. Lectures, readings.

ECP 8220. Experimental and Clinical Pharmacology. (3 cr; Stdnt Opt. Prereq-SACP grad major (ECP track) or #) Theory of advanced methodologies, applications, and evaluation techniques used to determine efficacy/toxicity of new drug therapies. Techniques for collecting/evaluating data.

ECP 8290. Clinical Clerkship. (2 cr; Stdnt Opt. Prereq-SACP grad major in ECP track or #) Supervised study of pharmaceutical services at Fairview-University Medical Center or affiliated institutions.

ECP 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) FTE: master’s.

ECP 8400. Pharmacometrics. (3 cr; Stdnt Opt. Prereq-ECP grad major or #) Theory/application of contemporary methods for analysis of concentration-time data and exposure-response relationships.

ECP 8410. Population Pharmacokinetic Modeling. (2 cr; A-F or Aud) Theoretical background for using mixed effects model in population analysis. Building fixed/random effects into a pharmacostatistical model. Project allows students to become familiar with a contemporary population pharmacokinetic analysis program.

ECP 8420. Clinical Trial Simulation. (2 cr; Stdnt Opt. Prereq-ECP grad or #) Theory/application of contemporary methods of using simulations to design more efficient/informative clinical trials.

ECP 8430. Advances in Pharmacometrics Modeling and Simulation. (1 cr [max 6 cr]; S-N only. Prereq-Grad Student in ECP or PHM or #) Modeling/simulation at interface between physiological/pharmacological processes. Current literature, discussion groups. Computer applications using relevant software programs.

ECP 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) FTE: doctoral.

ECP 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Doctoral pre-thesis credits.

ECP 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only]) Thesis credits: master’s.

ECP 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required) Thesis credit: doctoral.

ECP 8900. Advanced Topics in Experimental and Clinical Pharmacology. (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-ECP grad program or #) Topic varies depending on faculty teaching course.

ECP 8992. Directed Readings in Experimental and Clinical Pharmacology. (1-2 cr [max 4 cr]; Stdnt Opt)

ECP 8993. Directed Study in Experimental and Clinical Pharmacology. (1-4 cr [max 4 cr]; Stdnt Opt)


Family Medicine and Community Health (FMCH)

Department of Family Medicine and Community Health

Medical School

FMCH 5345. Curriculum Design and Teaching Strategies for Medical Education I. (3 cr; A-F or Aud. Prereq-Grad major or #) Identifying/developing course goals. Developing course, teacher, learner evaluations. Students must also take 5346, which follows immediately after 5345.

FMCH 5346. Curriculum Design and Teaching Strategies for Medical Education II. (1 cr; A-F or Aud. Prereq-[FMCH 5345, #) Taken with 5345. Practicum of lecture, demonstration, small-group discussion, clinical teaching, and computer-assisted instruction. Academic ethics, policies, copyright issues, tenure, academic freedom, problem-based learning.

FMCH 5564. Family Practice Seminar. (1 cr [max 9 cr]; O-N or Aud. Prereq-MD or DO degree) Knowledge, skills, and attitudes in biomedical and behavioral sciences that form foundation for academic discipline of family medicine; medical decision making, common problems and procedures, family theory and assessment, clinical pharmacy, human sexuality.

FMCH 5565. Principles of Geriatrics I. (1 cr [max 5 cr]; P-N or Aud. Prereq-Medical School or dental school or GNP School graduate) First in two-course sequence. Survey of major topics in geriatric medicine. Epidemiology, etiology, diagnosis, and treatment of major geriatric syndromes and illnesses.

FMCH 5561. Principles of Geriatrics II. (1 cr [max 5 cr]; P-N or Aud. Prereq-Medical School or dental school or GNP School graduate) Second in two-course sequence. Survey of major topics in geriatric medicine. Epidemiology, etiology, diagnosis, and treatment of major geriatric syndromes and illnesses.

FMCH 5960. Basic Research Methods in Family Practice. (3 cr; A-F or Aud. Prereq-Post-MD fellow or #) History and current status of research in family medicine, research resources available in the department. How to ask/define a research question, conduct a literature search, select a research methodology, meet federal requirements for protection of human subjects in research, critically read the medical literature and facilitate its discussion, and prepare a grant proposal.

Family Policy Minor (FPOL)

Department of Family Social Science

College of Education and Human Development

FPOL 8000. Family Policy Perspectives. (3 cr; A-F or Aud) Policies that effect families, from perspective of several academic disciplines. Faculty from academic units across the University teach theory/policy analysis skills from their disciplines. How to analyze public/private policies for their impact on families. Advocacy. Current policy making activities at the legislature, county boards, and other public sector policymaking bodies.

Family Social Science (FSOS)

Department of Family Social Science

College of Education and Human Development

FSOS 5014. Quantitative Family Research Methods I. (3 cr; Stdnt Opt. Prereq-Grad student or #) Family research methods, issues associated with multiple levels of analysis. Conducting family-focused data analyses using basic/intermediate methods (through ANOVA and multiple regression), including power analysis. Ethical issues involved in family research such as IRB/HIPAA regulations.

FSOS 5015. Family Research Laboratory. (1 cr; S-N or Aud. Prereq-Grad student or #) Application of basic family research methods into experiential learning using statistical software. Analyses that correspond with problem situations in 5014 and that involve secondary data analyses. Using statistical software for basic family research. Preparation to work with quantitative family data sets.

FSOS 5323. Family Systems Theories and Interventions. (3 cr; Stdnt Opt. Prereq-Grad student or #) Systemic/cybernetic frameworks as they apply to diverse families. Thinking systemically about families across multiple ecological systems. How to identify crucial epistemological issues in theoretical/applied areas of family science. Theoretical frameworks. Experiential role-playing, guest presentations, field work, research projects, reading clubs, class discussion.
### Family Social Science (FSOS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSOS 5101</td>
<td>Family Systems. (3 cr; Stdt Opt. [S])</td>
<td></td>
<td>Family systems and other family theories focusing on the dynamics and processes relevant to family life. Discuss various 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.</td>
</tr>
<tr>
<td>FSOS 5193</td>
<td>Directed Study in Family Social Science. (1-6 cr [max 6 cr]; Stdt Opt. Prereq-#)</td>
<td></td>
<td>Focuses on individual student needs. Topics vary by offering.</td>
</tr>
<tr>
<td>FSOS 5429</td>
<td>Counseling Skills Practicum I. (3 cr; Stdt Opt. [S]FSOS 5429)</td>
<td></td>
<td>Basic counseling skills. Counselor needs/motivations, non-verbal communication, basic/advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasizes building from client strengths, learning through role-playing.</td>
</tr>
<tr>
<td>FSOS 5900</td>
<td>Special Topics in Family, Youth, and Community. (1-4 cr [max 20 cr]; Stdt Opt)</td>
<td></td>
<td>Topics not dealt with in regular courses. Topics vary by offering.</td>
</tr>
<tr>
<td>FSOS 5902</td>
<td>Family Education Perspectives. (3 cr; A-F or Aud)</td>
<td></td>
<td>Origins, evolution, and critique of alternative perspectives on family education. Implications for educators, programs, and participants.</td>
</tr>
<tr>
<td>FSOS 5904</td>
<td>Contemporary Family Education. (3 cr; A-F or Aud)</td>
<td></td>
<td>Contemporary conditions of changes in transition in family life. Emphasizes implications for educators and educational programs.</td>
</tr>
<tr>
<td>FSOS 5906</td>
<td>Program Planning in Family Education. (3 cr; A-F or Aud)</td>
<td></td>
<td>Curricula research/theory. Alternative perspectives, their concomitant implications for families. Development of and evaluation of family education curriculum/programs.</td>
</tr>
<tr>
<td>FSOS 5908</td>
<td>Family and Work Relationships. (3 cr; A-F only)</td>
<td></td>
<td>Interactions of work/family roles, responsibilities, and aspirations. Resources, legal aspects, gender.</td>
</tr>
<tr>
<td>FSOS 5912</td>
<td>Sexuality Education. (3 cr; A-F only)</td>
<td></td>
<td>Development, delivery, and evaluation of sexuality education curriculum/programs.</td>
</tr>
<tr>
<td>FSOS 5914</td>
<td>Education for Family Communication. (3 cr; A-F only)</td>
<td></td>
<td>Development, delivery, and evaluation of curriculum/programs related to family communication.</td>
</tr>
<tr>
<td>FSOS 5932</td>
<td>Introduction to Parent Education. (1 cr; A-F only)</td>
<td></td>
<td>Philosophy, history, and models of parent education. Ethical, critically reflective professional practice.</td>
</tr>
<tr>
<td>FSOS 5936</td>
<td>Advanced Practice of Parent Education. (3 cr; Stdt Opt. Prereq-5935 or FE 5702 or #)</td>
<td></td>
<td>Evolving perspectives of parent education. Emphasizes psycho-dynamic, conceptual-change approaches. Reflective/dialogic approaches for working with parents in understanding beliefs and examining their origins/consequences. Issues related to diversity, self-awareness, ethics, and evaluation.</td>
</tr>
<tr>
<td>FSOS 5942</td>
<td>Everyday Experiences of Families. (2 cr; A-F only)</td>
<td></td>
<td>Understanding culture and everyday experiences of diverse families. Relevance to parent education and to professional development of parent educators. Research/theoretical knowledge woven with observation/personal reflection.</td>
</tr>
<tr>
<td>FSOS 5945</td>
<td>Parent Learning and Development: Implications for Parent Education. (2 cr; A-F only)</td>
<td></td>
<td>Research/theoretical perspectives critiqued. Challenging assumptions, examining competencies.</td>
</tr>
<tr>
<td>FSOS 5944</td>
<td>Parent Education Curriculum. (2 cr; A-F: Prereq-5943 or #)</td>
<td></td>
<td>How parent learning/adaptation, child development, and family systems theories influence curriculum approaches/materials in parent education. Student develop construct, critique, and select curriculum.</td>
</tr>
<tr>
<td>FSOS 5946</td>
<td>Teaching and Learning in Parent Education. (2 cr; A-F: Prereq-5943 or #)</td>
<td></td>
<td>Students select parent education teaching strategies/processes to meet needs of various populations of adult learners. Critical reflection, ethical practices, parent educator competencies.</td>
</tr>
<tr>
<td>FSOS 5946</td>
<td>Assessment and Evaluation in Parent Education. (2 cr; A-F: Prereq-5943 or #)</td>
<td></td>
<td>Theory, terminology, issues, and approaches in assessment/evaluation. Application to monitoring parent education program performance, assessing program quality, and measuring parent learning development.</td>
</tr>
<tr>
<td>FSOS 5949</td>
<td>Student Teaching in Parent Education. (2 cr; A-F: Prereq-#)</td>
<td></td>
<td>Supervised parent education practice to meet individual student needs. Online discussion, reflection, cooperative learning.</td>
</tr>
<tr>
<td>FSOS 8001</td>
<td>Conceptual Frameworks in the Family. (3 cr; Stdt Opt. Prereq-Family course or #)</td>
<td></td>
<td>Major theoretical models about families, emphasizing sociohistorical context.</td>
</tr>
<tr>
<td>FSOS 8003</td>
<td>Current Issues in Family Science. (3 cr; Stdt Opt)</td>
<td></td>
<td>Content, theories, and methodologies in family science. Emphasizes findings of recent/emerging areas of research. Readings covering a wide range of topics. Critical examination of research studies. Targeted class discussion.</td>
</tr>
<tr>
<td>FSOS 8007</td>
<td>Ethical Issues and Moral Dilemmas in Family Life. (3 cr; Stdt Opt)</td>
<td></td>
<td>Multidisciplinary perspectives of ethics, social norms, family law, family policy, family economics, and family decision-making. Focuses on differing perspectives of individuals representing various ethnicities, socio-economic levels, religions, and sexual orientations.</td>
</tr>
<tr>
<td>FSOS 8013</td>
<td>Qualitative Family Research Methods. (3 cr; Stdt Opt)</td>
<td></td>
<td>Approaches to qualitative family research evaluation. Phenomenological, feminist, grounded theory, content analysis, ethnomet hodological, ethnographic, program evaluation. Theory, research examples, student projects.</td>
</tr>
<tr>
<td>FSOS 8014</td>
<td>Quantitative Family Research Methods II. (3 cr; Stdt Opt. Prereq-([5014 or equiv.], [8001 and equiv.], two stat courses or #)</td>
<td></td>
<td>Quantitative research process, from developing a research question to putting findings to use. A major course project (development of a federally fundable research grant application) is basis for class discussion. Focuses on family research. Applying research knowledge to study of families.</td>
</tr>
<tr>
<td>FSOS 8031</td>
<td>Family of Origin. (3 cr; S-N or Aud. Prereq-Preference given to marriage and fam therapy students)</td>
<td></td>
<td>In-depth study of each student’s family of origin in a group of other students and a clinical faculty therapy supervisor.</td>
</tr>
<tr>
<td>FSOS 8033</td>
<td>Problems in Families. (3 cr; Stdt Opt. Prereq-[8032 or equiv.], #)</td>
<td></td>
<td>Family therapy assessment/treatment approaches to problems such as depression, alcoholism, and sexual abuse, and to challenges of varying family structures, such as single-parent/remarried families.</td>
</tr>
<tr>
<td>FSOS 8034</td>
<td>Marriage and Family Therapy Supervision. (3 cr; Stdt Opt. Prereq-5032 or 8032 or #)</td>
<td></td>
<td>Theories of supervision, structures for supervision, methods of supervision, evaluation process, legal/ethical issues. Therapist-client-supervisor relationships, potential problems, contextual issues.</td>
</tr>
<tr>
<td>FSOS 8035</td>
<td>Assessment of Couples and Families. (3 cr; A-F or Aud. Prereq-8014 or equiv or #)</td>
<td></td>
<td>Issues in research and clinical assessment. Assumptions and values underlying assessment approaches. Specific assessment techniques discussed, evaluated, and administered. Ethical, legal, and practical issues.</td>
</tr>
<tr>
<td>FSOS 8036</td>
<td>Couple and Family Therapy Research. (3 cr; A-F or Aud. Prereq-8031, 8014)</td>
<td></td>
<td>Strengths and limitations of current couple and family outcome research; methodological approaches, including qualitative and quantitative.</td>
</tr>
<tr>
<td>FSOS 8037</td>
<td>Ethical, Legal, and Professional Issues in Mental Health Practice: Issues with Couples and Families. (2-10 cr [max 10 cr]; A-F or Aud. Prereq-[8032, practicum or internship exper] or [grad student in cooperating mental hlth practice prog who has completed 1 course on therapy with children])</td>
<td></td>
<td>Boundaries and triangles, gender inequities, family law, confidentiality and reporting requirements, dual roles, client diversity, and value clashes.</td>
</tr>
<tr>
<td>FSOS 8039</td>
<td>Clinical Interventions for Couples. (3 cr; A-F or Aud. Prereq-5032 or equiv or #)</td>
<td></td>
<td>Interventions into problems faced by couples at various ages and stages of their relationship. Developing and implementing effective strategies for problem solving, relationship maintenance, and partner growth, including integration of sex therapy into ongoing couple therapy.</td>
</tr>
</tbody>
</table>
Trade.$\text{Science.}\text{Doctoral student in FSoS or related field)\text{Science.}}$

MFT grad student or #) Therapy. sciences courses to undergrads. only. Prereq-

Teaching in Family Studies. FSOS 8151. Preparation for Independent

Collaborative strategies designed to encourage change. Interdisciplinary seminar on critical modes of inquiry 8920 recommended

Prereq-8013 or equiv, 8014 or equiv or #; WCFE

Public policies and family economic well-being. Family investments in human/

Research and interventions. FSOS 8106. Seminar: Families From an

Economic Perspective. (3 cr; Stdnt Optr) Conceptual/methodological/economic perspectives of

Family social science. Conceptual family research from other family research. Conceptual frameworks, methods, and roles family policy research can play in policy-making and knowledge-building processes.

FSOS 8105. Family Gerontology. (3 cr; Stdnt Optr. Prereq-8154 or equiv or #) Integrates gerontology and family studies; new lines of inquiry, qualitative and quantitative, into aging families. Family gerontological research, family relationships, family and long-term care institutions, theoretical frameworks and research methods, and research and interventions.


FSOS 8107. Family Values Research. Theories and Critical Methods. (3 cr; Stdnt Optr. Prereq-8013 or equiv, 8014 or equiv or #; WCFE 8920 recommended) Interdisciplinary seminar on critical modes of inquiry in the family domain that require designing studies using normative theories, examining values as units of observation, and solving practical problems by collaborative strategies designed to encourage change.

FSOS 8150. Topics in Family Social Science. (1-6 cr [max 6 cr]; Stdnt Optr. Prereq-FSoS grad student or #) Special seminars on topical issues.

FSOS 8151. Preparation for Independent Teaching in Family Studies. (1 cr [max 3 cr]; S-N only. Prereq-#) Practicum. Skills to independently teach family sciences courses to undergrads.

FSOS 8160. Topics in Marriage and Family Therapy. (1-6 cr [max 6 cr]; Stdnt Optr. Prereq-MFT grad student or #) Special seminars on topical issues.

FSOS 8193. Directed Study in Family Social Science. (1-6 cr [max 12 cr]; Stdnt Optr. Prereq- Doctoral student in FSoS or related field) Directed study.

FSOS 8200. Orientation for Family Social Science. (1 cr; S-N or Aud. Prereq-#)
FINA 8890. Seminar: Finance Topics. (2-4 cr [max 16 cr]; A-F only. Prereq-[[8802, 8812, 8822, 8833] or equiv], business admin student or #) Current topics/problems of interest considered in depth. Topics vary.

FINA 8892. Independent Study in Finance. (1-8 cr [max 16 cr]; Stdnt Opt. Prereq-Business admin PhD student specializing in finance or #) Individualized directed research on a project of interest to the student, approved and advised by faculty.


Financial Mathematics (FM)

School of Mathematics


FM 5011. Mathematical Background for Finance I. (4 cr; Stdnt Opt. Prereq-[5001, 5002] with grade of at least B or [MFM program director approval, grad MFM major]) Mathematics needed for MFM program. Focuses on finance.


FM 5022. Mathematical Theory Applied to Finance II. (4 cr; Stdnt Opt. Prereq-5021, [5012 or P]5021, grad MFM major, program director approval) Bridge between theory and application.


Finnish (FIN)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

FIN 5670. Topics in Finnish Studies. (3 cr [max 9 cr]; Stdnt Opt) Interdisciplinary social science topics on Finnish people, culture, and society. Taught in English.

Fisheries and Wildlife (FW)

Department of Fisheries, Wildlife, and Conservation Biology

College of Food, Agricultural and Natural Resource Sciences


FW 5051. Analysis of Populations. (4 cr; Stdnt Opt. Prereq-[Biol 3407 or Biol 3408W], [4001 or STAT 3011 or ESPM 1012], FW 4010) Regulation, growth, general dynamics of populations. Data needed to describe populations, population growth, population models, regulatory mechanisms.

FW 5292. Special Lectures: Fisheries. (1-5 cr [max 15 cr]; Stdnt Opt. [WF 4292. Prereq-Grad student or #]) Lectures in special fields of fisheries given by visiting scholar or regular staff member.

FW 5392. Special Lectures: Wildlife. (1-5 cr [max 15 cr]; Stdnt Opt. [WF 4392. Prereq-Grad student or #]) Lectures given by visiting scholar or staff member.


FW 5601. Fisheries Population Analysis. (3 cr; A-F or Aud. Prereq-[4001 or Stat 5021], BIOL 3407, [Math 1142 or Math 2171]) Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 5603W. Habitats and Regulation of Wildlife. (3 cr; A-F or Aud. Prereq-Biol 3407, [4103 or #]) Environmental interactions of wildlife at population/community levels. Environmental threats from human activities. Habitat management practices. Objectives, policies, regulations in population management.


FW 5625. Wildlife Handling and Immobilization for Research and Management. (2 cr; S-N or Aud. Prereq-General biology, [grad student or vet med student or FW sr]) Practical techniques to maximize human/animal safety and encourage effective operations. Preparation procedures, legal responsibilities, capture drugs/delivery systems, safety measures, ethical issues, basic veterinary procedures for handling wildlife. Field course. Uses live animals.

FW 8200. Seminar. (1-4 cr [max 8 cr]; S-N or Aud) Oral and written student reports on selected topics from current literature in fisheries biology and management and wildlife. Lectures by and discussions with faculty and visiting specialists.

FW 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

FW 8394. Research in Fisheries. (1-4 cr [max 4 cr]; Stdnt Opt) Directed research.

FW 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

FW 8448. Fishery Science. (3 cr; Stdnt Opt. Prereq-Grad student [in fisheries or wildlife conserv or conserv biol or ecology or #]) Applying ecological theory to study/manipulation of fish populations. Dynamics of growth, mortality, and yield of fish stocks. Field assessment methodology. Simulation applied to management problems. Web-assisted course. Students produce a publishable (print or electronic) project.

FW 8450. Data Analysis. (4 cr; A-F or Aud. Prereq-5xxx statistics course) Advanced statistical methods are used to teach exploration/analysis of univariate/multivariate data. Descriptive statistics, estimation and inference, regression and smoothing, multivariate techniques, resampling.

FW 8452. Conservation Biology. (3 cr; A-F or Aud) Seminar examining population- to system-level biological issues (genetics; demographic processes; community, ecosystem, and landscape scale interaction; restoration ecology; ex situ strategies for restoration and recovery) and societal issues (social, economic, cultural perspectives; sustainable development strategies; roles of institutions; international and U.S. policies).

FW 8459. Stream and River Ecology. (3 cr; Stdnt Opt. Prereq-Limnology course or #) Structure/dynamics of running waters from ecosystem perspective. Historical perspective, basic hydrology/fluvial geomorphology, terrestrial-aquatic interactions, detrital dynamics, metabolism, drift, trophic relations, biotic/abiotic interactions, ecosystem experiments and natural alterations, stability/succession, ecosystem dynamics in a watershed.

FW 8461. Advanced Topics in Fish Physiology. (1 cr; Stdnt Opt. Prereq-Vertebrate physiology course or #) Lectures, discussion, current literature. Complements 5499.

FW 8462. Advanced Topics in Fish Behavior. (1 cr; Stdnt Opt. Prereq-5459 or behavior course or #) Current literature. Complements 5499.

FW 8465. Fish Habitats and Restoration. (3 cr; Stdnt Opt. Prereq-Intro ecology course or #) Mechanisms underlying physiology/behavior that shape fish community structure in specific north temperate habitats. Techniques and planning procedures for restoring lakes/streams.


Courses

Food Science and Nutrition

Department of Food Science and Nutrition

College of Food, Agricultural and Natural Resource Sciences

FSCN 5101. Food Regulation in the United States. (2 cr; A-F or Aud. Prereq-Grad or sr) food science or nutrition major or #) U.S. system of regulation. Food product formulation, manufacturing, labeling and advertising, including insight into the manner in which regulation and the underlying food laws are affected by scientific developments and changing societal values and concerns.

FSCN 5441. Introduction to New Product Development. (2 cr; Stdnt Opt. Prereq-4111, 4331) Interactive course that introduces students to the principles of new product development, from identification and testing of new product concepts, through prototype testing, to basic process design using examples from industry.

FSCN 5461. Food Packaging. (2 cr; Stdnt Opt. Prereq-1102, 3102, Phys 1102 or Phys 1302) Materials, principles, and procedures of packaging as they apply to food products. Emphasis is on consumer products, but the principles also apply to bulk and institutional foods and ingredients.


FSCN 5531. Grains: Introduction to Cereal Chemistry and Technology. (2 cr; Stdnt Opt. Prereq-Biol 1009) 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 5601. Management of Eating Disorders. (5 cr; Stdnt Opt. Prereq-[Sr or grad student] in health related program or #) Etiology, occurrence, course, treatment, and prevention of eating disorders from a multidisciplinary perspective. Roles/responsibilities of eating disorder treatment team members of varying types across various treatment milieus.

FSCN 8310. General Seminar. (1 cr; Prereq-Dr. Prereq-4111, 4331) Presentations by faculty, graduate students, and outside speakers.

FSCN 8318. Current Issues in Food Science. (2 cr; Prereq-4111, 4121, %) Current issues, how they impact food industry.

FSCN 8320. Advanced Topics in Food Science. (1-6 cr; Prereq-4111) Recent research or special topics.

FSCN 8330. Research Topics. (1 cr; Prereq-4111) Seminar in which faculty member or group of faculty/graduate students discuss research progress or review/discuss current research literature.


FSCN 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

FSCN 8334. Reaction Kinetics of Food Deterioration. (2 cr; Stdnt Opt. Prereq-Chem 3501) Basis for use of applied chemical kinetics to deteriorative reactions occurring in processing and storage of foods and drugs. Systems include enzymatic reactions, lipid oxidation, nonenzymatic browning, acid base catalysis, and microbial growth and death. Application of these kinetics to study of accelerated shelf-life testing of foods, drugs, and biologics.


FSCN 8391. Independent Study: Food Science. (1-4 cr; Prereq-4111) Includes written reports.

FSCN 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

FSCN 8666. Doctoral Pre-Thesis Credits. (1-6 cr; Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

FSCN 8773. Thesis Credits: Master’s. (1-6 cr; Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

FSCN 8888. Thesis Credit: Doctoral. (1-2 cr; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Foreign Study—SPAN (FSSP)

College of Liberal Arts

FSSP 5960. Preparatory Seminar for SPAN Overseas Research. (4 cr; A-F or Aud. [S]FSSP 3970, FSSP 5980. Prereq-%) Preparatory seminar for SPAN overseas research.

FSSP 5970. Seminar for SPAN Overseas Research. (4 cr; A-F or Aud. [S]FSSP 3970, FSSP 5980. Prereq-%) Seminar for SPAN overseas research.

FSSP 5980. Seminar for SPAN Overseas Research. (1-4 cr; No grade. Prereq-3970 or Aud. [S]FSSP 3970. Prereq-%)

Forest Resources (FR)

Department of Forest Resources

College of Food, Agricultural and Natural Resource Sciences

FR 5104. Forest Ecology. (4 cr; A-F or Aud. [S]FR 5101. Prereq-3104 or 1009, grad student) or #; 1 semester college chemistry recommended) Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions on research topics, exercises, current issues in forest resource management. Required weekend field trip.


FR 5131. Geographical Information Systems (GIS) for Natural Resources. (4 cr; A-F only. [S]FR 3114. Prereq-Grad student or #) Geographic information systems (GIS), focusing on spatial data development and analysis in the science and management of natural resources. Basic data structures, sources, collection, and quality; geodesy and map projections; spatial and tabular data analyses; digital elevation data and terrain analyses; cartographic modeling and layout. Lab exercises provide practical experiences complementing theory covered in lecture.


FR 5153. Forest and Wetland Hydrology. (3 cr; Stdnt Opt. Prereq-[Basic hydrology course, [upper div or grad student]] or #) Current topics, methods/models in forest/wetland hydrology. Hydrologic role of forests, wetlands, riparian systems in snowfall/rainfall regimes. How activities such as deforestation, wetland drainage, and stream channel alterations, affect hydrologic response of watersheds. Runoff/streamflow response from undisturbed/alterned forest/wetland watersheds. Problem-solving exercises.


Courses

FREN 5301. Critical Issues in French Studies. (3 cr; Stdnt Opt. Prereq-Grad or #). Introduction to the methods of interpretation and critical debates that have shaped and continue to define the discipline of French studies. Provides a practical introduction to graduate-level literary research.

FREN 5350. Topics in Literature and Culture. (3 cr [max 12 cr]; Stdnt Opt. Prereq-S3101 or equiv) Problems, period, author, or topic of interest. See Class Schedule.


FREN 5501. Structure of French: Phonology. (3 cr; Stdnt Opt. S/FREN 3501, Prereq-[LING 3001 or Ling 5001], grad student) Advanced study of sound system of contemporary French.

FREN 5531. Sociolinguistics of French. (3 cr; Stdnt Opt. S/FREN 5531, Prereq-[S] 3531; Ling 3001 or 5001, grad) Explores variation in the use of French associated with factors such as medium (oral/written), style (formal/informal), region, social, and economic groups.

FREN 5541. Oral Discourse of French. (3 cr; Stdnt Opt. Prereq-3015, grad student; Ling 5001 recommended) Nature of contemporary spoken French discourse. Focuses on spontaneous, multi-speaker discourse. Readings include examples of various linguistic approaches to such discourse. Emphasizes syntactic analysis. Phonological/lexical particularities. ‘Macro’ level analyses such as discourse analysis and conversation analysis.

FREN 5995. Directed Teaching. (1-6 cr [max 24 cr]; S-N or Aud. Prereq-#) Directed teaching.

FREN 8110. Topics in Early Medieval French Literature. (3 cr [max 9 cr]; Stdnt Opt) Introduction to epic, romance, allegory, and theater in Old French readings (12th-13th centuries). Specific topics/texts studied vary. Taught in French.

FREN 8111. Introduction to Old French. (3 cr; Stdnt Opt) Studies in medieval French: instruction in reading Old French, sources of bibliography, and topics in medieval studies (language and literature). Taught in French.

FREN 8114. Old Provençal Language and Literature. (3 cr; Stdnt Opt) Language and literature of Old Occitan (Old Provençal), chiefly troubadours’ poems. Some language instruction, reading of poems and other works, and consideration of nature and origins of “courly love.” Knowledge of French, Spanish, or Italian desirable.


FREN 8219. Old French Workshop. (1 cr [max 2 cr]; S-N only. Prereq-[II][III]8110 or [P]8250 or [P]8260 or [P]8270 or [P]8290) If section’s material is in Old French or [P]8250/8270/8290 if section is crosslisted with one of the above French seminars], reading knowledge of modern French]


FREN 8250. Critical Issues: Poetry. (3 cr [max 12 cr]; Stdnt Opt) Significant critical issues relating to poetic writing of selected authors or periods.

FREN 8260. Critical Issues: Theatre. (3 cr [max 12 cr]; Stdnt Opt) Significant critical issues relating to dramatic writing of selected authors or periods.

FREN 8270. Critical Issues: Prose. (3 cr [max 12 cr]; Stdnt Opt) Significant critical issues relating to prose writing of selected authors or periods.

FREN 8271. The Novel of the Ancien Regime. (3 cr; Stdnt Opt) Considers major novels of the 17th and 18th centuries in connection with developments in such areas as esthetic theory, intellectual currents, social transformations, and reading practices.

FREN 8290. Critical Issues: Perspectives on an Author. (3 cr [max 12 cr]; Stdnt Opt) In-depth study of major author’s writing, critical tradition this writing has occasioned, and theoretical issues upon which this writing may be brought to bear.

FREN 8901. Jean Genet’s Writings and French Institutions. (3 cr; Stdnt Opt) Jean Genet’s writings at the crossroads of several disciplines (politics, psychoanalysis, religion, and law). Genet’s novels, dramas, and political essays explore the power of institutional settings and strategies imagined by individuals to short-circuit their impact.

FREN 8933. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

FREN 8937. The Rule of Reason, The Reign of Madness in Philosophy, legitimation of political rule, and cultural memory. Specific topics/texts treated vary. Taught in French.

FREN 8994. Directed Research. (1-5 cr [max 25 cr]; Stdnt Opt. Prereq-#; may be taken as tutorial with #)


FREN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

FREN 8888W. Thesis Credit Dissertation Seminar. (1-3 cr [max 24 cr]; No grade. Prereq-Doctoral student who has passed oral prelims) A means for students to make progress on the dissertation in a structured setting. Brings together students writing on related topics. Credits are applied to doctoral thesis credits. Contact instructor for description.

FREN 8890. Directed Teaching. (1-5 cr [max 25 cr]; Stdnt Opt)

FREN 8992. Directed Readings for Graduate Students. (1-5 cr [max 25 cr]; Stdnt Opt. Prereq-#)

FREN 8994. Directed Research. (1-5 cr [max 25 cr]; Stdnt Opt. Prereq-#; may be taken as tutorial with #)

French and Italian (FRIT)
Department of French and Italian
College of Liberal Arts

FRIT 5257. Passionate Beings: Literary and Medical Problematics in Italy and France from 1800 to the Present. (4 cr; Stdnt Opt) Literary and medical representations of the passions in France and in Italy from 1800 to the present. Texts range from theatrical works to medical treatises on the passions as ways for exploring notions of subjectivity, responsibility, order. Taught in English.

FRIT 5850. Topics in French and Italian Cinema. (3 cr; Stdnt Opt. Prereq-Knowledge of [French or Italian helpful but not required]) Focuses on a theme, period, filmmaker, or other topic of interest in French or Italian cinema. See Class Schedule. Taught in English.

FREN 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

FREN 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Gay, Lesbian, Bisexual, and Transgender Studies (GLBT)
Department of Gender, Women, and Sexuality Studies
College of Liberal Arts
GLBT 5993. Directed Study. (1-12 cr [max 12 cr]; Stdnt Opt)

Gender, Women, and Sexuality Studies (GWSS)
Department of Gender, Women, and Sexuality Studies
College of Liberal Arts
GWSS 5101. Feminist Approaches to Ethnography. (3 cr; Stdnt Opt)
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.

GWSS 5102. Feminist Approaches to History. (3 cr; Stdnt Opt. Prereq-8 cr WoSt or grad or #) Analysis and practice of feminist history. Theories, methods, and sources that address the interrelationship of gender, race, class, and sexuality.

GWSS 5103. Feminist Pedagogies. (3 cr; Stdnt Opt. Prereq-grd 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.

GWSS 5104. Transnational Feminist Theory. (3 cr; Stdnt Opt) Third World and transnational feminisms. Interrogating the categories of “women,” “feminism,” and “Third World.” Varieties of power/oppression that women have endured/resisted, including colonization, nationalism, globalization, and capitalism. Concentrates on postcolonial context.

GWSS 5105W. Gendered Rhetoric of Science and Technology. (3 cr; Stdnt Opt. Prereq-[S] Rhet 5108, [S]Rhet 8530): 8 cr WoSt or grad or #) How cultural gender roles are affected by science and technology as well as influence scientific and technological thinking and communication strategies.

GWSS 5107. Gender, Culture, and Science. (3 cr; Stdnt Opt) Critical study of some of the major papers concerning the relations of gender and scientific inquiry produced in the past 20 years.


GWSS 5201. Global Processes and the Politics of Sexuality. (3 cr; Stdnt Opt. Prereq-12 cr WoSt or feminist studies grad student or #) Comparative examination of the social construction of sexuality. Formal/informal norms/regulations, categories of deviance, representation of sex in the media/arts, role of sexuality in relation to agency/subjectivity.

GWSS 5290. Topics: Biology, Health, and Environmental Studies. (3 cr; Stdnt Opt) Topics specified in Class Schedule.

GWSS 5300. Communication and Gender. (3 cr; A-F or Aud. [S]COMM 5406. Prereq-one women’s studies course or #) How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions.


GWSS 5404. Working Class Women’s Cultures. (3 cr; Stdnt Opt. Prereq-12 cr WoSt or #) Myths and realities surrounding working class women and their cultures. Use sociological and literary material in an effort to learn about working class women and to hear their own voices.

GWSS 5405. Chicana/a, Women and Work. (3 cr; Stdnt Opt. Prereq-#) Chicanas, their various relationships to family/community, local, national, and global work forces. Questions/issues related to growing integration of world s systems of production.

GWSS 5490. Topics: Political Economy and Global Studies. (3 cr [max 12 cr]; Stdnt Opt) Topics specified in Class Schedule.

GWSS 5503. Queering Theory. (3 cr; Stdnt Opt. [S]GWSS 4403) Lesbianism and lesbian identities as products of cultural practices, relations, and meanings that are historically specific/changing.


GWSS 5790. Topics: Sexuality Studies. (3 cr [max 6 cr]; Stdnt Opt) Topics specified in Class Schedule.

GWSS 5993. Directed Study. (1-12 cr [max 12 cr]; Stdnt Opt)

GWSS 5994. Directed Instruction. (1-12 cr [max 36 cr]; Stdnt Opt)

GWSS 5995. Directed Research. (1-8 cr [max 36 cr]; Stdnt Opt)

GWSS 8101. Intellectual History of Feminism. (3 cr; Stdnt Opt) Major trends in feminist intellectual history from 14th century to the present, especially in the United States and Europe.

GWSS 8102. Advanced Studies in Sexuality. (3 cr; Stdnt Opt. Prereq-Priority given to feminist studies grad students) Contemporary theoretical/philosophical/scholarship on selected issues related to sexuality, gender, and the body.


GWSS 8109. Feminist Theories and Methods II. (3 cr; Stdnt Opt. Prereq-Feminist studies PhD or grad minor student or #) Two-semester interdisciplinary seminar. First term: debates in gender theory; gender theory, critical race theory, post-colonial theory, sexuality theory, social class analysis. Second term: inter- and multidisciplinary feminist research methods from humanities/social sciences.

GWSS 8190. Topics: Feminist Theory. (3 cr [max 9 cr]; Stdnt Opt) Topics in feminist theory.

GWSS 8201. Feminist Theory and Methods in the Social Sciences. (3 cr; Stdnt Opt) Seminar on recent theories including feminist versions of positivist, interpretivist, critical theoretical, and postmodernist models of social science knowledge. Methodologies congenial to feminist practices of inquiry, including use of narrative in theory, feminist ethnography, discourse analysis, and comparative methods in history.

GWSS 8290. Topics: Social Sciences and Public Policy. (1-3 cr [max 3 cr]; Stdnt Opt)

GWSS 8301. Feminist Literary Criticism. (3 cr; Stdnt Opt) Recent developments and major issues in feminist studies of literature. Introduction to array of scholars and scholarship in field of feminist literary theory and criticism, emphasizing broad range of feminist textual analysis taking place in various University departments.

GWSS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

GWSS 8390. Topics: Literary Studies. (1-3 cr [max 3 cr]; Stdnt Opt) Topics in literature, film, and art.

GWSS 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

GWSS 8490. Topics: Comparative and Global Studies. (1-3 cr [max 5 cr]; Stdnt Opt) Graduate topics in comparative and global studies.

GWSS 8590. Topics: Historical Studies. (1-3 cr [max 3 cr]; Stdnt Opt)

GWSS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

GWSS 8888. Thesis Credit: Doctoral. (1-24 cr [max 24 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

GWSS 8993. Directed Study. (1-6 cr [max 9 cr]; Stdnt Opt)

GWSS 8994. Directed Instruction. (1-8 cr [max 36 cr]; Stdnt Opt)

GWSS 8995. Directed Research. (1-8 cr [max 36 cr]; Stdnt Opt)
Courses

GWSS 8996. Feminist Studies Colloquium. (1 cr [max 4 cr]; S-N or Aud. Prereq-Grad major or minor in Feminist studies)


GWSS 8998. Professional Development. (3-3 cr [max 6 cr]; S-N only. Prereq-Grad student) Workshop addressing one of a variety of professional development issues including, but not limited to, grant writing, book reviewing, revising term papers for publication, course development, writing and presenting conference papers, preparing to enter the job market (writing a c.v./application letter, preparing for interviews, job talk).

General Dentistry (GEND) School of Dentistry

GEND 5151. Advanced General Dentistry Seminar I. (5-10 cr [max 10 cr]; S-N or Aud) Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5152. Advanced General Dentistry Seminar II. (5-10 cr [max 10 cr]; S-N or Aud) Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5153. Advanced General Dentistry Seminar III. (2-10 cr [max 10 cr]; S-N or Aud) Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5254. Advanced General Dentistry Clinic I. (5-15 cr [max 15 cr]; S-N or Aud) Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5255. Advanced General Dentistry Clinic II. (5-15 cr [max 15 cr]; S-N or Aud) Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5256. Advanced General Dentistry Clinic III. (5-15 cr [max 15 cr]; S-N or Aud) Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5264. Advanced General Dentistry Clinic IV. (1-15 cr [max 15 cr]; S-N or Aud) Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5265. Advanced General Dentistry Clinic V. (1-15 cr [max 15 cr]; S-N or Aud) Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5266. Advanced General Dentistry Clinic VI. (1-15 cr [max 15 cr]; S-N or Aud) Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

Genetics, Cell Biology and Development (GCD)

Department of Genetics, Cell Biology, and Development

College of Biological Sciences

GCD 5036. Molecular Cell Biology. (3 cr; Stdnt Opt. Prereq-Biol 4004 or #, [sr or grad student recommended]) Modern, integrative approaches combining cellular and molecular biology, biochemistry, and genetics to investigate cell organization/function. Membranes, signaling, extracellular matrix, secretion, endocytosis, cytokinesis, cytoskeleton, nucleus. Analysis of scientific papers to illustrate new concepts in and experimental approaches to cell organization/function.

GCD 8006. Mammalian Gene Transfer and Expression. (2 cr; A-F or Aud. Prereq-#) Current gene transfer technology. Applications of genetic modifications in animals, particularly transgenic animals and human gene therapy.

GCD 8014. Small RNA Biology. (2 cr; A-F or Aud. Prereq-MICA 8004 or BIOC 8002 or equiv or #) Small RNAs as major regulators of gene and protein expression. MicroRNAs and their potential use in diagnosis and prognosis of various disease conditions including cancers. Biology of small RNAs and their role in health and disease.

GCD 8073. Advanced Human Genetics. (3 cr; Stdnt Opt. Prereq-Biol 8131 or BIOC 4003 or #) Application of molecular, biochemical, chromosomal, and population genetics to human variation and disease. Abnormal chromosome number and structure; abnormal enzyme, structural protein, receptor and transport; analysis of inheritance patterns; behavioral genetics; genetic basis of common disease. Current research articles in human genetics.

GCD 8103. Human Histology. (3 cr; Stdnt Opt. [GCD 6103. Prereq-Undergraduate biology, chemistry, math, and physics course; #]) Light/electron microscopic anatomy of tissues and their organization into human organs. Emphasizes integrating structure, its relationship to function at levels from molecules to organs. Lecture, lab.

GCD 8131. Advanced Genetics and Genomics. (5 cr; Stdnt Opt. Prereq-[[5022 or BIOL 4003], [BIOC 3021 or BIOC 4351] or #]) Literature-based. Modern genetic analysis, including mutant screens, characterization of multiple alleles, gene mapping and cloning, genome sequencing, intergenic interactions, transposable elements, genetic mosaics, and molecular mechanisms of recombination.


GCD 8151. Cell Structure and Function. (3 cr; Stdnt Opt. Prereq-[[5023 or 8121 or BIOC 8002], Biol 4004 or BMBB or MCDP/PhD student] or #) Structure, function, and biochemistry of cellular organelles. Cellular interactions in eukaryotes. Emphasizes membranes, secretion, trafficking, and cytokinesis, cell motility, nucleus, cell cycle, apoptosis, cell signaling, and signal transduction mechanisms.

GCD 8161. Advanced Developmental Biology. (3 cr; Stdnt Opt. Prereq-[[4032 or 8121 or BIOC 8002], [Biol 4003, Biol 4004] or #) Current concepts of and experimental approaches taken to understand basic mechanisms of development. Model organisms. Embryology, cell fate determination, differentiation, pattern formation, polarity, cell migration, and cell interactions. Analysis of original research articles.

GCD 8171. Literature Analysis. (2 cr; A-F or Aud. Prereq-Grad MCDG major) Critical reading and evaluation of current literature. May include evaluation of both excellent and flawed papers. Intensive and in-depth discussions of selected papers in molecular biology, genetics, cell biology, and developmental biology.

GCD 8212. Selected Topics in Cell and Developmental Biology. (3 cr, Stdnt Opt. Prereq-Biol 8121 or BIOC 8002, 8151, [4161 or 8151 or #]) Reading and discussion of papers from current literature. Topics selected from research areas of cell biology and developmental biology and experimental approaches taken in these fields. Topics vary annually.


GCD 8900. Seminar. (1-2 cr [max 8 cr]; S-N or Aud. Prereq-Grad MCDG major or #) Current scientific research.

GCD 8910. Journal Club. (1 cr [max 4 cr]; S-N or Aud. Prereq-Grad MCDG major or #) Critical evaluation of selected current literature.

GCD 8912. Genetic Counseling in Practice. (4 cr; A-F or Aud. Prereq-MCDG MS student with genetic counseling specialization or #) Practical genetic counseling, communicating genetics and medical information to the family, helping families with decision making.

GCD 8913. Psychosocial Issues in Genetic Counseling. (3 cr; A-F or Aud. Prereq-MCDG MS student with genetic counseling specialization or #) Interviewing skills, supportive counseling, and case-study analysis specific to genetic counseling.

GCD 8914. Ethical and Legal Issues in Genetic Counseling. (3 cr; A-F or Aud. Prereq-MCDG MS student with genetic counseling specialization or #) Professional ethics; ethical and legal concerns with new genetic technologies.

GCD 8920. Special Topics: Genetics and Reproduction: Law and Ethics. (2 cr; A-F only. Prereq-Grad student or #) Special topics. Genetics and reproduction: law and ethics.

GCD 8993. Directed Studies. (1-5 cr [max 15 cr]; Stdnt Opt. Prereq-MCDG MS student with genetic counseling specialization or #)
GIS 8333. FTE: Master’s. (1 cr; No grade. Prereq: Master’s student, adviser and DGS consent)
GIS 8501. Survey of Geographic Information Science: Past, Present, and Future Trends and Activities. (3 cr; Stdnt Opt. Prereq: MGIS student or #)
GIS 8990. Research Problems in GIS. (1-6 cr [max 6 cr]; A-F only. Prereq: MGIS student, #)

Geography (GEOG)

Department of Geography

College of Liberal Arts

GEOG 5520. GIS Internship. (1-3 cr [max 6 cr]; S-N only. Prereq: #; strong GIS/mapping skills)

Practical hands-on experience using GIS to solve problems in a real-world work environment.

GEOG 5555. Basic Spatial Analysis. (3 cr; Stdnt Opt. Prereq: [STAT 3001 or equiv, MGIS student] or #)

How to use spatial data to answer questions on a wide array of social, natural, and information science issues. Exploratory data analysis/visualization. Spatial autocorrelation analysis/regression.

GEOG 5571. ArcGIS I. (3 cr; Stdnt Opt. Prereq: [GEOG 5561 or equiv, status in MGIS program, familiarity with computer operating systems] or #)

First of a two-course series focusing on ArcGIS Desktop. Overview of ArcGIS system and its use for spatial data processing. Data capture, editing, geometric transformations, map projections, topology, Python scripting, and map production.

GEOG 5572. ArcGIS II. (3 cr; Stdnt Opt. Prereq: [GEOG 5571, GEOG 5561 or equiv, in MGIS program] or #)

Continues GIS 5571. Raster analysis, dynamic segmentation, geometric networks, geocoding, Python scripting, and data interoperability. Substantial projects include map and poster design and production.

GEOG 5573. Desktop Mapping. (1.5 cr; Stdnt Opt. Prereq: [GEOG 5561 or equiv, in MGIS program] or #)

Desktop mapping functions using ArcGIS software. Application of these systems to the display and analysis of geographical data.

GEOG 5574. GIS and the Internet. (3 cr; Stdnt Opt. Prereq: [GEOG 5561 or equiv, in MGIS program] or #)

Web-based technologies. Plan, design, develop, and publish a web-based GIS solution. Building websites, preparing data for the web, commercial software, Open Source software, volunteer geographic information, open GIS standards and developing a web GIS application. Hands-on experience with a variety of web GIS technologies and software.

GEOG 5575. Surveying and the Global Positioning System (GPS). (2 cr; Stdnt Opt. Prereq: [GEOG 5561 or equiv, in MGIS program] or #)

Surveying techniques and its relationship to GPS of use to GIS professionals. Geodesy, data adjustment, datums, ellipsoids, coordinate systems, and transformations.

GEOG 5577. Spatial Database Design and Administration. (3 cr; Stdnt Opt. Prereq: MGIS student or #)

Spatial database design, development planning/management, maintenance, security, access/distribution, and documentation.

GEOG 5578. GIS Programming. (5 cr; Stdnt Opt. Prereq: MGIS student or #)

Programming techniques using Python and other languages specifically relating to GIS technologies.

GEOG 5590. Special Topics in GIS. (1-3 cr [max 6 cr]; A-F or Aud. Prereq: #)

Topics vary according to curricular needs, technological developments in field.

GEOG 5501. Introduction to Atmospheric Science. (3 cr; Stdnt Opt. [SES 5421. Prereq: Familiarity with fundamentals of physics, calculus, and statistics, including differential and integral calculus and basic differential equations and basic thermodynamics, mechanics, and the electromagnetic spectrum]

Calculus-based introduction to atmospheric dynamics, radiation, thermodynamics, chemical composition, and cloud processes. Applications to climate, meteorology, the hydrologic cycle, air quality, and biogeochemical cycles.

GEOG 5623. Climate Models and Modeling. (3 cr; Stdnt Opt. Prereq: [SES 5401 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; Stdnt Opt. Prereq: [SES 5421 or #])

Theories of climatic fluctuations and change at decadal to centuries time scales; analysis of temporal and spatial fluctuations especially during the period of instrumental record.

GEOG 5431. Plant and Animal Geography. (3 cr; Stdnt Opt. [SES 5401 or #])

Introduction to biogeography. Focuses on patterns of plant/animal distributions at different scales over time/space. Evolutionary, ecological, and applied biogeography. Paleo-biogeography, vegetation-environment relationships, vegetation dynamics/disturbance ecology, human impact on plants/animals, nature conservation. Discussions, group/individual projects, local field trips.

GEOG 5511. Principles of Cartography. (3 cr; Stdnt Opt)


GEOG 5512. Cartography: Topics. (3 cr; Stdnt Opt. Prereq: 5511 or 5531 or #)

Selected topics include the system of cartographic communication, map design, map reading, map analysis, history of cartography.

GEOG 5530. Cartography Internship. (2-7 cr [max 10 cr]; S-N or Aud. Prereq: #)

Provides intensive hands-on experience in contemporary map production and design, ranging from GIS applications to digital prepress. Strong computer skills essential.

GEOG 5531. Numerical Spatial Analysis. (4 cr; Stdnt Opt. [SES 5401 or #])

Application of human-altered environmental conditions.

GEOG 5401. Geography of Environmental Science: Past, Present, and Future Trends and Activities. (3 cr; Stdnt Opt. [SES 5401 or #])

Introduction to geographic science, including university, local, state, and federal-level initiatives. History of GIS, professional development, GIS ethics/certification, and other current issues.

GEOG 8501. Survey of Geographic Information Science: Past, Present, and Future Trends and Activities. (3 cr; Stdnt Opt. Prereq: MGIS student or #)

Current trends and activities in geographic information science, including university, local, state, and federal-level initiatives. History of GIS, professional development, GIS ethics/certification, and other current issues.

GEOG 8501. Survey of Geographic Information Science: Past, Present, and Future Trends and Activities. (3 cr; Stdnt Opt. Prereq: MGIS student or #)

Current trends and activities in geographic information science, including university, local, state, and federal-level initiatives. History of GIS, professional development, GIS ethics/certification, and other current issues.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses


GEOG 5563. Advanced Geographic Information Science. (3 cr; Sdtnt Opt. Prereq-B or better in 3561 or 5561 or #) Advanced study of geographic information systems (GIS). Topics include spatial data models, topology, data encoding, data quality, database management, spatial analysis tools and visualization techniques. Hands-on experience using an advanced vector GIS package.

GEOG 5564. Urban Geographic Information Science and Analysis. (3 cr; Sdtnt Opt. Prereq-3561 or 5561) Core concepts in urban geographic information science including urban databases (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 Human-Environment Systems. (3 cr; Sdtnt Opt. Prereq-3561 or 5561 or FR-4101 or LA-5573 or one intro GIS course or grad student or #) Applications of geographic information systems and other spatial analysis tools to analysis of environmental systems patterns, dynamics, and interactions. Focuses on global to landscape databases developed to analyze atmospheric, hydrospheric, geomorphic, pedologic, biologic, and human landuse systems.

GEOG 5839. Introduction to Dendrochronology. (3 cr; Sdtnt Opt. Prereq-1403, [Biol 1001 or Biol 1009 or equiv] or #) Historical development, operational techniques, biological background, and principles of tree-ring analysis. Applications of tree-ring data to investigate environmental change and past cultures.

GEOG 5900. Topics in Geography. (3 cr [max 9 cr]; Sdtnt Opt. Prereq-sr or grad, #) Special topics and regions. Course offered by visiting professors in their research fields.

GEOG 8001. Problems in Geographic Thought. (3 cr; A-F or Aud) Currents of geographic thought in biophysical, GIS, human, cultural, and human-environment subfields. Focuses on concepts/paradigms through which geographers have attempted to unify/codify the discipline, around which debate has flourished, and about which interdisciplinary histories can be traced.


GEOG 8005. Proseminar: Population Geography. (3 cr; Sdtnt Opt. Prereq-#) Conceptual literature and empirical studies on fertility, mortality, and migrations in different parts of the world.

GEOG 8006. Proseminar: Research Methods in Geography. (3 cr; Sdtnt Opt. Prereq-#) Introduction to research design, strategies, methods of data collection, analysis, interpretation, and representation in contemporary geographic research.

GEOG 8007. Proseminar: Theories of Development and Change. (3 cr; Sdtnt Opt. Prereq-#) Recent research themes and questions in geography and related social sciences on Third World development; development theories, conceptually grounded case studies, and grassroots development research.

GEOG 8020. Research Seminar: Economic Geography. (3 cr; Sdtnt Opt. Prereq-#) Contemporary research. Advanced topics, which vary with interests of faculty offering course.


GEOG 8102. Proseminar: The State, the Economy, and Spatial Development. (3 cr; Sdtnt Opt. Prereq-#) Introduction to research in economic, political, and urban geography: conceptual research addressing interrelationship between political and economic processes and spatial dynamics of urban and regional development; empirical research documenting nature and extent of this interrelationship at different spatial scales.

GEOG 8103. Proseminar: Physical Geography. (3 cr; Sdtnt Opt. Prereq-#) Historical development of research in physical geography, current research trends, and transfer of current research to undergraduate education.

GEOG 8105. Proseminar: Historical Geography. (3 cr; Sdtnt Opt. Prereq-#) Introduction to conceptual research and empirical studies.


GEOG 8200. Seminar: Urban Geography. (2-3 cr [max 3 cr]; A-F or Aud) Contemporary research. Topics vary with the interests of faculty.

GEOG 8201. Explorations in the Geography of Minnesota. (3 cr; S-N or Aud. Prereq-) Physical environment, agriculture, forestry, mining, land survey, population, recreation, cities/towns, transportation. Sources of information about the state. Students make short oral/written reports. Might provide springboard for a Plan B paper, thesis, or dissertation. Two or three Saturday field trips.


GEOG 8212. Africa. (3 cr; Sdtnt Opt. Prereq-#) Advanced topics. Topics vary with interests of faculty offering course.

GEOG 8213. East Asia and China. (3 cr; Sdtnt Opt. Prereq-#) Contemporary research, advanced topics. Topics vary with interests of faculty offering course.

GEOG 8214. South Asia. (3 cr; Sdtnt Opt) Advanced topics. Topics vary with interests of faculty offering course.


GEOG 8230. Theoretical Geography. (3 cr; Sdtnt Opt. Prereq-#) Advanced topics. Topics vary with interests of faculty offering course. Contemporary theoretical/philosophical themes transcending subdisciplines of human/physical geography.

GEOG 8240. Medical Geography. (3 cr; Sdtnt Opt. Prereq-#) Geographic inquiry concerning selected problems of health and health care.

GEOG 8260. Seminar: Physical Geography. (3 cr; Sdtnt Opt. Prereq-#) Topics of contemporary research. Topics vary with interests of faculty offering course.

GEOG 8270. Seminar: Climatology. (3 cr; Sdtnt Opt. Prereq-#) Sample topics: climate modeling; climatic variability; climate change and predictability; severe local storms; drought; energy balance; urban climate; statistical climatology.

GEOG 8280. Biogeography. (3 cr [max 9 cr]; Sdtnt Opt. Prereq-#) Forest dynamics, dendrochronology, tree rings and climate, environmental disturbance, paleobiogeography, field/lab methods in biogeography.

GEOG 8290. Seminar in GIS and Cartography. (3 cr; Sdtnt Opt. Prereq-#) Selected concepts/methods. Topics, which vary yearly, include spatial analysis methods in GIS; advanced visualization methods; data quality and error propagation in GIS; generalization methods in GIS and cartography; role of time in GIS; interactive/animated cartography; incorporation of uncertainty.


GEOG 8302. Research Development. (3 cr; S-N or Aud. Prereq-#) Students in geography and related social sciences are guided in key steps to effective research proposal writing.

GEOG 8333. FTE: Masters. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

GEOG 8336. Development Theory and the State. (3 cr; A-F or Aud) Why certain interventionist states in third world countries have been able to guide their economies to overcome legacy of underdevelopment while most have failed to induce development. Internal/
null
German (GER)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

GER 5011. Advanced Conversation and Composition. (3 cr; Stdt Opt; Prereq-3012, [grad student or adv undergrad]) Achieving high efficiency in writing/speaking professional/academic German.


GER 5410. Topics in German Literature. (3 cr [max 9 cr]; Stdt Opt; Prereq-3011) Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

GER 5510. Topics in Contemporary German Culture. (3 cr [max 9 cr]; Stdt Opt. Prereq-3011) A topic of contemporary German culture explored in depth.

GER 5610. German Literature in Translation. (3 cr [max 9 cr]; Stdt Opt; Prereq-No knowledge of German required; cr toward major or minor requires reading in German) Study in depth of authors or topics from various periods in German literature. Requires no knowledge of German.

GER 5630. Topics in German Cinema. (3 cr [max 9 cr]; Stdt Opt. Prereq-3xxx film course or #) Topics chosen may focus on specific directors, genres, film production or reception, and/or other formal, theoretical, historical, or political issues.

GER 5711. History of the German Language I. (3 cr; Stdt Opt. Prereq-3011) Historical development of German, from beginnings to 1450.

GER 5712. History of the German Language II. (3 cr; Stdt Opt. Prereq-5711) Historical development of German from 1450 to 2000.

GER 5721. Introduction to Middle High German. (3 cr; Stdt Opt) Introduction to Middle High German language and literature. Study of grammar through formal description of Middle High German phonology, morphology, and syntax. Normalized MHG texts read.

GER 5722. Middle High German: Advanced Readings. (3 cr; Stdt Opt. Prereq-5721) Acquisition of fluency in reading Middle High German normalized as well as non-normalized texts, both poetry and prose.

GER 5731. Old High German I. (3 cr; Stdt Opt) 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; Stdt Opt. Prereq-5731) Study of the monuments of Old High German. Detailed investigation of Old High German in comparison with the other Germanic languages.

GER 5734. Old Saxon. (3 cr; Stdt Opt) Study of the poetry of Old Saxon. Detailed investigation of Old Saxon in comparison with the other Old Germanic languages.

GER 5740. Topics in Germanic Medieval Studies. (3 cr [max 9 cr]; Stdt Opt) Topics specified in Class Schedule.

GER 5993. Directed Studies. (1-4 cr [max 12 cr]; Stdt Opt. Prereq-#, %, [B]) Guided individual reading or study.

GER 8010. Current Debates in Literary and Cultural Theory. (3 cr [max 12 cr]; Stdt Opt) Seminar. Close readings of theoretical constellations in texts. Topic such as text/image, history/memory/time, oral culture/literacy, public/private, authority/crisis. Draws on literary, philosophical, and theoretical work.

GER 8020. Problems in Literary and Cultural History. (3 cr [max 12 cr]; Stdt Opt) Historiographic texts as literature or filmic texts as historical documents. Homogenizing/constractive elements in historiography. Strategies of writing historical syntheses.

GER 8200. Seminar in Medieval German Literature and Culture. (3 cr [max 9 cr]; Stdt Opt) Topics on specific author, group of authors, genre, or subject matter in German literature, ca. 800-1450.

GER 8210. Seminar in Early Modern German Literature and Culture. (3 cr [max 9 cr]; Stdt Opt) Topics on specific author, group of authors, genre, or subject matter in German literature, 1450-1750.

GER 8220. Seminar in 18th-Century German Literature and Culture. (3 cr [max 9 cr]; Stdt Opt) Literary, philosophical, and aesthetic texts emerging from major 18th-century literary trends, 1720-1810. Cultural and historical contexts of Enlightenment and Weimar Classicism.

GER 8230. Seminar in 19th-Century German Literature and Culture. (3 cr [max 9 cr]; Stdt Opt) Examination of an author, issue, or movement, using a variety of critical approaches.

GER 8240. Seminar in 20th-Century German Literature and Culture. (3 cr [max 9 cr]; A-F or Aud) Topics on literature, film, or other forms of “high” and popular culture.

GER 8300. Topics in Literature and Cultural History. (3 cr [max 9 cr]; Stdt Opt) Authors, themes, movements, and social issues from 1700 to present. Focus varies each semester.

GER 8741. Gothic and Methods of Comparative Reconstruction I. (3 cr; Stdt Opt) The oldest extant Germanic language and the prehistory of Germanic languages.

GER 8742. Gothic and Methods of Comparative Reconstruction II. (3 cr; Stdt Opt. Prereq-8741) Continuation of study of the oldest extant Germanic language and the prehistory of Germanic group of languages.

GER 8751. Paleography: Medieval Manuscript Readings. (3 cr; A-F or Aud) Introduction to techniques of reading and transcribing medieval German and Latin manuscripts.

GER 8752. Medieval Text Editing. (3 cr; Stdt Opt) Introduction to techniques of historical text-critical editing of medieval Germanic and Latin manuscripts.

GER 8820. Seminar: Advanced Theory. (3 cr [max 9 cr]; Stdt Opt) Topic in critical thought, e.g., the Frankfurt School, hermeneutics, reception theory.

GER 8894. Directed Research. (1-3 cr [max 12 cr]; Stdt Opt. Prereq-#, %; may be taken as tutorial with #)

GER 8994. Directed Research. (1-3 cr [max 12 cr]; Stdt Opt. Prereq-#, %; may be taken as tutorial with #)

German, Scandinavian, and Dutch (GSD)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

GSD 5103. Teaching of Germanic Languages. (3 cr; Stdt Opt) Second language acquisition theory, methods, testing, and technology applicable to teaching of modern Germanic languages.

GSD 8001. Approaches to Textual Analysis. (3 cr; Stdt Opt) Theoretical approaches to textual analysis that shape disciplinary discussions in Germanic studies.

GSD 8002. Interdisciplinary Approaches to Textual Analysis. (3 cr; Stdt Opt) Theoretical approaches in textual studies that challenge conventional notions of boundaries between disciplines and between national literatures/cultures.

GSD 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

GSD 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

GSD 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

GSD 8801. Dissertation Seminar. (3 cr; S-N or Aud) For doctoral students in German and Scandinavian studies who are beginning to establish topics and do research for their dissertations. Discussion of a variety of topics related to this process as well as presentation of some written work.


GSD 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Gerontology (GERO)

School of Public Health

GERO 5100. Topics in Gerontology. (5-6 cr [max 10 cr]; Stdt Opt) Timely topics related to the biology, sociology, and psychology of aging and applied aging services.

GERO 5101. Milestones in the Biology of Aging. (1 cr; Stdt Opt. Prereq-NIA training grant) Functional Proteomics of Aging [grad student or postdoc fellow] or biology research grad student, #

Biological research in aging. Original literature, including seminal, historical background papers. Progress in field of biogerontology research.
Courses

GRAD 8400. Interdisciplinary Dissertation Writing Seminar. (1-3 cr. [max 6 cr.]; Stdnt Opt. Prereq-Ph.D. student.) Led by graduate faculty. For course description, see sponsoring program(s).

Graphic Design (GDES)
Department of Design, Housing, and Apparel
Graphic Design
College of Design
GDES 5170. Topics in Graphic Design. (1-4 cr. [max 32 cr.]; A-F or Aud. Prereq-Jr or sr or grad student) In-depth investigation of specific topic, announced in advance.
GDES 5193. Directed Study in Graphic Design. (1-4 cr. [max 8 cr.]; A-F or Aud. Prereq-Jr or sr or grad student) Independent study in graphic design under tutorial guidance.
GDES 5196. Field Study. National/International. (1-10 cr. [max 10 cr.]; A-F or Aud. [S]APST 5196, HSG 5196, DES 5196, IDES 5196. Prereq-#) Faculty-directed field study in national or international setting.
GDES 5341. Interactive Design. (3 cr.; A-F or Aud. Prereq-[2334 or 2342], design minor) or (graphic design major or grad student or #) Design of interactive multimedia projects. Interactive presentations and electronic publishing. Software includes hypermedia, scripting, digital output.
GDES 5342. Web and Interface Design. (3 cr.; A-F or Aud. Prereq-[2334 or 2342], design minor) or (graphic design major or grad student or #) Internet-based design. Static Web pages, embedded media, cascading style sheets. Design/usability of interface between humans and technology. Evaluation of visual elements that control/organize dealings with computers to direct work. Students develop designs, use usability testing.
GDES 5383. Digital Illustration and Animation. (3 cr.; A-F or Aud. Prereq-[2334 or 2342], design minor) or (graphic design major or grad student, experience with computer illustration) or (graphic design major or [grad student, experience with computer production]) or #) Theory and practice. Elements of computer graphics and animation. Students learn to use Photoshop, Illustrator, After Effects, Flash.
GDES 5386. Fundamentals of Game Design. (3 cr.; A-F or Aud. Prereq-[2334 or 2342], design minor) or (graphic design major or grad student) or (graphic design major or sr or grad student) or (graphic design major or grad student) Games of all kinds. Theoretical/practical aspects of games. Investigating design process. Rules, strategies, methodologies. Interaction, choice, action, outcome, rules in game design. Social interaction, story telling, meaning/ideology, semiotics. Signs, cultural meaning.
GDES 5388. Graphic Design Research. (3 cr.; A-F or Aud. Prereq-Graphic Design major or grad student or #) Experience in Graphic Design research strategies and methods. Applied, theoretical, and human-centered aspects directed at project development. Design prototyping, testing, analysis.
GDES 5399. Theory of Electronic Design. (3 cr.; A-F or Aud. Prereq-Graphic Design track student or #) Theories, methodologies, histories of electronic design, its impact on visual communications. Digitak artifacts, processes, paradigms.
GDES 8170. Topics in Graphic Design. (1-3 cr. [max 6 cr.]; A-F or Aud.) In-depth investigation of topic, announced in advance.
GDES 8192. Readings in Graphic Design. (1-3 cr. [max 8 cr.]; A-F or Aud. Prereq-#) Independent study, review of books/periodicals under tutorial guidance.
GDES 8193. Directed Study. (1-3 cr. [max 8 cr.]; A-F or Aud. Prereq-#) Directed study in graphic design.
GDES 8222. Plan B Master's Project. (3 cr.; S-N or Aud. Prereq-[Design or DHA master's student,]) Plan B master's project.
GDES 8361. Color, Design, and Human Perception. (3 cr.; A-F or Aud. Prereq-Basic color theory course or Perceptual and psychological aspects of color and design. Human factors of color variables and design strategies that can enhance human experience of, and interaction with, color.
GDES 8990. MFA Creative Thesis. (6 cr. [max 12 cr.]; A-F or Aud. Prereq-Completed coursework requirements for MFA in DHA w/multimedia emphasis, #) MFA project.

Greek (GRK)
Department of Classical and Near Eastern Studies
College of Liberal Arts
GRK 5003. Intermediate Greek Prose. Graduate Student Enrollment. (3 cr.; Prereq-Greek Grade of at least [C- or S] in [1002 or 5001] or [# grad student]) Readings in Classical Greek prose texts by one or more authors (e.g., Plato, Lysias, Xenophon, Herodotus). Review of grammar/morphology. Meets with 3003.
GRK 5004. Intermediate Greek Poetry. Graduate Student Enrollment. (3 cr.; Prereq-[5003 or equiv], grad student or %) Greek poetry. Readings from Iliad or Odyssey. Nature of Homeric epic. Homeric dialect, Greek meter. Meets with 3004.
GRK 5100. Advanced Reading. (3 cr. [max 18 cr.]; Stdnt Opt. Prereq-[5004, at least two years of college level Greek] or [# or CNES grad student]) Reading in Greek texts/authors. Texts/authors vary.
GRK 5701. Prose Composition. (3 cr.; Stdnt Opt. Prereq-Grad student or #) 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 5704. Greek Paleography. (3 cr.; Stdnt Opt. Prereq-Grad student or #) Analysis of various hands used in Greek manuscripts with attention to date/provenance. History of transmission of Greek literature.
GRK 5706. History of Greek. (3 cr.; Stdnt Opt. Prereq-Grad student or #) Reading and formal analysis of documents illustrating evolution of Greek language from Mycenaean to modern times.
GRK 5800. Sight Reading for Graduate Students. (1 cr. [max 6 cr.]; S-N only. Prereq-Enrollment in a grad program in Department of Classical/Near Eastern Studies) Practice in reading Greek texts at sight.
GRK 5993. Directed Studies. (1-4 cr. [max 18 cr.]; Stdnt Opt. Prereq-Grad student or #) Guided individual reading or study.
GRK 5994. Directed Research. (1-12 cr. [max 18 cr.]; Stdnt Opt. Prereq-Grad student or #) Supervised original research on topic chosen by student.
GRK 5996. Directed Instruction. (1-12 cr. [max 20 cr.]; Stdnt Opt. Prereq-Grad student or #) Supervised teaching internship.
GRK 8100. Readings in Greek Prose. (3 cr. [max 18 cr.]; Stdnt Opt. Prereq-Advanced grad student) Reading and discussion of ancient Greek prose texts.
GRK 8120. Greek Text Course. (3 cr. [max 15 cr.]; Stdnt Opt. Prereq-3111 or %; not for students in dept of Classical and Near East Studies) Students attend 3xxx Greek courses. Supplementary work at discretion of instructor.
GRK 8262. Survey of Greek Literature I. (3 cr.; Stdnt Opt) Extensive selections from all genres of Greek literature of archaic and early classical periods.
GRK 8263. Survey of Greek Literature II. (3 cr.; Stdnt Opt) Extensive selections from Greek authors of the classical and Hellenistic eras.
GRK 8300. Readings in Greek Texts. (3 cr. [max 18 cr.]; Stdnt Opt. Prereq-Advanced grad student) Reading/discussion of litary or documentary texts from Greek antiquity. Topics may include subjects that draw on various of sources, genres, or methods.
GRK 8910. Seminar. (3 cr. [max 30 cr.]; Stdnt Opt) Various topics in Greek literature examined in depth with emphasis on current scholarship and original student research.
Health Informatics (HINF)
Department of Laboratory Medicine and Pathology

**Medical School**

**HINF 5115. Interprofessional Healthcare Informatics.** (3 cr; Stdnt Opt. Prereq-Grad student or professional student or #)


**HINF 5430. Health Informatics I.** (3-4 cr [max 4 cr]; A-F or Aud)


**HINF 5431. Health Informatics II.** (3 cr; A-F or Aud)


**HINF 5436. Seminar.** (1 cr; S-N or Aud)

Presentation and discussion of research problems, current literature and topics of interest in Health Informatics.

**HINF 5494. Topics in Health Informatics.** (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#)

Individual or group studies in health informatics.

**HINF 5496. Internship in Health Informatics.** (1-6 cr [max 18 cr]; S-N or Aud. Prereq-5430, 5431, #)

Practical industrial experience not directly related to student’s normal academic experience.

**HINF 5499. Capstone Project for the Masters of Health Informatics.** (3 cr; A-F or Aud. Prereq-[5430, 5431] or #; MHI student)

Students apply related knowledge/skills to a practical problem in health informatics. Proper design of projects, past exemplar projects. Students work with adviser to design/complete a project in a practical setting. Students submit a written project report in lieu of a final examination.

**HINF 5501. US Health Care System:**

Information Challenges in Clinical Care. (0-1 cr [max 1 cr]; S-N or Aud. Prereq-HH15th informatics student or #)

Health care system and its unique interaction between key health system stakeholders. Relationship between patients, providers, payers, and regulatory bodies. Role of information management and challenges of information standardization and exchange.

**HINF 5510. Applied Health Care Databases:**

Database Principles and Data Evaluation. (3 cr; A-F or Aud. Prereq-HINF student or grad student or #)

Principles of database modeling, design and manipulation for health care data analysis. Use a relational database management system and structured query language (SQL) to compose and execute query statements. Critically evaluate query results in a health care context.

**HINF 5520. Clinical Informatics and Patient Safety.** (2 cr; A-F or Aud. Prereq-HINF student or permission number)

Application/operation of clinical information systems, electronic health records, decision support and their application in the health care system. Use of clinical information systems and their associations with health care delivery, payment, quality, and outcomes.

**HINF 5530. Health Care Software Management.** (2 cr; A-F or Aud. Prereq-HINF student or #)

Health care software and unique interaction between key stakeholders in health care software development and implementation. Systems analysis, software development, and software life cycle management for health care applications.

**HINF 5535. Advanced Topics in Health Informatics I.** (3 cr; Stdnt Opt. Prereq-#)

Computer systems design for health sciences, small computer concepts/use, computers for clinical services, computer-aided medical decision making, biomedical image processing, pattern recognition. Case studies from health sciences.

**HINF 5540. Advanced Topics in Health Informatics II.** (3 cr; Stdnt Opt. Prereq-#)

Computer systems design for health sciences, small computer concepts/use, computers for clinical services, computer-aided medical decision making, biomedical image processing, pattern recognition. Case studies from health sciences.

**HINF 5833. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

**HINF 8405. Advanced Topics in Health Informatics.** (3 cr; Stdnt Opt. Prereq-#)

Examine systems based on statistical and logical approaches to decision making that include statistical prediction, rule-based systems, case-based reasoning, quantitative reasoning, and neural networks, and issues related to their use.

**HINF 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

Directed readings in topics of current or theoretical interest in health informatics.

**HINF 8446. Professional Studies in Health Informatics.** (1-2 cr [max 2 cr]; A-F or Aud. Prereq-5431, PUBH 5421 or #, grad hilf& minor) Health informatics as a profession, including discipline, responsibilities, resources, and job opportunities. Directed experiences in consulting, teaching, writing, conducting research, and managing facilities.

**HINF 8492. Advanced Readings in Health Informatics.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-#)

Directed readings in topics of current or theoretical interest in medical informatics.

**HINF 8494. Research in Health Informatics.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-#)

Directed research under faculty guidance.

**HINF 8525. Health Informatics Teaching.** (2 cr; A-F only. Prereq-HINF student or #)

Use selected teaching techniques to assist in the delivery of course content in health informatics curriculum. Work with a professor who is the course director. From evaluation and feedback on their teaching technique, students develop a teaching philosophy as a final course project.

**HINF 8535. Advanced Health Informatics Research Methods.** (1-3 cr [max 6 cr]; Stdnt Opt. Prereq. HINF student or #)

Application of research methods, evaluation. Design, data collection, and data analysis in the context of health informatics, including computational and health data challenges.

**HINF 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim exam, no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**HINF 8770. Plan B Project.** (4 cr; A-F or Aud. Prereq-Plan B MS student, no credit toward PhD)

Research project. Topic arranged between student and instructor. Written report required.

**HINF 8777. Thesis Credits: Master’s.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**HINF 8888. Thesis: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

**Hindi (HNDI)**

Department of Asian Languages and Literatures

**College of Liberal Arts**

**HEBR 5900. Advanced Modern Hebrew.** (3 cr [max 18 cr]; Stdnt Opt. Prereq-3012 or #)


**HEBR 5920. Advanced Classical Hebrew.** (3 cr [max 18 cr]; Stdnt Opt. [S]HEBR 3200. Prereq-[3 sem of biblical Hebrew, 5 sem of modern Hebrew] or #)

In-depth reading, analysis, and discussion of classical Hebrew texts. Grammar, syntax. Introduction to text-criticism, history of scholarship, and scholarly tools. Format varies between survey of themes (e.g., law, wisdom, poetry) and extended concentration upon specific classical texts.

**HEBR 5930. Post-Biblical Hebrew: Second Temple Period.** (3 cr [max 18 cr]; Stdnt Opt. Prereq-Grad student or #)

Readings in late-post-biblical Hebrew literature of Persian, Hellenistic, and early Roman periods (e.g., Chronicles, Ezra-Nehemiah, Ecclesiastes, Daniel, Dead Sea Scrolls, apocrypha, pseudepigrapha). Focuses on historical development of Hebrew language and literature in relation to earlier biblical sources.

**HEBR 5940. Rabbinic Texts.** (3 cr [max 18 cr]; Stdnt Opt. Prereq-Grad student or #)


**HEBR 5990. Topics in Hebrew Studies.** (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-Grad student or #)

Historical, linguistic, literary, religious, or humanistic study of Hebrew society/culture. Approach/method of study varies with topic.

**HEBR 5992. Directed Readings.** (1-4 cr [max 12 cr]; Stdnt Opt. Prereq., # [B])

Guided individual reading or study.

**Hindi (HNDI)**

Department of Asian Languages and Literatures

**College of Liberal Arts**

**HNDI 5940. Readings in Hindi/Urdu Texts.** (5 cr [max 9 cr]; Stdnt Opt. Prereq-4162 or equiv or #)

Students read authentic materials of various types to improve reading/speaking ability.

**HNDI 5993. Directed Readings.** (1-4 cr [max 12 cr]; Stdnt Opt. Prereq., # [B])

Guided individual reading or study of modern Hindi texts.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

History (HIST)
Department of History
College of Liberal Arts


HIST 5053. Doing Roman History: Sources, Methods, and Trends. (3 cr; Sdnt Opt. Prereq-Grad student or #) Survey of major scholarship in field of Roman history since Mommsen. Political, social, cultural, military, and economic history. Focuses on methodological problems posed by evidence. Ways in which these issues shape research.

HIST 5111. Proseminar in the History of Medieval Europe. (3 cr; A-F or Aud. Prereq-Advanced undergrads of exceptional ability or grads, #) Examination of basic scholarly bibliography for medieval Western European history. Aim is to help students to prepare for M.A. and Ph.D. examinations.

HIST 5115. Medieval Latin Historians. (3 cr; Sdnt Opt. Prereq-Reading knowledge of Latin) Writing of history in Western Europe during the Middle Ages. Focus on idea of history, philosophy of various historians, techniques of research by medieval historians and chroniclers, history as literature, and value of medieval histories to modern research scholars. Latin texts only.


HIST 5264. Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries. (3 cr [max 4 cr]; Sdnt Opt) 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; Sdnt Opt) 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 5271. The Viking World: Story, History, and Archaeology. (3 cr; A-F or Aud. [S]HIST 5271) Viking society and expansion of Viking influence abroad. Viking impact on Western Europe, interactions with Slavs, Jan Hus of North Atlantic islands, Western Europe’s impact on Scandinavian lands. Analyzes archaeological, historical, linguistic, and numismatic evidence.


HIST 5285. Problems in Historiography and Representation of the Holocaust. (3 cr; Sdnt Opt. [S]JWST 5285) Pre-1945; Prepar for JWST 5321 or RELS 5321 or #) Relationship of paintings, memorials, and other art forms to the question of understanding the Holocaust. Issues of sources, especially use of the Survivors of the Shoah project in U libraries.

HIST 5294. Social History of Russia and Eastern Europe Through the 19th Century. (3 cr; Sdnt Opt) 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; Sdnt Opt) Social movements (revolutionary, nationalist, women’s); communist and post-communist societies.

HIST 5379. Problems in Early American History. (3 cr; Sdnt Opt) Intensive consideration of topics in early American history. Topics may include readings in race, class, and gender; comparative colonialism; slavery; demography; economic history; religion; and regions in the colonial world.

HIST 5381. Minnesota History Workshop. (3-4 cr [max 8 cr]; Sdnt Opt. Prereq-1301, 1302) A case study and seminar approach to historical research and interpretation. It offers teachers and other scholars a chance to survey a particular topic in Minnesota history and to write their own historical narrative based on primary source research.

HIST 5421. Gender in Latin American History. (3 cr; Sdnt Opt) Women’s history/masculinity. Gender/colonialism, marriage, sexuality, nationalism, labor, political movements, feminism.

HIST 5436. Social History of African Women: 1850 to the Present. (3 cr; Sdnt Opt. Prereq-Grad or #) 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 5439. Environment and Society in Africa. (3 cr; Sdnt Opt. Prereq-#) 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 5441. Transformations in Pre-Colonial African History. (3 cr; A-F or Aud. Prereq-#) African internal/external processes before 1800. Framework by which early African history is understood, tools for reconstructing it, themes/debates that have shaped it, new directions in which it is moving.

HIST 5446. Problems in West African History. (3 cr; Sdnt Opt. Prereq-Grad or #) 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 5446a. China in the Song, Yuan, and Ming Dynasties. (3 cr; Sdnt Opt. [S]EAS 5446, 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.


HIST 5468. Social Change in Modern China. (3 cr; Sdnt Opt. [S]EAS 5468, 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.

HIST 5469. Historiographies of China, 1000-1700. (3 cr; A-F or Aud. Prereq-Grad student or #) Important recent English-language work on Chinese culture during the Song, Yuan, and Ming dynasties. Topics include religion, gender, family structures, ethnic identity, commerce/economics, and political structures/events.


HIST 5474. Sex and the Politics of Desire: Japan and Beyond. (3 cr; A-F or Aud. Prereq-Grad student or #) History of gender/sexuality in modern Japan and Korea. Geography of Japan. Theoretical/methodological literature not specific to Japan. Sexology, eugenics, feminism, nationalism, colonialism, cyber sexuality.


HIST 5501. Medieval Europe and the World. (3 cr; A-F or Aud. Prereq-#) Place of medieval Europe in the world. Relations of Europe with Asia, Africa, and the Americas. European knowledge of the world’s other great cultures. European travelers/explorers. Assessment of other cultures’ knowledge of Europe in the period.

HIST 5505. Survey of the Middle East. (3 cr; Sdnt Opt. Prereq-Grad or #) Peoples, lands, cultures of the Middle East, from earliest civilizations to present.

HIST 5520. Topics in Chinese History. (3 cr [max 12 cr]; Sdnt Opt) Selected topics not covered in regular courses. Taught as staffing permits.
HIST 5540. Topics in Mediterranean Studies. (3 cr [max 15 cr]; A-F or Aud. Prereq-Grad student or advanced undergrad or #) Mediterranean history, from Middle Ages to present. Taught as staffing permits.


HIST 5547. Empire and Modernity in the Middle East, 1600-1923. (3 cr; Stdnt Opt. Prereq-Grad student or #) Modernity in a non-Western imperial context: the Ottoman Empire. Identity, ideology, economy, environment, language.

HIST 5611. New Directions in the Middle Ages, ca. 300-1100. (3 cr; A-F or Aud. Prereq-Grad student or #) Basic scholarly bibliography for medieval Western European history during early Middle Ages. Foundation for teaching courses in medieval history, preparing for general doctoral exam.

HIST 5612. New Directions in the Middle Ages, ca. 1100-1500. (3 cr; A-F or Aud. Prereq-[5611, grad student] or #) Basic scholarly bibliography for medieval Western European history during central/later Middle Ages. Foundation for teaching courses in medieval history, preparing for general doctoral exam.

HIST 5614. The Medieval Church. (3 cr; Stdnt Opt. Prereq-Grad student or #) Introduction to history of western church in Middle Ages. Emphasizes church teachings and institutional structures, belief/practices of lay people, medieval Christian encounter with non-Christian world.

HIST 5616. Proseminar in Medieval Spain. (3 cr; A-F or Aud. Prereq-#) Graduate research on the development of the medieval kingdoms of Spain from Roman times to ca. 1500. Emphasis on major social, economic, and cultural developments. Christian, Jewish, and Muslim interaction. Spain and the beginnings of European expansion.

HIST 5617. Spain in the Early Modern Period: 1492-1814. (3 cr; A-F or Aud) 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 5621. Proseminar: The French Revolution. (3 cr; A-F or Aud. Prereq-Grad student or [advanced undergrad, #]) Historical literature about French Revolution of 1789. Old Regime political culture, Enlightenment, origins of the revolution, revolutionary transformations in society, politics/culture both in France and abroad, the Terror, Napoleon, revolutionary legacy.

HIST 5631. Proseminar: Comparative Early Modern History. (3 cr; A-F or Aud. Prereq-#) Critical reading of historical literature dealing with integration of the globe during the early modern period, ca. 1550-1750; book reports, class discussion.

HIST 5632. World History Proseminar. (3 cr; A-F or Aud. Prereq-#) Theoretical approaches to world/global history. Review of major theories, controversies, chronologies, pedagogical approaches.


HIST 5640. Topics in Legal History. (3 cr; A-F or Aud) Comparative approaches to, methodology of, and theoretical debates in legal history. Topics from ancient to modern world to present, such as citizenship/state building, religion and the law, women's legal history.


HIST 5646. U.S. Women's Legal History. (3 cr; Stdnt Opt) Women's legal status in U.S. history, 1648 to present. Changes in women's legal status in marriage, divorce, and child custody; reproductive/sxual autonomy; and economic/educational equality. Differences among women based on race, class, and ethnicity.

HIST 5648. Development of the Western European Legal Tradition. (3 cr; A-F or Aud) Evolution of and interaction among Roman and civil law, customary/feudal law, canon law, and English common law. Primary/secondary sources in English.

HIST 5649. Ideas in Context: Making Early Modern Knowledge, 1500-1800. (3 cr; A-F or Aud. Prereq-Grad student or #) Role of institutions/locale in development of early modern European thought/culture. University, academy, learned society, princely court, museum, printing house, using theoretical, a company, army, navies, state bureaucracies, salons, other independent associations of nascent civil society.

HIST 5650. Proseminar: Early Modern Europe. (3 cr; A-F or Aud. Prereq-Hist grad or #) Critical reading of historical literature for early modern Europe, ca. 1450-1700., dealing with France, Germany, Italy, the Low Countries, and Spain. Each student chooses a country to focus on; book reports, class discussion.

HIST 5671. Proseminar: British Empire. (3 cr; A-F or Aud. Prereq-#) Critical study of major writings in British history, 1760-1945, and preparation for research in field.

HIST 5715. Readings in European Women's History, 1450-1750. (3 cr; A-F or Aud) Introduction to literature in English on problems of modern European social, cultural, political history. Thematic/geographic focus varies year to year. Topics include historical approaches to class/gender relations, state formation as social/political process, family history, evolution of public life, popular culture.

HIST 5721. Contemporary Europe From the Late 19th Century to the Beginning of the Cold War, 1890-1950. (3 cr; Stdnt Opt. [HIST] 3721. Prereq-previous coursework in 19th- and/or 20th-century Europe, #) The historical literature and debates surrounding major issues in the social, political, cultural, and economic development of Europe from the turn of the century through the impact of WWII. Topics include the development of imperialism, national rivalries, social and political conflict, the rise of fascism and communism, and the origins of war.


HIST 5740. Topics in Modern German History. (3 cr [max 12 cr]; A-F or Aud. Prereq-#) Readings and discussions on some central questions concerning the history of Germany during the modern period, with a particular emphasis on the relationship between social change and political development. Offerings vary in thematic and chronological focus.

HIST 5761. Proseminar - Imperial Russia.. (3 cr; A-F or Aud. Prereq-Knowledge of Russian or German or French) Western and Russian historiography on crucial issues of Imperial Russia. Political institutions; culture and society; modernization and reforms; new interpretations.

HIST 5762. Proseminar in 20th Century Russia. (3 cr; A-F or Aud. Prereq-5761, knowledge of Russian or German or French) Western and Russian historiography on crucial issues of 20th-century Russia. The nature of revolutions, debate over the evolution of the Soviet regime, the collapse of empires, war experience.

HIST 5777. Proseminar in Habsburg Central Europe. (3 cr; A-F or Aud. Prereq-#) Central Europe under Habsburg rule from the reforms of Maria Theresa to imperial collapse. Continuity and change in society; economic and political modernization; the rise of national consciousness and anti-Semitism; politics and culture in the Fin de Siecle; the Empire and World War I.

HIST 5794. Proseminar in European Economic History. (3 cr; A-F or Aud. Prereq-#) Europe's rise in the world economy; England's industrial revolution and uneven development in Europe; imperialism and World War I; the Great Depression; the post-1945 economic miracle; continuity and change in Eastern Europe.

HIST 5797. Methods of Population History. (3 cr; A-F or Aud) Standard methods of population analysis. Focus on methods widely used for historical population research.

HIST 5801. Seminar in Early American History. (3 cr; A-F or Aud) 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 5802. Readings in American History, 1848-Present. (3 cr; A-F or Aud) Readings-intensive course. U.S. history from Mexican-American War to present.


HIST 5821. American History in the Twentieth Century. (3 cr [max 4 cr]; A-F or Aud. Prereq-Grad student, #) Intensive readings seminar.
Courses

HIST 5831. Cultural Fallout: The Cold War and Its Legacy: Readings. (3 cr; A-F or Aud)
Culture of the Cold War, its legacy. How it affected/ reflected domestic politics, public policies, civic life, gender expectations, sexuality, class relations, racial justice, and civil rights. Impact of domestic anti-communism and of American cultural politics abroad.

HIST 5841. Proseminar in American Economic History. (3 cr; A-F or Aud. Prereq-#)
Historical literature on American economic and business history from American Revolution to the modern economy.

HIST 5844. U.S. Labor History. (3 cr; A-F or Aud)
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 5845. History of American Capitalism. (3 cr; A-F or Aud. Prereq-Grad student or #)
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 5846. Proseminar: U.S.-Mexico Border. (3 cr; A-F only)

HIST 5857. Readings in U.S. Intellectual History: 19th-20th Centuries. (3 cr; A-F or Aud. Prereq-#)
An analysis of key issues, theoretical frameworks, research, and methodologies of Asian American history. Seminal texts that defined the field. Recent scholarship in history and in related disciplines.

HIST 5877. Asian American History. (3 cr; A-F or Aud)
Introduction to key issues, theoretical frameworks, research, and methodologies of Asian American History. A survey of Asian American scholarship that defined the field. Recent scholarship in history and in related disciplines.

HIST 5881. American Foreign Relations to 1895. (3 cr; A-F or Aud. Prereq-#)
Intensive readings in the historiography of American foreign relations with emphasis on American imperialism, domestic courses of foreign policy, and international political, economic, and cultural relations.

HIST 5890. Problems in American Indian History. (3 cr; A-F or Aud. S/MAM 5890. Prereq-%)
Intensive consideration of topics in American Indian history. Topics may include social history, history of particular regions, political systems, education, and American Indian policy.

HIST 5900. Topics in European/Medieval History. (1-4 cr [max 16 cr]; A-F only. Prereq-Grad 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; A-F or Aud. Prereq-#)
Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes.

HIST 5902. Latin America Proseminar: Modern. (3 cr; A-F or Aud. Prereq-#)
Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes.

HIST 5905. Topics in European Medieval History. (1-4 cr [max 16 cr]; Stdt Opt. Prereq-Grad or [advanced undergrad with #])
Selected topics in Medieval European history, up to 1500ce.

HIST 5910. Topics in U.S. History. (1-4 cr [max 16 cr]; Stdt Opt. Prereq-Grad or advanced undergrad with #)
Selected topics in U.S. history not covered in regular courses. Taught as staffing permits.

HIST 5920. Topics in African History. (3 cr [max 15 cr]; Stdt Opt. Prereq-Grad or #)
Topics not covered in regular courses.

HIST 5930. Topics in Ancient History. (1-4 cr [max 16 cr]; A-F or Aud. Prereq-Grad or #)
Selected topics in ancient history not covered in regular courses. To be taught as staffing permits and as enrollment warrants.

HIST 5931. Topics in Comparative Third World History. (3-4 cr [max 12 cr]; A-F or Aud. Prereq-Grad student or #)
Topics specified in Class Schedule.

HIST 5932. African Historiography and the Production of Knowledge. (3 cr; A-F or Aud. Prereq-Major in African history or [Grad student, #])
Recent scholarship on social history of Africa. Focuses on new literature on daily lives of ordinary people in their workplaces, communities, households.

HIST 5933. Seminar in Ancient History. (3 cr; A-F or Aud. Prereq-Previous coursework in Greek or Roman history)
Seminar on a selected topic in ancient history.

HIST 5934. Comparative History and Social Theory. (3 cr; A-F or Aud. Prereq-Grad student or [upper-div undergrad, #])
Works of history/sociology that are broadly comparative/theoretical. Issues of state formation, social movements, social structure, and economic development.

HIST 5935. Methods and Pedagogy in African History. (3 cr; A-F or Aud. Prereq-Grad student or #)
Current historical methods/sources of African history. Pedagogical issues. Students design their own courses.

HIST 5940. Topics in Asian History. (1-4 cr [max 16 cr]; Stdt Opt. Prereq-Grad student or [advanced undergrad, #])
Topics not covered in regular courses.

HIST 5941. Readings in Chinese Documents. (3 cr; A-F or Aud. Prereq-Reading knowledge of Chinese)
Readings in Chinese on a topic to be selected by the instructor. Depending on the topic and the time period, readings may involve a mixture of modern and classical Chinese or may be entirely in modern Chinese. Consult instructor for more information.

HIST 5942. Topics: History of Medicine. (3-4 cr [max 16 cr]; A-F or Aud. Prereq-Prior history of medicine or history of science course recommended for undergrads)
An exploration of topics central to the history of medicine. Emphasis on mid-18th century to the present. Topics vary yearly.

HIST 5950. Topics in Latin American History. (1-4 cr [max 15 cr]; A-F or Aud. Prereq-Grad or advanced undergrad with #)
Selected topics in Latin American history not covered in regular courses. Taught as staffing permits.

HIST 5960. Topics in History. (1-4 cr [max 16 cr]; Stdt Opt. Prereq-Grad or [advanced undergrad with #])
Selected topics in history not covered in regular courses. Taught as staffing permits.

HIST 5962. Expansion of Europe. (3 cr; A-F or Aud. Prereq-Grad student, #)
Research proseminar on actions of Europeans in wider world, 1350-1790. Based on documents in James Ford Bell Library.

HIST 5964. Comparative Economic History. (3 cr; A-F or Aud. Prereq-#)
Theoretical approaches guide cross-cultural examinations of major issues in the economic history of East Asia, Europe, and the New World. Agrarian structures in economic development, markets, the state and economic development, and the industrial revolution.

HIST 5970. Advanced Research in Quantitative History. (4 cr [max 16 cr]; A-F or Aud)
Students will carry out publishable-quality research on a quantitative historical topic.

HIST 5971. Proseminar: Editing and Publishing. (3 cr; A-F or Aud)
Evolution of modern scholarly publication as system of knowledge. Survey of history of printing/manufacture of books. Recent changes in information technology. Contemporary academic publishing.

HIST 5980. Topics in Comparative Women's History. (3-4 cr [max 20 cr]; A-F or Aud. Prereq-Grad student or [advanced undergrad, #])
Cross-cultural/thematic explorations in history of women. Topics vary. May include gender and colonialism; women and class formation; women and religion; sexuality; medical construction of gender; women’s narratives as historical sources; gender and politics.

HIST 5990. Readings in Comparative History. (3 cr [max 9 cr]; A-F only. Prereq-#)
Topics read/discuss historical works that focus on common theme or employ similar methods in different geographic areas. Issues of cross-area comparison. Topics vary (e.g., peasant societies, race/ethnicity, states/nationalism).

HIST 5993. Directed Study. (1-16 cr [max 20 cr]; Stdt Opt. Prereq-Grad student or sr/ Jr, #, %, B])
Guided individual reading or study.

HIST 5994. Directed Research. (1-16 cr [max 16 cr]; Stdt Opt. Prereq-Grad student or sr/ Jr, #, %, B]
Work on a tutorial basis.

HIST 6015. Scope and Methods of Historical Studies. (3 cr; A-F or Aud. Prereq-#)
Development of historical studies over time (especially in 19th and 20th centuries). Methodologies currently shaping historical research. Theoretical developments within the discipline during 19th and 20th centuries.

HIST 6021. Seminar: Advanced Historical Writing. (3 cr; A-F or Aud. Prereq-Grad student, #)
Formal writing group. Writing practices for historians. Readings/discussions about historical analysis. Practical application of writing historical narratives. Students complete a major writing project based on their program needs and progress.

HIST 6025. Politics of Historical Memory. (3 cr [max 6 cr]; A-F or Aud)

University of Minnesota Fall 2012 Graduate Education Catalog

94
HIST 8110. Medieval History: Research Seminar. (3 cr; A-F or Aud. Prereq-#; good reading knowledge of Latin, French, other European language) Research in medieval European history, using primary source material.

HIST 8252. Cultural Fallout: The Cold War and Its Legacy: Research. (3 cr; A-F or Aud) Student produces research paper on history/culture of Cold War era as it developed in United States after World War II. Research project builds upon readings from 8231.

HIST 8239. Readings in Gender, Race, Class, and/or Ethnicity in the United States. (3 cr; A-F or Aud. Prereq-#) Dynamics of gender, racial, class, and ethnic relations in U.S. history; intersections of these forces.

HIST 8240. Topics in Research in Gender, Race, Class, or Ethnicity in the United States. (3 cr; A-F or Aud. Prereq-#) Dynamics of gender, racial, class, and ethnic relations in U.S. history; intersections of these forces. Topics vary by instructor.

HIST 8245. Human Rights and Crimes Against Humanity: A Global History. (3 cr; A-F or Aud) Theoretical literature on genocides and human rights and on race/nation. Readings/discussions on meaning of “genocide” and its codification in international law. Historical cases. Students choose case to research.

HIST 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) Research and writing skills in American Indian history. With instructor and other participants, students identify their research questions, locate sources with which to answer these questions, conduct original research, and produce a substantial research paper.


HIST 8702. Research Seminar on Central European History. (1-4 cr [max 16 cr]; A-F or Aud) Broad research theme/problem: in most cases preparation for dissertation. Students identify primary/secondary sources. Conduct original research, write, read, and comment upon each other’s drafts. Geographical focus varies with instructor, may include Germany or lands of former Habsburg Austrian empire.

HIST 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 16 cr per semester or summer; 10 cr total required [Plan A only])

HIST 8832. Cultural Fallout: The Cold War and Its Legacy: Research. (3 cr; A-F or Aud. Prereq-5831) Student produces research paper on history/culture of Cold War era in the United States after World War II. Research projects build upon readings from 5831.

HIST 8857. Seminar: Research in the History of American Women. (3 cr; A-F or Aud. Prereq-5857) Students define a historical problem or area of research in American women’s history; they would like to pursue in depth, identify appropriate sources and accomplish research in primary and secondary sources, write a 25 to 35-page scholarly article, and read and comment upon each other’s drafts.

HIST 8858. Research in Early American History. (3 cr; A-F or Aud. Prereq-5858 or #) Research and writing skills. With instructor and other participants, students identify their research questions, locate the sources with which to answer these questions, conduct original research, and produce a substantial research paper.

HIST 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

HIST 8900. Topics in European/Medieval History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8905. Topics in European Medieval History. (1-4 cr [max 16 cr]; Stdt Opt) Selected topics in Medieval European history, up to 1500ce.

HIST 8910. Topics in U.S. History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8920. Topics in African History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8930. Topics in Ancient History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8940. Topics in Asian History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.


HIST 8950. Topics in Latin American History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8960. Topics in History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8961. Research Seminar: Intellectual History. (3 cr; A-F or Aud) Approaches/methods. Readings on or exemplifying intellectual history. Intellectual history as something broader than history of philosophical thought: a set of approaches of broad cross-disciplinary applicability. Each student prepares a research paper on a topic of intellectual history and present it to class for critique.

HIST 8990. Topics in Comparative History-Research. (3 cr [max 15 cr]; Stdt Opt. Prereq-#) Topics vary. Students read/discuss historical works from different geographic areas, develop proposals for comparative research, or pursue comparative research projects.

HIST 8993. Directed Study. (1-16 cr [max 16 cr]; A-F or Aud. Prereq-Grad student, #) Students work on tutorial basis. Guided individual reading or study.

HIST 8994. Directed Research. (1-16 cr [max 16 cr]; A-F or Aud. Prereq-#) Work on a tutorial basis.

History of Medicine (HMED)

Medical School

HMED 5002. Public Health Issues in Historical Perspective. (3 cr; Stdt Opt) Introduction to the evolution of major recurring problems and issues in public health including environment and health, food customs and nutrition, control of alcohol and drugs, venereal diseases and public policy, human resources regulation, and relationship of science to promotion of health.

For definitions of course numbers, abbreviations, and symbols, see page 3. 95
Courses


HMED 5055. Women, Health, and History. (3 cr; Stdnt Opt. Prereg-Grad student or [jr or sr] with prev coursework in hist or #) Women’s historical roles as healers, patients, research subjects, health activists. Biological determinism, reproduction, mental health, nursing, women physicians, public health reformers, alternative practitioners. Gender disparities in diagnosis, treatment, research, careers. Assignments allow students to explore individual interests.

HMED 5075. Technology and Medicine in Modern America. (3 cr; A-F or Aud. Prereq-#) How technology came to medicine’s center-stage. Impact on medical practice, institutions, consumers, production of medical knowledge, professionalization, health policy, gender/consumer disparities in health care.

HMED 5200. Early History of Medicine to 1700. (3 cr; A-F or Aud) An introductory survey of the history of medicine in Europe and America.


HMED 5210. Seminar: Theories and Methods in Medical History. (3 cr; A-F or Aud) Historiography of the history of medicine.


HMED 5600. Directed Study. (0-4 cr [max 16 cr]; Stdnt Opt. Prereg-#) Directed Study. (0-4 cr [max 16 cr]; Stdnt Opt. Prereg-#)

HMED 5940. Topics in the History of Medicine. (3-4 cr [max 16 cr]; Stdnt Opt) Seminar on the historical relations between medicine and the State from the 18th to 20th centuries.

HMED 8001. Foundations in the History of Early Medicine. (3 cr; A-F only) History of Western medicine, from professionalization of healing in Greco-Egyptian antiquity to association of postmortem pathology with disease and clinical movement of early 19th century Paris.

HMED 8002. Foundations in the History of Modern Medicine, 1800-present. (3 cr; A-F only) History of Western medicine in Europe and America, from the Paris School and pathological anatomy in early 19c France through germ theories of disease, bacteriological revolution, reform of medical education, pharmaceutical revolution, growth of biomed research establishment, and comparative health care delivery systems.

HMED 8112. Historiography of Science, Technology, and Medicine. (3 cr; A-F only. Prereg-#) Models of practice, different schools. Work of representative historians of science, technology, and medicine.

HMED 8113. Research Methods in the History of Science, Technology, and Medicine. (3 cr; A-F only [S]HMED 8113. Prereg-#) Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision.

HMED 8220. Seminar: Current Topics in the History of Medicine. (3 cr [max 9 cr]; A-F or Aud. Prereg-#) Topics vary.

HMED 8333. FTE: Master’s. (1 cr; No grade. Prereg-Master’s student, adviser and DGS consent) FTE: Master’s. (1 cr; No grade. Prereg-Doctoral student, adviser and DGS consent)

HMED 8681. Directed Study. (1-6 cr [max 12 cr]; A-F or Aud. Prereq-#)

HMED 8682. Directed Study. (1-6 cr [max 12 cr]; A-F or Aud. Prereq-#)

HMED 8686. Doctoral Pre- Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereg-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

HMED 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereg-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

HMED 8880. Topics in the History of Science, Technology, and Medicine. (3 cr [max 9 cr]; A-F or Aud. Prereg-#) Historical literature of topics common to history of science, technology, and medicine.

HMED 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereg-Max 18 cr per semester or summer; 24 cr required)


HSCI 5401. Ethics in Science and Technology. (3 cr; Stdnt Opt. [S]HSCI 5401) Historical issues involving ethics in science. Ethical problems posed by modern science/technology, including nuclear energy, chemical industry, and information technologies.

HSCI 5411. Art and Science in Early Modern Europe. (3 cr; Stdnt Opt) Interaction of art and science, from Renaissance to 19th century. Development of linear perspective, color theory, artistic practice, and scientific illustration/representation.

HSCI 5421. Engineering Ethics. (3 cr; Stdnt Opt. [S]HSCI 5421) Engineering ethics in historical context, including the rise of professional engineering societies, ethical problems in engineering research and engineers’ public responsibility; ethical implications of advanced engineering systems such as the production of nuclear weapons; development of codes of ethics in engineering.


HSCI 8112. Historiography of Science, Technology, and Medicine. (3 cr; A-F only) Models of practice, different schools. Work of representative historians of science, technology, and medicine.

HSCI 8113. Research Methods in the History of Science, Technology, and Medicine. (3 cr; A-F only, [S]HMED 8113) Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision.


HSCI 8125. Foundations for Research in the Scientific Revolution. (3 cr; A-F or Aud. Prereg-Grad HSCI major or minor or #) Development of sciences/natural philosophy, 1500-1725.

HSCI 8131. Industrial Revolutions. (3 cr; A-F only) Development of industrial society, from 1700 through 1850. Emphasizes developments in mechanical/engineering sciences. Scientific, economic, political, and social dimensions of industrialization.

HSCI 8333. FTE: Master’s. (1 cr; No grade. Prereg-Master’s student, adviser and DGS consent) FTE: Master’s. (1 cr; No grade. Prereg-Master’s student, adviser and DGS consent)

HSCI 8621. Social and Cultural Studies of Science. (3 cr; Stdnt Opt) Review of recent work; theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.
HSCI 8441. Women in Science: Historical Perspectives. (3 cr; Stdnt Opt. Prereq-#) Key literature dealing with patterns of participation in science and medicine since the 18th century. The ways in which modern science is perceived to be gendered, particularly in its practice and in ways that seem to influence theory and applications.

HSCI 8444. FTE: Doctoral. (1 cr; No grade. Prereq: Doctoral student, adviser and DGS consent)

HSCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq: Doctoral student who has not passed prelim oral, no required consent for 1st/2nd registrations, up to 12 combined cr; 4 cr for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

HSCI 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only))

HSCI 8850. Topics in the History of Science, Technology, and Medicine. (3 cr [max 9 cr]; A-F or Aud. Prereq-#) Historical literature of topics common to history of science, technology, and medicine.

HSCI 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq: Max 18 cr per semester or summer; 24 cr required)

HSCI 8900. Seminar: History of Early Physical Science. (3 cr; Stdnt Opt. Prereq-#) For advanced graduate students; topics in development of natural and mathematical science before 1800.

HSCI 8910. Seminar: History of Modern Physical Sciences. (3 cr [max 6 cr]; Stdnt Opt. Prereq-#) For advanced graduate students; topics in development of physical sciences since 1800.

HSCI 8920. Seminar: History of Biological Sciences. (3 cr; Stdnt Opt. Prereq-#) For advanced graduate students; topics in development of natural, biological, and medical sciences from Aristotle to the present.

HSCI 8930. Seminar: History of Technology. (3 cr; Stdnt Opt. Prereq-#) For advanced graduate students; topics in development of technology from ancient times to the present.

HSCI 8940. Seminar: History of Science and Technology in the Americas. (3 cr; Stdnt Opt. Prereq-#) For advanced graduate students; topics in development of science and technology, emphasizing the United States and Canada.

HSCI 8950. Seminar: Science and Technology in Cultural Settings. (3 cr; Stdnt Opt. Prereq-#) For advanced graduate students; topics in development of science and technology in or across specific geographic regions or particular cultures.

HSCI 8993. Directed Studies. (1-15 cr [max 15 cr]; Stdnt Opt. Prereq-#)

HSCI 8994. Directed Research. (1-5 cr [max 15 cr]; Stdnt Opt)

Horticulural Science (HORT)

Hmong (HMNG)

Department of Asian Languages and Literatures

College of Liberal Arts

HMNG 5040. Readings in Hmong Texts. (2-4 cr [max 12 cr]; Stdnt Opt. Prereq-1016 or 3022 with grade of at least B or #) Comprehensive, multidimensional overview of Hmong oral forms/traditions. Hmong legends, mythology, folk songs, birth, marriage/funeral rites. History, social/cultural anthropological. Values, life ways of traditional village society. Societal changes resulting from emigration to U.S.

Horticulural Science (HORT)

Department of Horticultural Science

College of Food, Agricultural and Natural Resource Sciences


HORT 5012. Common Chinese Medicinal Plants: Growing and Processing. (3 cr; Stdnt Opt. Prereq-Hort 1001 or BIOL 1009, CHEM 1015, HORT 5011) or # How to grow, process, and store 40 common Chinese herbs and herbal products.


HORT 5051. Organic Viticulture and Fruit Production. (3 cr; A-F or Aud. Prereq-Hort 1001, 3005) or # Principles of fruit production. Temperature fruit crops. Integrated management of fruit cropping systems. Site selection, cultural management practices, taxonomic classification, physiological/environmental control of plant development. Writing.


HORT 5090. Directed Studies. (1-6 cr [max 18 cr]; Stdnt Opt. Prereq-6 cr upper div Hort courses, #) In-depth exploration of concepts, technology, materials, or programs in specific area to expand professional competency/self-confidence. Planning, organizing, implementing, and evaluating knowledge obtained from formal education and from experience.

HORT 5131. Student Organic Farm Planning, Growing, and Marketing. (3 cr; Stdnt Opt. [S] HORT 5131, AGRO 3131, Prereq-Hort 1001 or AGRO 1101 or AGRO 1103 or BIOL 1001 or BIOL 1009 or #) Students plan/implement cropping/marketing strategies for organic produce/flowers from Student Organic Farm on St. Paul campus.

HORT 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. [S]BBE 8005, SOIL 8005, PLPA 8005, AGRO 8005, LAAS 8005, Prereq-#) Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticultural Science; Plant Pathology; or Soil, Water, and Climate. Participation in discussions about effective teaching to strengthen skills and develop personal teaching philosophy.

HORT 8007. Extension Horticulture Practicum. (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-9 grad cr in [ag or bio science] # Selected activities that may include development of an extension fact sheet, assistance in Dial-U Clinic, or preparation of a workshop or short course.

HORT 8023. Evolution of Crop Plants. (3 cr; A-F only. Prereq-9 grad cr in [ag or bio science] Origin, distribution, and evolution of cultivated plants; implication of the effects of evolutionary processes on crop breeding for needs of people today.


HORT 8090. Graduate Horticultural Research. (1-12 cr [max 18 cr]; Stdnt Opt. Prereq-# Conduct literature, lab, and/or field research with horticultural plants and cropping systems.

HORT 8201. Advanced Plant Breeding. (3 cr; A-F only. [S] AGRO 8201, Prereq-STAT 5301 or equiv) Principles/current methods in breeding agronomic/ horticultural crops. Use of genotype/environment data to increase genetic gain, population improvement, parent breeding, alternative selection strategies, breeding for special traits, new approaches.

HORT 8270. Graduate Seminar. (1 cr; A-F or Aud. [S] AGRO 8270. Prereq-Grad major in [hort or applied plant sciences or ent or agro or plant brdg or plant path or soil] or #) Reports/discussions on problems, investigation work.

HORT 8280. Current Topics in Applied Plant Sciences. (1 cr; S-N or Aud. Prereq-Grad major in [hort or applied plant sciences or ent or agro or plant brdg or plant path or soil] or #) Topics presented by faculty or visiting scientists.
Courses

HORT 8900. Advanced Discussions. (1-3 cr [max 32 cr]; S-N or Aud. [S]AGRO 8900. Prereq-#) Special workshops or courses in applied plant sciences.

Housing Studies (HSG)
Department of Design, Housing, and Apparel:
Housing Studies
College of Design
HSG 5170. Topics in Housing Studies. (1-4 cr [max 32 cr]; A-F or Aud. Prereq-Jr or Sr or grad student) In-depth investigation of a single specific topic, announced in advance.

HSG 5193. Directed Study in Housing Studies. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Jr or Sr or grad student) Independent study in Housing Studies under tutoring guidance.

HSG 5196. Field Study: National/International. (1-10 cr [max 10 cr]; A-F or Aud. [S]GIS/DES 5196, APST 5196, DES 5196, IDES 5196. Prereq-#) Faculty-directed field study in national or international setting.

HSG 5463. Housing Policy. (3 cr; A-F or Aud. [S] PA 5261. Prereq-[(2401 or DHA 2401), [2463 or DHA 2463)] or #) Institutional/environmental settings that make up up housing policy in the United States. Competing ideas about solving housing problems through public intervention in the market. Federal/local public sector responses to housing problems.

HSG 5464. Understanding Housing: Assessment and Analysis. (3 cr; A-F or Aud. Prereq-[(2401 or DHA 2401), [2463 or DHA 2463)] or #) Analytical design applied to analysis/presentation of housing/housing-related data. Use of Geographical Information Systems (GIS) to display, analyze, and communicate spatial data related to housing.


HSG 5484. Housing Studies Certificate Seminar. (2 cr; A-F or Aud. Prereq-Admitted to Housing Studies Certificate Program) Integrative seminar and “capstone” to Certificate program. Students prepare an individual career plan that focuses on application of housing studies to community/workplace.

HSG 5481. Promoting Independence in Housing and Community. (3 cr; A-F or Aud. Prereq-[(2401 or DHA 2401), [ Jr or Sr or grad student]] or #) Housing, work, and community environments as they relate to aging and managing disabilities. Principles of home modification, universal design, livable communities, and assistive technology to support individuals/families.

HSG 5484. Rural Housing Issues. (3 cr; A-F or Aud. Prereq-[(2401 or DHA 2401), [2463 or DHA 2463)] or #) Housing issues for non-metropolitan places, small towns, and rural areas. Housing needs and policy implications for rural residents. Economic development strategies for housing availability, adequacy, and affordability.

HSG 8170. Topics in Housing Studies. (1-3 cr [max 6 cr]; A-F or Aud) In-depth investigation of topic announced in advance.


HSG 8192. Readings in Housing Studies. (1-3 cr [max 8 cr]; A-F or Aud. Prereq-#) Independent study, review of books, and periodicals under tutorial guidance.

HSG 8193. Directed Study. (1-3 cr [max 8 cr]; A-F or Aud. Prereq-#) Directed study in Housing studies.

HSG 8222. Plan B Master’s Project. (3 cr; S-N or Aud. Prereq-[DHA or design master’s student]) Plan B master’s project.

HSG 8463. Housing: Race and Class. (3 cr; A-F or Aud. Prereq-Intersection between housing, race, and class. How housing reflects and helps to constitute racial/class difference. Housing as spatial expression of race/class. Case studies.

HSG 8467. Theoretical Perspectives in Housing Studies. (3 cr; A-F or Aud. Prereq-5463 or DHA 5467 or #) Investigation/evaluation of theories applied to housing. Levels of analysis. Links between theory, research questions, and methodological approaches.

Human Factors (HUMF)
School of Kinesiology
College of Education and Human Development


HUMF 5722. Human Factors Psychology. (3 cr; A-F or Aud. Prereq-Grad student or #) Psychological principles that underlie human interactions with technological systems. Techniques/methodologies to assess faulty/incorrect system design. Emphasizes human-centered approaches. Rigorous evaluation of human-machine interaction.


HUMF 8002. Proseminar in Human Factors/Ergonomics. (1 cr; A-F or Aud. Prereq-Enrollment in good standing, grad HumF minor) Issues and concerns tailored to interests of faculty and students regarding human factors/ergonomics, an interdisciplinary science concerned with interaction of performance and behavior with design factors in performance environment.

HUMF 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser consent, DGS consent) FTE: master’s.

HUMF 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser consent, DGS consent) FTE: doctoral.

HUMF 8541. Decision Support Systems. (4 cr; A-F or Aud. [S]IE 8541. Prereq-Undergraduate-level computer programming course or #; programming skills recommended) Students build a decision support system for a problem of their choice. How to identify appropriate problems. Styles of DSSs, evaluating their effectiveness.

HUMF 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr) Doctoral pre-thesis credits.

HUMF 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only]) Thesis credits: master’s.

HUMF 8794. Human Factors Research. (1-4 cr [max 4 cr]; S-N only) Human factors research.

HUMF 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required) Thesis credit: doctoral.

Human Resources and Industrial Relations (HRIR)
Industrial Relations Center
Curtis L. Carlson School of Management
HRIR 5000. Topics in Human Resources and Industrial Relations. (2 cr [max 8 cr]; Stdnt Opt. Prereq-Prereq-HRIR MA student) Topics in human resources and industrial relations.


HRIR 5023. Employment and Labor Law for the HRIR Professional. (2 cr; A-F only. Prereq-[(At least 60 sem cr or 75 qtr cr), 2.00 GPA] or grad student or #) Application of statutes and case law to work settings. Civil rights and equal opportunity. Discrimination and harassment. Compensation and benefits. Employee protection and privacy, labor relations. Emphasizes application and ability to recognize legal aspects of HRIR issues.


HRIR 5028. Leadership and Personal Development. (2 cr; A-F only) Effective leadership; Leadership theory. Personal leadership strengths/vulnerabilities. Exercises, role playing, giving/receiving feedback. Students create leadership development plan.


HRIR 5991. Independent Study in Human Resources and Industrial Relations. (1-8 cr [max 8 cr]; Stdnt Opt. Prereq-% or #) Individual readings or research topics.

HRIR 8000. Graduate Topics in Human Resources and Industrial Relations. (1-8 cr [max 8 cr]; Stdnt Opt. Prereq-HRIR MA student or Sch Mgmt approval; grad majors must enroll A-F only) Selected graduate topics of current relevance to human resource management and industrial relations.


HRIR 8011. Using Data and Metrics in Human Resources and Industrial Relations. (4 cr; Stdnt Opt. Prereq-Grad HRIR major or %) Theory/applications of methods of data analysis for using data in HRIR decision-making. Descriptive/ inferential statistics, especially hypothesis tests and confidence intervals. Regression analysis, Identification of appropriate techniques. Avoiding unreliable inferences. Introduction to HRIR metrics.


HRIR 8013. Research Methods in Social and Labor Policy. (3 cr; A-F or Aud. [S]PA 8366. Prereq-8011, grad HRIR major or %; grad majors must enroll A-F only) Application of social science research methods to public policy issues.

HRIR 8014. Human Resource Information Systems. (2 cr; Stdnt Opt. Prereq-Grad HRIR major or %; grad majors must enroll A-F only) Hardware and database fundamentals, software applications, security issues, vendor evaluation, system and software development and design issues, and environmental levels. Their implications for organizational design, control, coordination, and development.

HRIR 8021. Introduction to Human Resources and Industrial Relations. (5 cr; Stdnt Opt. [S] HRIR 3021. Prereq-[S]: 3021; Econ 1101, Econ 1102, Psy 1001, %; grad HRIR majors must enroll A-F only) Human resource management in contexts of labor markets and organizations. Valuing, employing, developing, motivating, and maintaining human resources in an industrial society. Staffing, training, and development; organizational behavior and theory; compensation and benefits; labor market analysis; and labor relations and collective bargaining.

HRIR 8022. Field Project. (4 cr; Stdnt Opt. Prereq-[8011, 8031, 8041, 8051, 8061, 8071, grad HRIR major] or %; grad majors must register A/F, must have instructors consent to drop course) Teams formulate and execute study of actual business problem faced by business, non-profit, or governmental organization, generally in Twin Cities.

HRIR 8023. International Human Resource Management. (2 cr; Stdnt Opt. Prereq-Grad HRIR major or %) Strategies for effective management. Analysis of cross-cultural differences in values, norms, and practices, and how they affect organizational behavior/ performance. Implications for designing HR practices in multinational organizations and international contexts.

HRIR 8031. Staffing, Training, and Development. (4 cr; Stdnt Opt. Prereq-HRIR 8011, grad HRIR major or %; grad majors must enroll A-F only) Introduction to staffing processes (recruitment, selection, promotion, demotion, transfer, dismissal, layoff, retirement); training development theory and techniques as mechanisms for influencing individual and organizational outcomes, such as performance, satisfaction, and climate.

HRIR 8032. Staffing and Selection: Strategic and Operational Concerns. (2 cr; Stdnt Opt. Prereq-[8031, HRIR grad student] or %; HRIR grad students must register A/F) HRIR 8031. Recruitment and selection decisions (recruitment, selection, promotion, transfer, dismissal, layoff, retirement) in organizations. Legal environment in which staffing decisions are made. Staffing from strategic/organizational perspectives.

HRIR 8033. Employee Training: Creating a Learning Organization. (2 cr; Stdnt Opt. Prereq-[8031, HRIR grad student] or %; HRIR grad students must register A/F) HRIR 8031. Theory/practice related to staffing decisions (recruitment, selection, promotion, transfer, dismissal, layoff, retirement) and training. Training development and design. Transfer of training, program evaluation/costing. Role of employees, firm policies/practices in training.

HRIR 8034. Employee Development: Creating a Competitive Advantage. (2 cr; Stdnt Opt. Prereq-8031 or %, grad HRIR major or %; grad majors must enroll A-F only) Career development and planning, employee and management development techniques, and organizational and employee concerns related to mobility, job stress, balancing work and family, job enrichment, job sharing, employee stock ownership, individual incentives, information sharing, intervention mechanisms, and international comparisons.

HRIR 8041. Design and Management of Organizations. (4 cr; Stdnt Opt. Prereq-Econ 1101, Econ 1102, Psy 1001 or %, grad HRIR major or %; grad majors must enroll A-F only) Introduction to micro and macro organizational issues at individual, dyadic, group, organizational, and environmental levels. Their implications for organizational design, control, coordination, and development.

HRIR 8042. Organizational Structure and Performance. (4 cr; Stdnt Opt. Prereq-8041 or %, grad HRIR major or %; grad majors must register A/F) How different organizational practices (e.g., employee empowerment, job enrichment, profit sharing, employee stock ownership, individual incentives, information sharing, intervention mechanisms) affect organizations in their competitiveness, profitability, workplace safety, employment stability, and wages. Coherence of system of organizational practices.

HRIR 8043. Comparative Organizations and HRM Systems. (2 cr; Stdnt Opt. Prereq-8041 or %, grad HRIR major or %; grad majors must register A/F) Variations in organizational practices related to variations in ownership (profit, nonprofit, government, cooperatives), economic systems, culture, technology, market structure, etc. Organizations: employee empowerment, job enrichment, profit sharing, employee stock ownership, individual incentives, information sharing, intervention mechanisms, and international comparisons.


HRIR 8052. Compensation Theory and Applications. (2 cr; Stdnt Opt. Prereq-8051 or %, grad HRIR major or %; grad majors must enroll A-F only) Relationship between economic and psychological theories and the design and operation of compensation programs. Demographic influences on compensation program outcomes. Statistical analysis applied to pay program design and administration. Global pay variations. Current pay issues and controversies.

HRIR 8053. Employer-Sponsored Employee Benefit Programs. (2 cr; Stdnt Opt. Prereq-[8011, 8031, 8051 or %, grad HRIR major or %; grad majors must enroll A-F only) Design and administration of nonmandatory compensation benefit programs: medical expense insurance, pensions, profit sharing plans, disability, and other employee benefits. Effects of providing benefits.
on workers’ incentives with regard to performance, acquisition and maintenance of human capital, mobility, and risk sharing.

**HRIR 8601. Introduction to Labor Market Analysis.** (4 cr; Stdnt Opt. Prereq-Econ 1101, Econ 1102 or & grad HRIR major or %; grad majors must enroll A-F only)

Labor supply and demand analysis, its international dimensions; determination of wages, employment and unemployment; accumulation of human capital and investment in education and training; government regulation in areas of discrimination and workplace safety; role of unions in wage determination.

**HRIR 8602. Human Resource Strategy and Planning.** (2 cr; Stdnt Opt. Prereq-8601 or & grad HRIR major or %; grad majors must enroll A-F only)

Case studies used to diagnose strategy.

**HRIR 8603. Human Resources and Organizational Performance.** (2 cr; Stdnt Opt. [S]PA 8105, Prereq-8601 or & grad HRIR major or %; grad majors must enroll A-F only)

Impact of human resource policies and practices on organizational productivity and effectiveness. Role of government, unions, and private sector institutions on organizational effectiveness.

**HRIR 8604. Topics in Micro Labor Market Analysis.** (2-4 cr [max 3 cr]; Stdnt Opt. Prereq-8601 or & HRIR PhD student or %; grad majors must enroll A-F only)

May include micro aspects of unemployment, implicit contracts and efficiency wages, investment in human capital, occupational choice, job search, job matching and turnover, migration, labor force participation, and government program evaluation.

**HRIR 8605. Topics in Macro Labor Market Analysis.** (2-4 cr [max 3 cr]; Stdnt Opt. Prereq-8601 or & HRIR PhD student or %; grad majors must enroll A-F only)

May include theories of unemployment based on sectoral shocks, theories of wage rigidity, efficiency wages, intermediate wage structure, role of labor market in resource allocation, and effects of government intervention in labor market.

**HRIR 8607. Labor Relations and Collective Bargaining.** (4 cr; Stdnt Opt. Prereq-Econ 1101, Econ 1102 or & grad HRIR major or %; grad majors must enroll A-F only)

Evolution of U.S. unions and public policy, bargaining environment and structure, goals and negotiations, contract administration and results. International labor, labor-management cooperation, and newly emerging issues.

**HRIR 8607. Labor Movements in a Changing World.** (2 cr; Stdnt Opt. Prereq-8601 or & grad HRIR major or %; grad majors must enroll A-F only)

Labor movement philosophies. Critical evaluation of labor movement growth and adjustment to environmental change. Domestic and international perspectives of labor movement innovations.

**HRIR 8607. Dispute Resolution: Labor Arbitration.** (2 cr; Stdnt Opt. Prereq-8601 or & grad HRIR major or %; grad majors must enroll A-F only)

Arbitration to resolve grievances and impasses arising out of the collective bargaining agreement’s administration and negotiation. Arbitration law and legal issues, procedures and practices, case presentation, presentation rights, discipline and discharge, evidence, contract language interpretation, and remedies. Newly emerging approaches.

**HRIR 8074. Labor-Management Negotiations.** (2 cr; Stdnt Opt. Prereq-8071 or & grad HRIR major or %; grad majors must enroll A-F only)


**HRIR 8601. HRIR in Practice: Strategy, Execution, and Ethics.** (2 cr; Stdnt Opt. Prereq-8001, 8051, 8071, 8141, 8241, grad HRIR major)

Types of strategies. Developing/executing HRIR strategies. Project management. Ethical frameworks, issues, and considerations in HRIR.

**HRIR 8102. Capstone Project.** (2 cr; Stdnt Opt. Prereq-8001, 8011, 8051, 8071, 8141, 8241, grad HRIR major)

Application of related knowledge, concepts, and methods to a practical problem in human resources and industrial relations. Benchmarking of related best practices in research and in practice. Full development, analysis, and proposed recommendations for implementation or improvement of the selected problem.

**HRIR 8141. Organizational Theory Foundations of High-Impact HRIR.** (2 cr; Stdnt Opt. Prereq-[8001, HRIR MA student] or %)

Economic aspects of individual/group behavior in organizations. Individual/collective rationality, information, incentives, coordination problems, contracts. Impacts on HRIR decisions/outcomes. Solutions/approaches to problems in organizations at micro/macro levels.

**HRIR 8241. Organizational Behavior Foundations of High-Impact HRIR.** (2 cr; Stdnt Opt. Prereq-HRIR grad major or %)


**HRIR 8333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)*

**HRIR 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)*

**HRIR 8866. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**HRIR 8777. Thesis Credits: Master’s.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**HRIR 8801. Core Seminar: Fundamentals of Economic Analysis for HRIR.** (4 cr; Stdnt Opt. Prereq-HRIR PhD student or %; grad majors must enroll A-F only)

Core seminar: fundamentals of economic analysis for HRIR.

**HRIR 8802. Core Seminar: Organizational Behavior.** (4 cr; Stdnt Opt. Prereq-HRIR PhD student or %; grad majors must enroll A-F only)


**HRIR 8803. Core Seminar: Fundamentals of HR Research.** (4 cr; Stdnt Opt. Prereq-HRIR PhD student or %; grad majors must enroll A-F only)


**HRIR 8811. Advanced Quantitative Research Methods in Human Resources and Industrial Relations.** (2-4 cr [max 3 cr]; Stdnt Opt. Prereq-HRIR core or %, HRIR PhD student or %; grad majors must enroll A-F only)

General linear model and its assumptions and violations; simultaneous equations; pooling cross-section and time series; limited qualitative dependent variable models; sample selection models; hazard models. Emphasizes application to human resources and industrial relations.

**HRIR 8812. Core Seminar: Human Resources and Industrial Relations Research Methods.** (4 cr; Stdnt Opt. Prereq-HRIR PhD student or %; grad majors must enroll A-F only)

Application in research projects.

**HRIR 8820. Seminar: Special Topics in HRIR Research.** (2 cr [max 12 cr]; Stdnt Opt. Prereq-HRIR PhD student or %; grad majors must enroll A-F only)

Contemporary theories and research on specific topics in human resources and industrial relations. Topics vary.

**HRIR 8825. Research Practicum/Workshop.** (1 cr [max 4 cr]; S-N only. Prereq-HRIR PhD student or %)

Experience in conducting research and other doctoral student activities.

**HRIR 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 15 cr per semester or summer; 24 cr required)

**HRIR 8991. Independent Study in Human Resources and Industrial Relations.** (1-8 cr [max 8 cr]; A-F or Aud. Prereq-%)

Individual readings and/or research projects.

---

**Industrial Engineering (IE)**

Department of Mechanical Engineering

College of Science and Engineering

**IE 5080. Topics in Industrial Engineering.** (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-Upper div or grad student)

Topics vary each semester.

**IE 5111. Systems Engineering I.** (2 cr; A-F or Aud. Prereq-CSE upper div or grad student)

Overview of systems-level thinking/techniques in context of an integrated, design-oriented framework. Elements of systems engineering process, including lifecycle, concurrent, and global engineering. Framework for engineering large-scale, complex systems. How specific techniques fit into framework.

**IE 5112. Introduction to Operations Research.** (3 cr; A-F or Aud. Prereq-Math 2243 or Math 2573 or equiv. [one semester of probability or statistics], [CSE upper div or grad student])

Survey of Operations Research models/methods in deterministic/stochastic settings. Linear programming, integer programming, networks, forecasting, Markov chains, and queuing systems. Examples from various application areas, such as systems engineering, logistics, design, and project management.
Information and Decision Sciences (IDSC)

Department of Information and Decision Sciences
Curtis L. Carlson School of Management

IE 5113. Systems Engineering II. (4 cr; A-F or Aud. Prereq-5111, a course on basic probability, [CSE upper div or grad student]) Systems engineering thinking/techniques presented in 5111. Hands-on techniques applied to specific problems. Topics pertinent to effectiveness of design process. Practices and organizational/reward structure to support collaborative, globally distributed design team.


IE 5512. Applied Ergonomics. (4 cr; A-F or Aud. Prereq-Upper div CSE or grad student, 5511) Small groups of students work on practical ergonomic problems in local industrial firms. Projects cover a variety of ergonomic issues: workstation design, equipment and tool design, back injuries and material handling, cumulative trauma disorders, illumination and noise, and safety.

IE 5513. Engineering Safety. (4 cr; A-F or Aud. Prereq-Upper div CSE or grad student) Occupational health, and product safety. Standards, laws, and regulations. Hazards and their engineering control, including general principles, tools and machines, mechanics and structures, electrical safety, materials handling, fire safety, and chemicals. Human behavior and safety, procedures and training, warnings and instructions.

IE 5522. Quality Engineering and Reliability. (4 cr; upper div or grad student or CNE) Quality engineering management, economics of quality, statistical process control design of experiments, reliability, maintainability, availability.

IE 5531. Engineering Optimization I. (4 cr; Stdt Opt. Prereq-Upper div or grad student or CNE) Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch-bound/dynamic programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning.

IE 5541. Project Management. (4 cr; Stdt Opt. Prereq-Upper div or grad student or CNE) Introduction to engineering project management. Analytical modeling, selecting, organizing, budgeting, scheduling, and controlling projects, including risk management, team leadership, and program management.


IE 5551. Production Planning and Inventory Control. (4 cr; Stdt Opt. Prereq-CNE or upper div or grad student) Inventory control, supply chain management, demand forecasting, capacity planning, aggregate production and material requirement planning, operations scheduling, and shop floor control. Quantitative models used to support decisions. Implications of emerging information technologies and of electronic commerce for supply chain management and factory operation.


IE 5555. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

IE 5556. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)


IE 5564. Advanced Topics in Operations Research. (1-4 cr; max 8 cr; Stdt Opt. Prereq-5531, 5532) Special topics determined by instructor. Examples include Markov decision processes, stochastic programming, integer/combinatorial optimization, and queuing networks.


IE 5552. Advanced Topics in Production, Inventory, and Distribution Systems. (4 cr; max 8 cr; Stdt Opt. Prereq-5551) Cutting edge research issues in production, inventory, and distribution systems. Topics vary: stochastic models of manufacturing systems, stochastic inventory theory, multi-echelon inventory systems and supply chains, supplier-retailer and supplier-manufacturer coordination, supplier and warehouse networks, business logistics, transportation.

IE 5566. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr) No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for Ist/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

IE 5773. Graduate Seminar. (1 cr; S-N or Aud) Recent developments.

IE 5774. Graduate Seminar. (1 cr; S-N or Aud) Prereq-5773) Recent developments.

IE 5777. Thesis Credits: Master's. (1-18 cr; max 50 cr) No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only)

IE 8794. Industrial Engineering Research. (1-6 cr; max 10 cr; Stdt Opt. Prereq-#) Directed research.

IE 8888. Thesis Credits: Doctoral. (1-24 cr; max 100 cr) Prereq-Max 18 cr per semester or summer; 24 cr required)

IE 8951. Plan B Course. (1-12 cr; S-N or Aud) Prereq-IE 8951) Structured environment in which students can complete M.S. Plan B project.

IE 8953. Plan B. (2 cr; A-F or Aud. Prereq-8951) Structured environment in which students can complete M.S. Plan B project.

IE 8991. Curricular Practical Training. (1-2 cr; max 6 cr; S-N only) Industrial work assignment involving advanced mechanical engineering. Review/approval by faculty member/director of graduate studies. Final report covering work assignment.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

IDSC 8511. Conceptual Topics and Research Methods in Information and Decision Sciences. (4 cr; Stdnt Opt. Prereq-Business admin PhD student or #) Relationships to underlying disciplines; major research streams; seminal articles, survey literature, and major researchers. Provides framework for organizing knowledge about information and decision sciences.

IDSC 8521. System Development. (2 cr; Stdnt Opt. Prereq-Business admin PhD student or #) Why it is hard to develop efficient/effective information systems, what can be done to improve situation. Defining/evaluating artifacts in development process and in systems. Producing/evaluating artifacts (constructs, models, methods, tools) that enable more efficient/effective information systems to be developed.


IDSC 8541. Introduction to Economics of Information Systems. (2 cr; A-F only. Prereq-PhD student in Business Administration or #) Classical research questions. Methodologies/findings that form backbone of economics of IS. Online auctions, electronic markets, e-commerce, human capital issues.

IDSC 8711. Cognitive Science. (4 cr; Stdnt Opt. Prereq-Business admin PhD student or #) Empirically based concepts of knowledge and reason, mental representation and conceptual systems that guide problem solving and decision making. Computational metaphor of mind drawn from psychology, computer science, linguistics, anthropology, and philosophy. Implications for understanding of knowledge work.


IDSC 8713. Heuristic Decision Making. (2 cr; Stdnt Opt. Prereq-Business Admin PhD student or #; offered all yrs) How decisions are made, how knowledge is stored/used, how knowledge of variability/feedback influence decisions. Decision, operational, individual level. Exceptional performance, pathologies of decision making. Basis for “best practice.” How knowledge is managed in decisions, decision failure. Folly, normal accidents, decision problems in which individuals manipulate information to influence/deceive others.

IDSC 8800. Research Seminar in Information and Decision Sciences. (4 cr [max 20 cr]; Stdnt Opt. Prereq-Business admin PhD student or #) Topics, which vary by semester, are selected from new areas of research, research methods, and significant issues.

IDSC 8801. Research Seminar in Information and Decision Sciences. (2 cr [max 20 cr]; Stdnt Opt. Prereq-Business Admin PhD student or #) New areas of research, research methods, issues.

IDSC 8892. Readings in Information and Decision Sciences. (1-4 cr [max 16 cr]; Stdnt Opt. Prereq-Business admin PhD student or #) Readings useful to a student’s individual program and objectives that are not available through regular courses.

IDSC 8894. Graduate Research in Information and Decision Sciences. (1-8 cr [max 24 cr]; Stdnt Opt. Prereq-Business admin PhD student or #) Individual research on an approved topic appropriate to student’s program and objectives.

Infrastructure Systems Engineering (ISE)

Center for the Development of Technological Leadership

College of Science and Engineering

ISE 5101. Project Management. (3 cr; A-F or Aud. Prereq-IDSC 851E student) Broad areas in project management and leadership. Emphasizes practical understanding of business engineering, engineering project management. Project planning, scheduling, controlling. Budgeting, staffing, task/cost control. Communicating with, motivating, leading, and managing conflict among team members. Lectures, discussions, experiential exercises.


ISE 8105. Capstone Project. (1-2 cr [max 3 cr]; A-F or Aud. Prereq-IDSC 851E student) Integrates knowledge from courses in Master’s program with job experience. Students prepare proposal, conduct project, and report results in written and oral form. Project involves aspect of design, management, or operation of some feature of infrastructure.

ISE 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser approval, DGS approval) FTE: Master’s

Innovation Studies (IS)

College of Continuing Educatio

IS 5001. Introduction to Innovation Studies. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-%) Key concepts/models from sociology, futures study, and business. Innovative, team leadership strategies. Definition/application of just-in-time concept. Life-long self-improvement skills.

IS 5002. Final Project for Innovation Studies. (1-4 cr [max 4 cr]; A-F or Aud. Prereq-Completion of IS requirements, %) Either an internship in an organization or a hands-on study project on a contemporary issue or problem. Students apply expertise/ideas to a real-world situation.

IS 5100. Innovation Studies Seminar. (1-4 cr [max 24 cr]; A-F or Aud. Prereq-%) Innovation studies topics.
IS 5950. Special Topics. (1-4 cr [max 12 cr]; A-F or Aud. Prereq-#) Special interdiscipinary topics.
IS 5993. Directed Studies. (1-4 cr [max 6 cr]; Stdnt Opt. Prereq-#) Guided individual reading or study.

Insurance and Risk Management (INS)

Curtis L. Carlson School of Management


Interdisciplinary Archaeological Studies (INAR)

College of Liberal Arts

INAR 5100. Topics in Interdisciplinary Archaeological Studies. (3 cr; A-F or Aud. Prereq-InAr grad major or #) Topics specified in the Class Schedule.
INAR 5200. Directed Readings. (1-7 cr [max 7 cr]; Stdnt Opt. Prereq-InAr grad major or #)
INAR 5300. Directed Research. (1-7 cr [max 7 cr]; Stdnt Opt. Prereq-InAr grad major or #)
INAR 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)
INAR 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)
INAR 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
INAR 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))
INAR 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Interior Design (IDES)

Department of Design, Housing, and Apparel

Interior Design

IDES 5170. Topics in Interior Design. (1-4 cr [max 32 cr]; A-F or Aud. Prereq-Jr or sr or grad student) In-depth investigation of specific topic, announced in advance.
IDES 5193. Directed Study in Interior Design. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Jr or sr or grad student) Independent study in interior design under tutorial guidance.
IDES 5196. Field Study: National/International. (1-10 cr [max 10 cr]; A-F or Aud. Prereq: IDES 5196, APST 5196, HSG 5196, DES 5196. Prereq-#) Faculty-directed field study in national or international setting.
IDES 8170. Topics in Interior Design. (1-3 cr [max 6 cr]; A-F or Aud) In-depth investigation of topic, announced in advance.
IDES 8192. Readings in Interior Design. (1-3 cr [max 8 cr]; A-F or Aud. Prereq-#) Independent study, review of books/periodicals under tutorial guidance.
IDES 8193. Directed Study. (1-3 cr [max 8 cr]; A-F or Aud. Prereq-#) Directed study in interior design.
IDES 8222. Plan B Master’s Project. (3 cr; S-N or Aud. Prereq-DHA or design major’s master’s student, #) Plan B master’s project.

International Business (IBUS)

Department of Global Initiatives

Curtis L. Carlson School of Management

IBUS 5000. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5112. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5113. Undergraduate Seminar: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5114. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5115. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5116. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5117. Undergraduate Semester: CIMBA (Consortium of Universities for International Studies). (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.
IBUS 5210. Vienna Seminar: International Business (Graduate). (4 cr; A-F only. Prereq-Carson grad student, consent of Carlson International Programs) Rapidly changing business environment of Central/Eastern Europe. Students work in teams with students from WU-Vienna University of Economics and Business for two weeks in May/June in Central/Eastern Europe.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

IBUS 5130. France Seminar: Doing Business in the European Union (Graduate). (4 cr; S-N only. Prereq-Carlson grad student, Carlson School International Programs consent) Two-week study abroad program at Universite Jean-Moulin Lyon 3 in Lyon, France. Includes courses taught by international faculty, site visits, cultural excursions.

IBUS 5140. Vienna Summer Program: International Business (Graduate). (0-15 cr [max 15 cr]; S-N only. Prereq-Carlson grad student, consent of Carlson School International Programs) Summer study abroad program at Europe’s largest business school (WU-Vienna). Students take three business classes, plus German language. Program participants from Europe, Asia, Latin America, and the United States.


IBUS 5160. Cologne Summer Program: European Management (Grad). (6 cr [max 24 cr]; S-N only. Prereq-Carlson School grad student, Carlson School International Programs consent) Summer study abroad at one of Carlson School’s international exchange partner universities. Students select courses based on their academic needs/interests.


IBUS 5172. IBUS 5172: Global Business Practicum-Brazil. (4 cr [max 8 cr]; A-F only) Study abroad course. Short-term global enrichment program traveling to Brazil in May.

IBUS 5180. Economics in Transition: A Study of Central and Eastern Europe. (4 cr; S-N only. Prereq-%) Seminar. Students participate in field study with executive MBA students. Run by executive MBA program at Wirtschaftsuniversität Wien, in Vienna, Austria. Insights into Central/Eastern European economies of Bucharest, Romania, and St. Petersburg, Russia, which are in the process of transitioning from central planning to market system.

IBUS 5190. Brazil Seminar: Doing Business in Brazil. (4 cr; A-F only. Prereq-Carlson grad student, Carlson School International Programs consent) Two-week study abroad at Escola de Administração de Empresas de Sao Paulo da Fundacao Getulio Vargas (FGV). Full class days, cultural tours, field trips, site visits.

IBUS 5200. International Business: Undergraduate Exchange. (0-16 cr [max 160 cr]; S-N only. Prereq-Carlson grad student, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5201. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5202. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5203. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5204. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5205. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr completed, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5206. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5207. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5208. International Business: Undergraduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-60 cr, Carlson School International Programs consent) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5209. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5301. Copenhagen Summer Program in International Business (Graduate). (4-8 cr [max 24 cr]; S-N only. Prereq-Carlson grad student, consent of Carlson School International Programs) Summer study abroad at one of Carlson School’s international exchange partner universities. Students select courses based on their academic needs/interests.

IBUS 5302. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5303. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5304. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5305. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5306. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5307. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5308. International Business: Graduate Exchange. (1-6 cr [max 60 cr]; S-N or Aud. Prereq-Carlson grad student, consent of Carlson School International Programs) Study at one of Carlson School’s international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5998. Directed Studies in International Business. (1-32 cr [max 32 cr]; S-N only. Prereq—Grad student, permission of Carlson School International Programs) Directed studies in specific topics, such as strategy, finance, international law, or country-specific issues. Students select courses based on academic needs/interests.

Interpersonal Relationships Research (IREL)

Institute of Child Development

College of Education and Human Development

IREL 8001. Proseminar in Interpersonal Relationships Research. (2 cr; S-N or Aud. Prereq—Grad IRel minor) Survey of major topics, including theoretical assumptions, methods, and samples of current research.
ITAL 5289. The Narrow Door: Women Writers and Feminist Practices in Italian Literature and Culture. (4 cr [max 16 cr]; Stdt Opt. Prereq-3015) Focuses on issues of gender, sexual difference, equality, and emancipation raised by Italian women writers and thinkers from the 19th century to the present.

ITAL 5505. Staging the Self: Theater and Drama in Modern Italy. (4 cr [max 16 cr]; Stdt Opt. Prereq-3305. Prereq-grad student or #) Theatrical representations of the self in modern Italy. Focuses on issues of identity, gender, and class in theatrical works ranging from Alfieri’s Mira, Pirandello’s Enrico IV to Dacia Maraini’s Clytemnestra.


ITAL 5337. Nation and Narration: Writings in the 19th Century. (4 cr [max 16 cr]; Stdt Opt. Prereq-3015) Introduces the construction of modern Italian national identity by examining the role that literature plays in this process. Works by Manzoni, Foscolo, Leopardi, Gioia, Verga, Serao, and Deledda studied in the context of a range of sociopolitical and cultural issues.

ITAL 5401. Mondo di Dante. (4 cr [max 16 cr]; Stdt Opt. Prereq-3201 or #) Intensive reading of Dante’s Inferno, Purgatorio, and Vita Nuova with emphasis on Dante’s linguistic and cultural contributions.

ITAL 5502. Making of Modern Italy: From the Enlightenment to the Present. (3 cr [max 12 cr]; Stdt Opt. [S]) ITAL 3502. Prereq-grad student or #) Italian literary, cultural, and symbolic practices, from Enlightenment to present.

ITAL 5550. Topics in 19th Century Italy. (3 cr [max 12 cr]; Stdt Opt. Prereq-Ital 3015 or #) Explores the literature and culture of Italy in the 19th century. Content will vary depending on the instructor. Topics and readings may include literary, critical, cultural, historical, and/or social issues, a specific author, a genre, or other topics of interest for the period. Specific content will be posted in the department and listed in the Course Guide.

ITAL 5609. World of Dante. (4 cr [max 8 cr]; Stdt Opt) 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 5640. Topics in Italian Studies. (3 cr [max 12 cr]; Stdt Opt. Prereq-Ital 3015) Topics of interest in studies of Italian and/or Italian American culture of the 20th century. Topics and readings may include literary, critical, cultural, historical, and/or social issues, a specific author, a genre, or other topics. Content varies by instructor. Specific content posted in the department and in the Course Guide.

ITAL 5806. Negotiating the Terms: Italian Film and Literature. (3 cr [max 12 cr]; Stdt Opt. [S]) ITAL 3806. Prereq-grad student or #) Cinematic representations of Italian literary texts. Basic tools of literary analysis. How both media impact Italian culture. Taught in English.

ITAL 5970. Directed Readings. (1-4 cr [max 16 cr]; Stdt Opt. Prereq-#) Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required.

ITAL 5833. FTE: Masters. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

ITAL 5777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

ITAL 8992. Directed Readings. (1-4 cr [max 16 cr]; Stdt Opt. Prereq-#) Requirements decided on by faculty member and student: contact hours, number of credits, written/other work.

Japanese (JPN)

Department of Asian Languages and Literatures

College of Liberal Arts

JPN 5040. Readings in Japanese Texts. (5 cr [max 9 cr]; A-F or Aud. Prereq-4042 or equiv or #) Students read authentic materials of various types to increase reading/speaking ability. Topics specified in Class Schedule.

JPN 5071. Communicative Competence for Japan-Oriented Careers. (4 cr; Stdt Opt. Prereq-4041 or 4042 or #) Effective communication using spoken and written Japanese in contexts likely to be encountered by a career-oriented professional in Japan.


JPN 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

JPN 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

JPN 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for lst/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

JPN 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

JPN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Jewish Studies (JWST)

Department of Classical and Near Eastern Studies

College of Liberal Arts

JWST 5311. Problems in Historiography and Representation of the Holocaust. (3 cr; Stdt Opt. [S] HIST 5285. Prereq-JwSt 3521 or ReIS 3521 or #) Focuses on issues connected with the Holocaust. Inclusiveness of other groups, Holocaust vs. Shoah, historiographical conflicts about perpetrators, an examination of the problems of representation in literature and art, problems of narrative theology after Auschwitz.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses


JWST 5900. Topics in Jewish Studies. (3-4 cr [max 8 cr]; Stdnt Opt) Topics specified in Class Schedule.

JWST 5992. Directed Readings. (1-12 cr [max 12 cr]; Stdnt Opt. Prereq-#) Guided individual reading or study.

Journalism and Mass Communication (JOUR)

School of Journalism and Mass Communications

College of Liberal Arts

JOUR 5001. Health Writing. (3 cr; A-F or Aud. Prereq-[[3004W or 3004V], [3101 or 3101H], 3121], [jour major or approved ICP major or BI major or IDIM major] or enrolled in MA in health journalism or grad student or #) Overview/techniques of news reporting/writing. Complex health topics. Techniques of other forms of health writing, including health feature writing and health new media/communication.

JOUR 5131. Capstone: In-Depth Reporting. (5 cr; A-F only. Prereq-[[3004W or 3004V], [3101 or 3101H], 3121], [jour major or approved ICP major or BI major or IDIM major] or grad student) Techniques/issues of special project stories. Explanatory, investigative, civic, and literary or ethnographic journalism. Topics (e.g., civil rights, governmental malfeasance, health care problems) typically involved in these stories.

JOUR 5155. Capstone: Database Reporting. (5 cr; A-F only. Prereq-[[3004W or 3004V], [3101 or 3101H], 3121], [jour major or approved ICP major or BI major or IDIM major] or grad student) Obtaining/analyzing digital data for computer-assisted reporting that can be published on various media platforms. Using spreadsheets/databases to manage information, find news stories, and produce maps/graphics.

JOUR 5174. Capstone: Magazine Editing and Production. (4 cr; A-F only. Prereq-[[3004W or 3004V], [3101 or 3101H], [3155 or 3175W or 3321 or 4302]], [jour major or approved ICP major or IDIM major or ICP major or BI major]) Writing, editing, illustration, design, layout, and photocomposition of print or Web magazine.

JOUR 5251. Psychology of Advertising. (3 cr; A-F or Aud. Prereq-Jour major or jour minor or grad major or IDIM major or ICP major or BI major) Psychological principles, research techniques, and applications in advertising/selling. Consumer attitudes/behavior. Psychological mechanisms upon which effectiveness of advertisements/commercials depends.

JOUR 5501. Communication and Public Opinion. (3 cr; A-F or Aud. Prereq-Non-jour major or jour minor with course appr on prog plan or prejour with adviser approval) Theories of communication, persuasion, attitude change. Functions of interpersonal/mediated communication in diffusion of information and in opinion formation.

JOUR 5541. Mass Communication and Public Health. (3 cr; Stdnt Opt. Prereq-Jour major or jour minor or grad major or IDIM major or ICP major or BI major) Intersection of mass media, public health, and behavior. Role of theory in understanding intended/unintended campaign effect. Role of health journalism. Decisions that inform media-based interventions.

JOUR 5542. Theory-based Health Message Design. (3 cr; A-F or Aud. Prereq-Enrolled in MA in health journalism or grad student or Jour major or mass comm minor or approved IDIM major or ICP major or BI major or #) Best practices for message design across media/systems. Students apply concepts to design health campaign messages that affect various audiences. Implications of theories of message engagement for current public health practice.

JOUR 5552. Law of Internet Communications. (3 cr; A-F or Aud. Prereq-Jour-Non-jour major or jour major with course appr on prog plan or [pre-jour with adviser approval]) Whether/how/which traditional media laws/regulations apply to the Internet. Developing law of communication on Internet, global/ethical issues.

JOUR 5601W. History of Journalism. (3 cr; A-F or Aud. Prereq-Jour major or jour minor or approved ICP major or IDIM major or ICP major or BI major; ICP sections are open to non-majors; prereqs do not apply to ICP sections) Development of American media, from beginnings in Europe to present day. Rise of film/radio/television. Internet. Relation of communications development to political, economic, social trends.

JOUR 5606W. Literary Aspects of Journalism. (3 cr; A-F or Aud. [S]ENGW 5606. Prereq-Jour major or jour minor or approved ICP major or IDIM major or ICP major or BI major; ICP sections are open to non-majors; prereqs do not apply to ICP sections) Literary aspects of journalism as exemplified in, and influenced by, works of American/British writers, past/present. Lectures, discussions, weekly papers, critiques.

JOUR 5615. History of the Documentary. (3 cr; A-F or Aud. Prereq-Jour major or jour minor or approved ICP major or IDIM major or ICP major or BI major; ICP sections are open to non-majors; prereqs do not apply to ICP sections) Social history of photography, film, video. Informational, documentary, propaganda, and entertainment functions of visual communication. Rise/influence of visual media industries and of public imager

JOUR 5725. Management of Media Organizations. (3 cr; A-F or Aud. Prereq-Non-jour major or jour minor with course appr on prog plan or prejour with adviser approval) Introduction to concepts/principles of media management. Strategic planning, leadership, organizational strategies, ethical/legal issues. Working in teams. Balance sheets, income statements. Motivating/persuading people.

JOUR 5777. Contemporary Problems in Freedom of Speech and Press. (3 cr; A-F or Aud. [S]LAW 6030, Prereq-Jour major or jour minor or approved IDIM major or ICP major or BI major) Legal/constitutional derivation of freedom of press/speech. Emphasizes case law, statutes, judicial theories. Leading cases in privacy torts, prior restraints, news gathering/dissemination. Access to courts/government, including via the Internet. Legal-research techniques.

JOUR 5990. Special Topics in Mass Communication: Professional. (3 cr [max 6 cr]; A-F or Aud. Prereq-Jour major or approved IDIM major or ICP major or BI major) Professional-skills-learning opportunity not regularly offered. Topics specified in Class Schedule.

JOUR 5991. Special Topics in Mass Communication: Context. (3 cr [max 6 cr]; A-F or Aud. Prereq-Jour major or mass comm minor or approved IDIM major or ICP major or BI major or grad student or #) Special context topics not regularly offered. Topics specified in Class Schedule.

JOUR 5993. Directed Study. (1-3 cr [max 6 cr]; A-F or Aud. Prereq-[Jour major or jour minor or approved IDIM major or ICP major or BI major], GPA of at least 3.00, [B], %, #) Directed study/projects.

JOUR 8001. Studies in Mass Communication I. (3 cr; A-F or Aud) Introduction to key concepts, theories, and methods in study of mass communication from social sciences perspective. Survey of research literature using individualistic/structural approaches.

JOUR 8002. Studies in Mass Communication II. (3 cr; A-F or Aud. Prereq-8001) Literature on history of the field, cultural and humanistic approaches to its study, and legal and ethical issues.

JOUR 8003. The Changing Media Environment. (3 cr; A-F or Aud. Prereq-Journalism graduate students) Nonprofessional skills course. Prepares entering graduate students to work in the changing media environment, emphasizing its political, social, economic, legal, ethical and technological implications nationally and globally; students produce scholarly research about changing media.


JOUR 8192. Advanced Health Journalism: Computer-Assisted Reporting on Health. (3 cr; A-F or Aud. Prereq-Enrolled in MA in health journalism or #) How to use data/databases to tell health news stories or help with health campaigns. Databases, how to access them. How to mine data for effective communication to consumer audience.

University of Minnesota Fall 2012 Graduate Education Catalog
JOUR 8193. Capstone: Health Journalism and Communication. (4 cr; A-F or Aud. Prereq- Enrollment in MA in health journalism or #) Students focus on different aspects of health communication and journalism. Final project (possibly group project) such as publishable article(s), research paper, or multimedia production.

JOUR 8194. Health Journalism Field-Based Practicum. (3 cr; A-F only. Prereq-[3101, 8101] or enrolled in MA in health jour) Field-based practicum. Students are teamed with a local news organization, media company, or communications office of a health care entity to write/produce health news/information under guidance of an editorial manager at that institution and a faculty instructor. With faculty permission, may lead to capstone project for 8193.


JOUR 8201. Factors Affecting Communication Strategy. (3 cr; A-F only. Prereq-Strat Comm MA grad major) Concepts/methods to support analytic/creative processes that lead to development of breakthrough communication strategies. Criteria for selecting among strategic alternatives.

JOUR 8203. Integration of Communication Strategies Across Media. (3 cr; A-F only. Prereq-8200, 8201, 8202, strat comm MA grad major) Concepts, analytical techniques, and methodologies used to plan communication strategies and implement communication campaigns utilizing a diverse range of media.

JOUR 8204. Measuring the Effectiveness of Strategic Communication Campaigns. (5 cr; A-F only. Prereq-8203, Strat Comm MA grad major) Examination, evaluation, and application of concepts/methods to evaluate effectiveness of strategic communication campaigns and their components.

JOUR 8205. Cases in Strategic Communication. (3 cr; A-F only. Prereq-8203, strat comm MA grad major) Case study analysis concerning development, implementation, and evaluation of communication strategies. Cases cover broad range of organizations, focus on such issues as brand introduction, brand reinforcement, revitalizations, crisis communication, issues management, and legal/ethical considerations.

JOUR 8206. Directed Study: Development of an Integrated Strategic Communication Campaign. (3 cr [max 6 cr]; A-F only. Prereq-8205, strat comm MA grad major) Project to develop a case study analysis concerning development, implementation, and evaluation of a strategic communication campaign.

JOUR 8333, FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) Major issues. Frontal boundaries of federal government and network news departments. Historical studies.

JOUR 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) Major issues. Frontal boundaries of federal government and network news departments. Historical studies.

JOUR 8601. Seminar: Methods in Mass Communication History Research. (3 cr; A-F or Aud. Prereq-8600, 8002) Research paradigms, concepts, and findings for developing a general theory of mass communication.


JOUR 8620. Seminar: Advertising Research. (3 cr [max 12 cr]; A-F or Aud. Prereq-5251 or #) Advertising as persuasive communication. Current research/theory related to advertising decision-making process.

JOUR 8651. Seminar: Media and Social Change. (3 cr; A-F or Aud. Prereq-8801 or 8002 or equiv) Interplay between social theories and media studies. Pragmatism, structural-functionalism, Marxism, political economy, cultural studies, globalization.


JOUR 8666, Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Doctoral-Pre-Doctoral student who has not passed prelim oral, no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

JOUR 8671. Seminar: Communication Ethics--Public/Civic Journalism. (3 cr; A-F or Aud) Historical underpinnings, philosophical debate, theoretical dynamics, legal concerns, ethical implications.


JOUR 8678. Seminar: Constitutional Law--Theories of Freedom of Expression. (3 cr; A-F or Aud. [S]Law 6059, Prereq-5777 or # or law student) Problems of constitutional/tort law affecting the press. Underlying theories.

JOUR 8679. Seminar: Research Methods in Media Ethics and Law. (3 cr; A-F or Aud) Research at intersection of first amendment and media ethics.


JOUR 8721. Seminar: Communication Agencies as Social Institutions. (3 cr; A-F or Aud) Influence/effects of mass communication, internal dynamics of media organizations, criticism/modes of reform. Theoretical frameworks for analysis.

JOUR 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]) No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

JOUR 8801. Seminar: Comparative Research in Mass Communication, a Cross-National Approach. (3 cr; A-F or Aud. Prereq-4801 or 5825) Comparative research designs/markets. Analysis of production, presentation, transmission, and consumption of mass media products/services (particularly news, entertainment, and information) across national borders. Theoretical concerns, empirical problems, policy. Ethical issues involving research on form/content of mass communication within/between countries.

JOUR 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]) No grade. Prereq-Max 18 cr per semester or summer; 24 cr required

JOUR 8990. Special Problems in Mass Communications. (3-12 cr [max 12 cr]; A-F or Aud. Prereq-Mass comm grad student or #) Topics specified in Class Schedule.

JOUR 8993. Directed Study. (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Grad mass comm major or minor, #, %) Directed study.

Kinesiology (KIN)

School of Kinesiology

College of Education and Human Development

KIN 5001. Foundations of Human Factors/Ergonomics. (3 cr; A-F or Aud. [S]HUMF 5001) 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 or Aud) 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 or Aud) Different approaches to providing physical education service and related movement interventions for persons with disabilities. Topics: movement behavior foundations, movement skill progression, unique considerations for specific impairments, and sport for persons with disabilities.

KIN 5111. Sports Facilities. (3 cr; A-F or Aud. Prereq-Kin or Rec grad student or MEd student) Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use.

KIN 5115. Event Management in Sport. (3 cr; A-F or Aud. Prereq-Grad student or #) Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events, benefits, professional events.

KIN 5122. Applied Exercise Physiology. (3 cr; A-F or Aud. Prereq-3385 or equiv or #) Methods 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 5123. Motivational Interventions in Physical Activity. (3 cr; A-F only. Prereq-3126W or grad student) Psychological principles related to physical activity (PA). Delivery of motivational interventions for physical activity. Motivational PA interventions. Two papers, one presentation, two exams.

KIN 5126. Sport Psychology. (3 cr; A-F only. Prereq-3126W or equiv or grad student or #) Theory/research in sport psychology. Human behavior in sport and physical activity settings.

KIN 5136. Psychology of Coaching. (3 cr; Stdnt Opt) Psychological dimensions of coaching across age levels, including coaching philosophy, leadership, communication skills, motivation, and mental skills training for performance enhancement.


KIN 5171. Foundations of Kinesiology. (3 cr; A-F or Aud. Prereq-Kin major or #) Introduction to the emerging field of kinesiology, broadly conceived as the study of human movement. Development and emergence of the term kinesiology and the scholarly, political, and educational ramifications of its development.

KIN 5196. Practicum: Developmental/Adapted Physical Education. (1-4 cr; max 4 cr; S-N or Aud. Prereq-3103 or [P]3103 or [P]3104 or [P]3104 or #. KIN undergraduate pre-teaching with sr status are limited to 2 practicum hrs) Observation, participation in physical education instruction for students with disabilities. Current issues in development/adaptive physical education. Exchange of ideas/problems.


KIN 5203. Health Media, Consumerism, and Communication. (2 cr; A-F only) Effects of media, consumerism, technology, and health related issues. Students form/defend opinions on positive/negative aspects of how health information is disseminated and how individual health decisions are made.

KIN 5204. Methods in Health Education. (3 cr; A-F only. Prereq-Health licensure student or #) Background knowledge/skills to deliver comprehensive health education program. Techniques, skills, and methods for teaching active learning projects. Lessons/units in health curriculum discussed/demonstrated. Focused on grades 5-12.


KIN 5271. Sport and Society. (3 cr; A-F or Aud. Prereq-3126W, grad student) or #) Sport, sporting processes, social influences, systems. Structures that have effected and exist within/among societies, nations, and cultures. Contemporary issues such as social differentiation, violence, and honesty.

KIN 5275. Competitive Sport for Children and Youth. (3 cr; Stdnt Opt) 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 Disease Prevention and Management. (2 cr; A-F or Aud. Prereq-Undergrad [physiology or biology]) Exercise testing/prescription with modifications required because of special considerations associated with aging, gender differences, environmental conditions, or presence of medical conditions.

KIN 5421. Sport Finance. (3 cr; A-F or Aud. Prereq-Grad student or #) Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market.

KIN 5435. Advanced Theory and Techniques of Exercise Science. (3 cr; A-F or Aud. Prereq-[3385, 4385, Kin major] or #) Theoretical constructs, in-depth description of procedures used in exercise science research and clinical settings. Laboratory exercises, lectures.

KIN 5461. Foundations of Sport Management. (3 cr; A-F or Aud. Prereq-Kin or rec or postbac or grad student or #) Theories/techniques in administration/management of sport enterprises. Organizational theory/policy, practical examples of sport management skills/strategies.

KIN 5485. Advanced Electrocardiogram Interpretation. (3 cr; A-F only. Prereq-[3385, 4385] or #) Placement and interpretation. Clinical exercise testing hands-on experience in electrocardiogram for resting and exercise testing situations.

KIN 5505. Human-Centered Design - Principles and Applications. (3 cr; Stdnt Opt. [S]KIN 3505) Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

KIN 5511. Sport and Gender. (3 cr; A-F only. [S] REC 551I) Critically examines women’s involvement in/contributions to sport, physical activity, and leisure.

KIN 5585. Pediatric Physiology and Health: Concepts and Applications. (2 cr; A-F only. Prereq-[3385 or 4385]) Current understanding of pediatric medicine and exercise physiology. Use of physical activity and weight management in the treatment of various diseases (i.e, obesity) that affect children and adolescents.

KIN 5601. Sport Management Ethics and Policy. (3 cr; A-F or Aud. Prereq-MEd or grad student or #) How to critically analyze ethical concepts that underpin or inform sport policy and evaluate sport policies from a normative point of view. Selected sport policy issues are used to illustrate relevance of ethical considerations in policy development and to explore the ethical implications of sport policy.

KIN 5631. Programming and Promotion in Sport. (3 cr; A-F or Aud. Prereq-Kin or Rec grad student or #) Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing, discussion, practical application.

KIN 5641. Scientific Theory and Application of Training and Conditioning in Sport. (3 cr; A-F only. Prereq-3385 or SPST 3641 or SPST 4641 or exercise physiology course or #) Current scientific literature on physiological adaptation through training/conditioning for sport. Applying methods in research journals to improve physiological adaptation through training/conditioning with sport specificity.

KIN 5666. Practicum in Kinesiology. (1-6 cr [max 6 cr; S-N only. Prereq-[Kin MEd or grad student, #]) Practical experience in kinesiology under supervision of a University faculty member and an agency supervisor.
KIN 5720. Special Topics in Kinesiology. (1-8 cr [max 6 cr]; Stdt Opt. Prereq-Kin upper div undergrad or grad student or #) Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings.

KIN 5722. Human Factors Psychology. (3 cr; A-F or Aud. Prereq-Grad student or #) Psychological principles that underlie human interactions with technological systems. Techniques/methodologies to assess faulty/incorrect system design. Emphasizes human-centered approaches. Rigorous evaluation of human-machine interaction.


KIN 5725. Organization and Management of Physical Education and Sport. (3 cr; A-F or Aud. Prereq-Grad/initial licensure or #) Comprehensive analysis of organization and management of physical education and sport in educational settings. Focuses 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 5801. Legal Aspects of Sport and Recreation. (4 cr; A-F or Aud. Prereq-Kin or rec major) Legal issues related to recreation, park, and sport programs/facilities in public/private sectors.

KIN 5804. National Collegiate Athletic Association (NCAA) Compliance. (2 cr; A-F only. Prereq-Upper div undergrad or grad student) in KIN, #) Governance structure, policies, and procedures in intercollegiate athletics. Careers in college athletics as coach, administrator, athletic trainer, counselor, etc.

KIN 5941. Clinical Movement Neuroscience. (5 cr; A-F only. Prereq-3027 or ANAT 3001 or ANAT 3601 or ANAT 3611 or equiv. [PHSL 3051 or equiv. (4441)]) Various neural subsystems involved in controlling human motor function. How injury and disease of the nervous system affects motor behavior. Possibilities for rehabilitation and treatment. Lectures, seminars, class presentations.

KIN 5981. Research Methodology in Kinesiology, Recreation, and Sport. (3 cr; A-F or Aud. [S]REC 5981. Prereq-3151 or equiv) Defines/reviews various types of research in exercise/sport science, physical education, and recreation studies. Qualitative research, field studies, and methodology as an alternative research strategy to traditional scientific paradigm.

KIN 5987. Professional Skills and Grant Writing for Health Sciences. (2 cr Prereq-Grad student) Introduction to structure/function of different organizations (e.g., NIH, AHA). Writing/reviewing grants/manuscripts. Preparing for a job in academia.

KIN 5992. Readings in Kinesiology. (1-9 cr [max 9 cr]; A-F or Aud. Prereq-[KIN upper div undergrad or MEd or grad student]) #) Independent study under tutorial guidance.

KIN 5995. Research Problems in Applied Kinesiology. (1-6 cr [max 6 cr]; A-F only. Prereq-[KIN upper div undergrad or MEd or grad student], 15 cr of major coursework [including 4981 or 5981], #) Selected topics in physical activity and human performance.


KIN 8122. Seminar: Exercise Physiology. (2-6 cr [max 6 cr]; A-F or Aud. Prereq-S1122 or equiv or #) Classic and contemporary literature in exercise physiology and allied disciplines, emphasizing contributions of major leaders in the field and opportunities for interdisciplinary research.

KIN 8126. Sports Medicine Psychology. (3 cr; A-F only, Prereq-Grad student or #) Advanced seminar examining the contributions to sports medicine psychology. Theory, research, and practice in the behavioral/social aspects of injury prevention/experiences among physically active populations across the life span.

KIN 8128. Doctoral Sport Management Seminar. (3 cr; A-F only. [S]REC 8128. Prereq-PhD student, #) Analysis of current literature, theoretical constructs, research methodology and design relative to sport management. Focuses on student-selected topics, research problems.

KIN 8132. Seminar: Motor Development. (3 cr; A-F or Aud. Prereq-grad student or #) Contemporary research literature on motor skill development from before birth to senescence. Emphasizes interaction between physical/environmental/performer constraints. Coordination/control of movement.

KIN 8135. Seminar: Motor Control and Learning. (3 cr; A-F or Aud. Prereq-grad student or #) Advanced reading/discussion of research on motor control, motor learning, human performance.

KIN 8211. Seminar: Perception and Action. (3 cr; A-F or Aud. Prereq-grad student or #) Survey of theory/research on use of perceptual information for control of action. Behavioral research on perceptual guidance of daily activities (e.g., standing, walking, driving). Perceptual control in context of expertise (e.g., sports). Perceptual-motor development.

KIN 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

KIN 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

KIN 8666. Doctoral Pre-thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 m; register up to four times, up to 60 combined cr)

KIN 8696. Internship: Applied Sport Psychology. (3-6 cr [max 6 cr]; S-N or Aud. Prereq-S1126, S126, Kin PhD student, #) Supervised internship; emphasis on educational sport psychology approaches to athletic performance enhancement and psychological adjustment to sport injury.

KIN 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

KIN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

KIN 8980. Graduate Research Seminar in Kinesiology. (1-9 cr [max 9 cr]; S-N or Aud. Prereq-Grad Kin major, #) Reporting and discussion of student and faculty research activity.

KIN 8995. Research Problems in Kinesiology. (1-9 cr [max 9 cr]; S-N only. Prereq-Kin PhD student, #) Individual scholarly research.

Korean (KOR)

Department of Asian Languages and Literatures

KOR S140. Readings in Sino-Korean Texts. (3 cr [max 9 cr]; Stdt Opt. Prereq-S5052 or equiv or #) Sino-Korean vocabulary/characters necessary for advanced and superior level of knowledge in Korean. Students conduct research projects based on specialized readings in their own fields of study.

Laboratory Medicine and Pathology (LAMP)

Department of Laboratory Medicine and Pathology Medical School


LAMP 5125. Chronobiology. (2-6 cr [max 6 cr]; O-N or Aud) 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.

Land and Atmospheric Science (LAAS)

Department of Soil, Water, and Climate

College of Food, Agricultural and Natural Resource Sciences

LAAS 5050. Integrated Topics in Land & Atmospheric Science. (3 cr; A-F or Aud) Earth system science. Interactions between the land and atmosphere. Biogeochemistry, human-environment interactions, environmental biophysics, and global environmental change.

LAAS 5051. Theory & Practical Writing for Land & Atmospheric Science. (2 cr; A-F or Aud) Grant proposals, including proposal formats of various funding sources, how to develop a significance statement, hypotheses and objectives, background, methods, project summary, time line, and budget. Critique proposal samples/discuss other aspects of seeking funding for research. Discuss LAAS graduate program prelim exam process.

LAAS 5425. Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere. (3 cr; A-F or Aud. Prereq-One yr college-level [calculus, physics]) Basic laws governing atmospheric motion through analysis of atmospheric dynamics and thermodynamics at the micro, synoptic, and global scales. Fundamental thermodynamic and dynamical processes/equations governing the behavior of the atmosphere/apply to larger-scale geophysical situations.


LAAS 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. [S]BBE 8005, SOIL 8005, PLPA 8005, AGRO 8005, HORT 8005, Prereq-#) Teaching experience in biosystems and agricultural engineering or agronomy and plant genetics or horticultural science or soil, water, and climate or plant pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

LAAS 8128. Land and Atmospheric Science Seminar. (1.5 cr; max 3 cr; S-N or Aud) Students present an open seminar on an advanced topic and attend seminars presented by other graduate students.

LAAS 8195. Research Problems in Soils. (1-5 cr; max 10 cr; Stdt Opt. Prereq-[Grad major in soil sci or related field, #]) Directed research on special topics of interest in soil science or related field. Students present their research to their peers and faculty.

LAAS 8444. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) Provides students with practical experiences in instructional techniques in a university setting.

LAAS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Doctoral pre-thesis credits.

LAAS 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

LAAS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

**Landscape Architecture (LA)**

**Department of Landscape Architecture**

**Course Overview**

**LA 5001. Sustainable Landscape Design and Planning Practices.** (3 cr; Stdt Opt. [[S]LA 4001. Prereq-TSA 5201, 5203]) Systemic, formal and spatial relationships. Quantitative and qualitative changes in global biodiversity, quality of the earth’s air, soil, and water resources, development and consumption of energy resources and climate change. Development of design processes for selection, deployment, and management of sustainable practices.


**LA 5003. Case Studies in Sustainable Landscape Planning and Design.** (3 cr; Stdt Opt. [[S]LA 5003]) Ecology, design, materials, policy, and community. Working from site to regional scales, evaluate case studies through the lens of larger issues and systems, including infrastructure, urban water cycle, transportation, energy, health, food systems, innovation, and more.

**LA 5004. Regional Landscape Planning.** (3 cr; Stdt Opt. Prereq-[[FR 3131 or [ [FR 5311 or FR 5311 or [ [FR 5311 or GEOG 5351 or [ [GEOG 5351 or GEOG 5561 or [ [GEOG 5561]) Critical environmental parameters affecting the growth and development of metropolitan areas. Students assess these parameters/prepare a multifunctional land use plan for a defined locale.

**LA 5201. Making Landscape Spaces and Types.** (6 cr; A-F or Aud. Prereq-B.E.D accelerated status or LA grad or #) Design exploration using 3-D models and historical precedent studies to create outdoor spaces for human habitation and use. Application of the basic landscape palette of landform, plants, and structures to give physical, emotional, cognitive, and social definition to created places.

**LA 5202. Landscape Analysis Workshop.** (1 cr; S-N or Aud) Introduction to field techniques for site analysis, including vegetation, soil, and landform description. One-week session, before fall term, at lake Itasca Forestry and Biological Station.

**LA 5203. Ecological Dimensions of Space Making.** (6 cr; A-F or Aud. Prereq-La LA major or #; recommended for both BEd and Grad students) Design studio experience drawing on ecological, cultural, aesthetic influences to explore development of design ideas responsive to ecological issues and human experience.

**LA 5204. Metropolitan Landscape Ecology.** (3 cr; Stdt Opt. Prereq-BED accelerated status or LA grad student or #) Theories/principles of holistic landscape ecology. People, nature, and environmental stewardship in metropolitan landscapes. Urban areas, rural areas that provide food, water, energy, and recreation.


**LA 5351. AutoCAD I.** (3 cr; Stdt Opt. Prereq-B.Ed. major or LA grad or #; may not be taken for graduate credit) Basic concepts, tools, and techniques of computer-aided drawing. Introduction to current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawings. Introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

**LA 5352. AutoCAD II.** (3 cr; Stdt Opt. Prereq-Arch 5351 or LA 5351. B.E.D. major or LA grad or #; may not be taken for graduate credit) Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawings. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

**LA 5371. Computer Methods I.** (1 cr; S-N or Aud. [[S]ARCH 5371. Prereq-B.E.D. accelerated status or LA grad or #) Introduction to current techniques, programs, and new editions of computer programs, and their application to landscape architecture computing.

**LA 5372. Computer Methods II.** (1 cr; S-N or Aud. [[S]ARCH 5372. Prereq-Arch/LA 5371. LA grad or #) Current techniques and computer programs, and their application to landscape architecture computing.


**LA 5400. Topics in Landscape Architecture.** (1-3 cr [max 12 cr]; Stdt Opt. Prereq-B.E.D. accelerated status or LA grad or #) Current topics in landscape architecture. Taught by regular or visiting faculty in their areas of specialization.

**LA 5401. Directed Studies in Emerging Areas of Landscape Architecture.** (1-3 cr [max 12 cr]; Stdt Opt. Prereq-#)
LA 5402. Directed Studies in Landscape Architecture History and Theory. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#) Independent studies under the direction of landscape architecture faculty.

LA 5403. Directed Studies in Landscape Architecture Technology. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#) Independent studies under the direction of landscape architecture faculty.

LA 5404. Directed Studies in Landscape Architecture Design. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#) Independent studies under the direction of landscape architecture faculty.

LA 5405. Interdisciplinary Studies in Landscape Architecture. (1-6 cr [max 12 cr]; A-F or Aud. Prereq-#) Research, planning, or design projects. Topics vary.

LA 5406. Urban Design Journal. (5-6 cr [max 4 cr]; A-F or Aud. Prereq-Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark) Methods and theories in urban design and human behavior. Students develop journal as tool for experiencing, analyzing, and recording the urban landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions.

LA 5407. Landscape Architecture Studio. (3-4 cr [max 4 cr]; A-F or Aud. Prereq-Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark) Individual and small-group projects focusing on urban issues, design process in Danish conditions; solutions based on knowledge of Danish problems in landscape and urban design and an understanding of how these problems are solved within Danish and European contexts.

LA 5408. Landscape Architecture, Architecture, and Planning. (3-4 cr [max 4 cr]; A-F or Aud. Prereq-Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark) Methods and theories in urban design and human behavior. Students develop urban design journal as tool for experiencing, analyzing, and recording the urban landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions.

LA 5413. Introduction to Landscape Architectural History. (3 cr; A-F or Aud. Prereq-One course in history at 1xxx or higher) Introductory course examines the multiple roots of landscape architecture by examining the making of types of landscapes over time. Emphasis on ecological and environmental issues, and issues related to political, economic, and social contexts of landscape architectural works.

LA 5431. History of Landscape Architecture: Individual Influences. (3 cr; A-F or Aud) Assessment of influences of individuals on formation of the profession of landscape architecture from 1800 to present. Lectures, presentations, field trips, readings, papers, projects.

LA 5514. Making the Mississippi. (3 cr; A-F or Aud. [S]LA 3514) Critical environmental parameters affecting growth/development of metropolitan areas. Students assess these parameters and prepare a multi-functional land use plan for a defined locale.

LA 5571. Landscape Construction: Landform Systems and Spatial Performance. (3 cr; A-F or Aud. Prereq-Accelerated BED student or LA grad student) Theory and professional applications of landform systems for design. Landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues. Spatial accommodation of vehicles in landscape architecture, including road design.

LA 5572. Plants in Design. (3 cr; A-F or Aud. Prereq-[5201, 5203, plant identification course] or #) Design principles for using plants in landscape. Cultural/ecological principles in design projects of various scales. Lectures, presentations, field trips, readings, projects.

LA 5573. Landscape Technology: Introduction to Geographic Information Systems. (3 cr; A-F or Aud. Prereq-jr or sr B.E.D. major or LA grad or #) GIS as an analytical tool to solve geographical problems of regional landscape design and resource management. Topics include application techniques, analytical procedures, data characteristics, data sources, input/output methods, and implementation.

LA 5574. Identification of Minnesota Flora. (3 cr; A-F or Aud. Prereq-BED accelerated status or Aud. Prereq-#) Identification of approximately 500 plants commonly used by landscape architects and environmental designers in Minnesota. Students develop a working knowledge of over 250 plants. Focuses on plant selection techniques, plant landscape associations, and issues of plants for use in standard landscape architectural settings. Regular field sessions.

LA 5755. Infrastructure, Natural Systems and the Space of Inhabited Landscapes. (3 cr; A-F or Aud. [S]LA 4755. Prereq-Grad student) Introduction to identification of approximately 500 plants commonly used by landscape architects and environmental designers in Minnesota. Students develop a working knowledge of over 250 plants. Focuses on plant selection techniques, plant landscape associations, and issues of plants for use in standard landscape architectural settings. Regular field sessions.

LA 5790. Special Topics in Metropolitan Design. (3 cr [max 6 cr]; A-F or Aud. [S]ARCH 5790. Prereq-Enrollment in CMD prog or #)] Designs for planning and design projects related to regional landscape design and planning. Topics include regional landscape design, regional planning, and professional applications of landform systems to mitigate/reverse anthropogenic impacts on Earth. Design of sustainable urban infrastructure solutions to mitigate/reverse anthropogenic impacts on Earth. Design of sustainable urban infrastructure systems, policy options, available technologies, criteria, design methods.

LA 8201. Designing Landscapes for Dwelling and Settlement. (6 cr; A-F or Aud. Prereq-[5203, 5571, grad LA major, [P]) Petroecological design studio. Hypothetical projects include development of schematic master plans for site layout, grading, and planting. Design for residential, commercial, and civic uses with attention to zoning and other controls, environmental quality, human behavior, markets, project finance, and techniques. Requires concurrent registration in LA 8202.

LA 8202. Design of Planned Developments. (2-3 cr [max 3 cr]; Stdnt Opt. Prereq-Grad LA major or #) Issues related to planned community developments: historical precedents; design for residential, commercial, and civic uses; role of zoning and other controls; deed restrictions; preparation of design brief; environmental quality; human behavior; market; project finance; and techniques of site development.

LA 8203. Making Regional Landscape Space. (6 cr; A-F or Aud. Prereq-[8202, grad LA major, coconcurrent enrollment 8204 or #) Design exploration of landscape ecology, landscape perception, regional economics, and public policy as informants of design decision-making in regional landscapes at or exceeding township level. Geographic information systems as design tools.
Courses

LA 8406. Concepts of Landscape Evaluation. (3 cr; A-F or Aud. Prereq-Grad land arch major or #)
Philosophical basis for wide-ranging approaches to evaluating qualitative aspects of landscape. Aesthetic factors and integration of landscape evaluation into regional design decision-making.

LA 8407. Perception Manipulation in Design of Exterior Space. (3 cr; Stdnt Opt. Prereq-Grad land arch major or #)
Historic and modern design devices that alter one’s sense of spatial control and arrangement to create illusionary situations in exterior environment. Organized to inform and test principles of perception distortion in exterior space.

LA 8408. 18th-Century Landscape Theory: Nature and the Sublime, the Beautiful, and the Picturesque. (3 cr; A-F or Aud. Prereq-Grad land arch or arch major or #)
Eighteenth-century landscape architectural theory underpinned most modern western traditions in landscape architecture. These theoretical positions framed the nature of Nature in the context of human experience through treaties and works of landscape architecture.

LA 8409. Filling Buildings to the Land. (3 cr; A-F or Aud. Prereq-Land arch or arch grad student with 1 yr grad design or #)
Exercises and projects in site manipulation to adjust structures and attendant uses and circulation to specific land parcels.

LA 8554. Project Programming. (1 cr [max 3 cr]; A-F or Aud. Prereq-8205, grad land arch major or #)
Individual research in preparation for final studio.

LA 8555. Advanced Landscape Planning and Design. (6 cr; A-F or Aud. Prereq-8205, grad land arch major or #)
Advanced studies in area of student’s choice.

LA 8574. Landscape Storm Water Management. (3 cr; A-F only, Prereq-8201, grad land arch major or #)
Theory and applications of hydrology and storm water management techniques. Applied hydrology, catchment delineation, storm water runoff models, and storm water management techniques (detention ponds, swales, channels, culverts, small storm sewer systems, run-off systems, sedimentation, and erosion control systems).

LA 8575. The Art and Ecology of Landscape Detail. (3 cr; Stdnt Opt. Prereq-Grad LA major or #)
Design of pavements, enclosures, decks, lighting, electrical, and irrigation systems for landscape architecture. Theory/principles of design of light structures, properties/use of materials, construction communication. Landscape integrity and economic viability as performance issues.

LA 8741. Metropolitan Design Workshop and Optional Seminar. (3-6 cr [max 6 cr]; A-F or Aud. Prereq-Enrollment in CMD prog or #)
Introduction to discipline/methodologies of urban design. Contributing fields/issues, including government/community goals, land use, housing, economic development, natural resources, services, and transportation. Implementation program.

LA 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

Language, Teaching, and Technology (LGT)

College of Liberal Arts

LGT 5101. Applications of Technology in Language Teaching. (3 cr; Stdnt Opt. $[LGT 5100]
Explore uses of technology in language teaching: theoretical background, demonstrations, and applications.


LGT 5710. Special Topics in Language Teaching and Technology. (2 cr [max 6 cr]; Stdnt Opt)
Examine, evaluate, apply specific area of technology to K-higher education, second foreign language teaching/learning in classroom, independent study, distance education environments.

LGT 5738. Web-based Second Language Instruction: Issues, Models, and Designs. (3 cr [max 6 cr]; Stdnt Opt)

Latin (LAT)

Department of Classical and Near Eastern Studies

College of Liberal Arts

LAT 5003. Intermediate Latin Prose: Graduate Student Enrollment. (3 cr; Stdnt Opt. $[LAT 5003. Prereq-[Grade of at least [C- or $] in [1002 or 5001] or #], grad student]

LAT 5004. Intermediate Latin Poetry for Graduate Students. (3 cr; Stdnt Opt. $[LAT 5004. Prereq-[5003 or equiv], grad student or #]

LAT 5100. Advanced Reading. (3 cr [max 18 cr]; Stdnt Opt. Prereq-[5004 or equiv], at least two yrs of college level Latin] or #)
Reading in Latin texts/authors. Texts/authors vary.

LAT 5200. Advanced Reading in Later Latin. (3 cr [max 18 cr]; Stdnt Opt. Prereq-3004 or equiv or # or CNES grad student)
Reading course. Authors of late antiquity, Middle Ages, and Renaissance. Topics specified in Class Schedule.

LAT 5701. Latin Prose Composition. (3 cr; Stdnt Opt. Prereq-Grad student or #)
Latin grammar, syntax, diction, and prose style. Graduated exercises in prose composition.

LAT 5702. Text Criticism. (3 cr; Stdnt Opt. Prereq-Grad student or #)

LAT 5703. Epigraphy. (3 cr; Stdnt Opt. Prereq-Grad student or #)
Practical/theoretical introduction to Latin epigraphy (study/interpretation of inscriptions). Readings/discussion of epigraphic texts. Their value as historical documents, as evidence for development of Latin language, and as literary texts.

LAT 5704. Latin Paleography. (3 cr; Stdnt Opt. Prereq-Grad student or #)
Analysis of various hands used in manuscripts of Latin authors, with attention to date/provenance. Transmission of ancient Latin literature.

LAT 5705. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr; Stdnt Opt. $[LAT 5705. Prereq-Two yrs college [Greek or Latin] or #]
Historical/comparative grammar of Greek/Latin, from proto-Indo-European origins to classical norms.

LAT 5706. History of Latin. (3 cr; Stdnt Opt. Prereq-Grad student or #)
Reading/analysis of documents illustrating stylistic registers/evolution of Latin language, from its earliest attestations through Middle Ages.

LAT 5800. Sight Reading for Graduate Students. (1 cr [max 6 cr]; S-N only, Prereq-Enrolled in a grad program in Department of Classical/Near Eastern Studies) Practice in reading Latin texts at sight.

LAT 5993. Directed Studies. (1-4 cr [max 18 cr]; Stdnt Opt. Prereq—#, %)
Guided individual reading or study.

LAT 5994. Directed Research. (1-12 cr [max 20 cr]; Stdnt Opt. Prereq-Grad student or #)
Guided research on original topic chosen by student.

LAT 5996. Directed Instruction. (1-12 cr [max 20 cr]; Stdnt Opt. Prereq-Grad student or #)
Supervised teaching experience.


LAT 8120. Latin Text Course. (3 cr [max 15 cr]; Stdnt Opt. Prereq-3110 or #; not for students in dept of Classical and Nr East Studies) Students attend 3xxx Latin courses. Supplementary work at discretion of instructor.


LAT 8262. Survey of Latin Literature I. (3 cr; Stdnt Opt) Extensive readings in variety of works from republican and early Augustan period.

LAT 8263. Survey of Latin Literature II. (3 cr; Stdnt Opt) Variety of works from Augustan and imperial periods.

LAT 8267. Graduate Survey of Latin Literature of Late Antiquity. (3 cr; Stdnt Opt. Prereq—#, %) Latin literature of 3rd to 6th centuries A.D., including Ammianus and Augustine.

LAT 8300. Readings in Latin Texts. (3 cr [max 18 cr]; Stdnt Opt. Prereq-Advanced grad student) Reading/discussion of literary or documentary texts from Roman antiquity. Topics may include subjects that draw on various sources, genres, or methods.

LAT 8910. Seminar. (3 cr [max 30 cr]; Stdnt Opt. Prereq-Grad student) Topics in Latin literature examined in depth. Emphasizes current scholarship, original student research.

112 University of Minnesota Fall 2012 Graduate Education Catalog
Liberal Studies (LS)
College of Continuing Education
LS 5100. Liberal Studies Seminar. (1-4 cr [max 24 cr]; A-F or Aud. Prereq-%)
Interdisciplinary topics.

LS 5125. Field Experience. (1-8 cr [max 8 cr]; A-F or Aud. Prereq-MLS student or #)
Off-campus observation, experience, and evaluation in interdisciplinary field of study.

LS 5950. Special Topics. (1-4 cr [max 12 cr]; A-F or Aud. Prereq-%)
Interdisciplinary topics.

LS 5993. Directed Studies. (1-4 cr [max 15 cr]; Stdnt Opt. Prereq-Grad student, %)
Guided individual reading or study.

LS 5994. Directed Research. (1-4 cr [max 15 cr]; Stdnt Opt. Prereq-%)
Tutorial for qualified graduate students.

LS 8001. Introduction to Interdisciplinary Inquiry. (3 cr; A-F or Aud. Prereq-MLS student, %)
Required course. Emphasizes what students need to know or be able to do to successfully complete their individually crafted program, including critical thinking, clear writing, and interdisciplinary research.

LS 8002. Final Project for Graduate Liberal Studies. (3 cr; A-F or Aud. Prereq-MLS; all MLS coursework must be completed by end of sem, %)
Students synthesize/complete final project.

LS 8100. Advanced Interdisciplinary Inquiry. (1-3 cr [max 5 cr]; A-F or Aud. Prereq-MLS student, %)
Readings/discussion to shape/focus final project. Workshop format. Key ideas of various disciplines, influential thinkers. Emphasizes developing critical themes.

LS 8533. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

Linguistics (LING)
Institute of Linguistics
College of Liberal Arts
LING 5001. Introduction to Linguistics. (4 cr; Stdnt Opt. [S]LING 5001H, LING 5001. Prereq-grad or #)
Phonetics, phonology, morphology, syntax, semantics, and historical-comparative linguistics; language learning andpsychology of language; linguistic universals; language in society.

LING 5101. Language Types and Linguistic Universals. (3 cr; Stdnt Opt. Prereq-[5001 or 3001H or 5001], [4201 or 5201], [4302W or 5302] or #)
Comparison of languages and language types. Cross-linguistic similarities/universals of language, their explanation.

LING 5105. Field Methods in Linguistics I. (4 cr; Stdnt Opt. Prereq-[(4201 or 5201) or [4302W or 5302] or #])
Techniques for obtaining/analyzing linguistic data from unfamiliar languages through direct interaction with native speaker.

LING 5201. Syntactic Theory I. (3 cr; Stdnt Opt. [S]LING 4201. Prereq-3001 or 3001H or 5001 or #)
Concepts/issues in current syntactic theory.


LING 5205. Semantics. (3 cr; Stdnt Opt. Prereq-[4201 or 5201] or #)
Analysis of sentence meaning. Semantic properties. 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; Stdnt Opt. Prereq-[4201 or 5201] or #)
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 5207. Phonological Theory I. (3 cr; Stdnt Opt. [S]LING 4302W. Prereq-3001 or 3001H or 5001 or #)

LING 5208. Phonological Theory II. (3 cr; Stdnt Opt. [S]LING 4303. Prereq-4302W or 5302 or #)
Phonology of human languages. Reading papers in the literature. Doing research in phonology.

LING 5461. Conversation Analysis. (3 cr; Stdnt Opt. [S]COMM 5461. Prereq-3001 or 3001H or 5001 or #)
Discourse processes. Application of concepts through conversation analysis.

LING 5462. Field Research in Spoken Language. (3 cr; Stdnt Opt. [S]COMM 5462. Prereq-3001 or 3001H or 5001 or #)
Transcribing/analyzing talk and movement related to talk. Applying concepts to recorded conversations.

LING 5501. Introduction to Language Acquisition. (3 cr; Stdnt Opt. Prereq-3001 or 3001H or 5001 or #)
First second language acquisition.

LING 5601. Historical Linguistics. (3 cr; Stdnt Opt. [S]LING 5601. Prereq-3001 or 3001H or 5001)
Historical change in phonology, syntax, semantics, and lexicon. Linguistic reconstruction. Genetic relationship among languages.

LING 5801. Introduction to Computational Linguistics. (3 cr; Stdnt Opt. Prereq-[4201 or 5201] or programming experience or #)
Methods/ideas in computer understanding of natural language. Programming languages, their linguistic applications. Lab projects.

LING 5900. Topics in Linguistics. (1-4 cr [max 12 cr]; Stdnt Opt)
Topics vary. See Class Schedule.

LING 5901. Historical Linguistics. (3 cr; Stdnt Opt. [S]LING 5901. Prereq-3001 or 3001H or 5001)
Historical change in phonology, syntax, semantics, and lexicon. Linguistic reconstruction. Genetic relationship among languages.

LING 5913. Morphology and Syntax of Contemporary English. (3 cr; Stdnt Opt. Prereq-3001 or 3001H or 5001 or #)
Linguistic analysis of word/sentence structure of contemporary English. Focuses on data from recorded/ written texts.

LING 5993. Directed Study. (1-3 cr [max 10 cr]; Stdnt Opt. Prereq-4, %, [B])
Directed study for Linguistics.

LING 8005. Research Paper Workshop. (3 cr [max 12 cr]; S-N or Aud. Prereq-[5105, 5202, 5205, 4302W or 5302]) or [#; grad linguistics major])
Workshop on research methodology/writing in linguistics.

LING 8105. Field Methods in Linguistics I. (4 cr [max 8 cr]; Stdnt Opt. Prereq-[5001, 5201, 5302, grad linguistics major or #])
Techniques and practice in obtaining/analyzing linguistic data from an unfamiliar language through direct interaction with a native speaker. Study of a language by elicitation of speech samples/analysis of patterns that emerge.

LING 8106. Field Methods in Linguistics II. (4 cr [max 8 cr]; Stdnt Opt. Prereq-8105 (taken in same academic yr))
Continued analysis through work with a native speaker of language begun in 8105. Greater emphasis on analysis of recorded texts of various kinds. Some grammars of the language/contents compared with field notes from previous semester.

LING 8200. Topics in Syntax and Semantics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5202, 5205 or #)
Syntax and semantics of natural language, with particular emphasis on the interface between the two.

LING 8210. Seminar in Syntax. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5202, 5205 or #)
Current issues in syntactic theory. Topics vary.

LING 8300. Topics in Phonetics and Phonology. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5303 or #)

LING 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

LING 8444. FTE: Doctoral. (3 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

LING 8500. Topics in Second Language Acquisition. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5001, 5505)

LING 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr, % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

LING 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

LING 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

LING 8888W. Thesis Credit Dissertation Seminar. (1-3 cr [max 24 cr]; No grade. Prereq-Doctoral student who has passed oral prelims)
A means for students to make progress on the dissertation in a structured setting. Brings together students writing on related topics. Credits are applied to doctoral thesis credits. Contact instructor for description.

LING 8900. Seminar: Topics in Linguistics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-#)
Topics vary. See Class Schedule.

LING 8920. Topics in Language and Cognition. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5001 or #)
Language-related issues in cognitive science from a linguistic perspective. Serves as elective for cognitive science minor, but only for linguistics nonmajors.

LING 8991. Independent Study. (1-4 cr [max 15 cr]; Stdnt Opt. Prereq-%)
Independent Study

For definitions of course numbers, abbreviations, and symbols, see page 3. 113
Management (MGMT)

Department of Strategic Management and Organization

Curtis L. Carlson School of Management

MGMT 5019. Business, Natural Environment, and Global Economy. (2 cr; A-F only) [S]ESPM 5019. Prereq-MBA student)
Resource deployment policies that affect the natural environment. Sustainability. Local/global environmental threats, how government policies address these issues. Business strategies/practices that produce “win-win” outcomes.

MGMT 5480. Topics in Natural Resources. (3 cr; A-F only)
Specific topic for each offering.

MGMT 8101. Theory Building and Research Design. (4 cr; Stdtnt Opt. Prereq-Business admin PhD student or #) Problem formulation, conceptual modeling, theory building, and research design in the social and behavioral sciences.


MGMT 8202. Seminar in International Management. (4 cr; Stdtnt Opt. Prereq-Business admin PhD student or #) Overview of the field of international management research.

MGMT 8204. Topics in BGS - I. (2 cr; A-F or Aud. Prereq-PhD student or #) Topics vary.

MGMT 8205. Topics in Business, Government, and Society II. (2 cr; A-F or Aud. Prereq-PhD student or #) Topics vary.

MGMT 8301. Seminar in Organizational Behavior. (4 cr; Stdtnt Opt. Prereq-Business admin PhD student or #) Major theories and current research on individual behavior and group processes in organizations from a micro perspective.

MGMT 8302. Seminar in Organizations Theory. (4 cr; Stdtnt Opt. Prereq-Business admin PhD student or #) Major theories and current research on organizational and interorganizational theories from a macro perspective.

MGMT 8304. Topics in Organizations I. (2 cr; A-F or Aud. Prereq-PhD student or #) Topics vary.

MGMT 8305. Topics in Organizations II. (2 cr; A-F or Aud. Prereq-PhD student or #) Topics vary.

MGMT 8401. Seminar in Strategy Content. (4 cr; Stdtnt Opt. Prereq-Business admin PhD student or #) Review of research in strategy formulation.

MGMT 8402. Seminar in Strategy Process. (4 cr; Stdtnt Opt. Prereq-Business admin PhD student or #) Examines research on process by which strategy is formulated and implemented in firms.


MGMT 8404. Topics in Strategy I. (2-4 cr; max 8 cr); A-F or Aud. Prereq-PhD student or #) Topics vary.

MGMT 8405. Topics in Strategy II. (2-4 cr; max 8 cr); A-F or Aud. Prereq-PhD student or #) Topics vary.

MGMT 8892. Readings in Management Theory and Administration. (1-8 cr; max 16 cr); Stdtnt Opt. Prereq-Business admin PhD student or #, adviser consent) Intensive research on a management topic; major term paper.

MGMT 8894. Graduate Research in Management Theory and Administration. (1-8 cr; max 16 cr); Stdtnt Opt. Prereq-Business admin PhD student or #, adviser consent) Research project on a management problem of interest to student; may be completed in cooperation with a business firm.

Management of Technology (MOT)

College of Science and Engineering

MOT 5001. Leadership and Management Development for Research Scientists. (2 cr; A-F only) Provides graduate students (and advanced UGs) interested in careers in research with a working knowledge of business functions, strategies for development of leadership and team building skills and career progression planning. Content and experiential learning approach reflect challenges faced by scientific professionals.

MOT 5224. Introduction to Technological Leadership and Management: Assessing Emerging and Pivotal Technologies. (1 cr; A-F only) Selected emerging technologies expected to play key roles in future industrial development.

MOT 5991. MOT Independent Study. (1-3 cr; S-N or Aud. Prereq-MOT grad student) Independent study in MOT-related topic.


MOT 8113. Operations Management for Competitive Advantage. (2 cr; A-F or Aud. Prereq-Grad MOT major) Overview of operations functions. Impact of operation management on a firm’s competitiveness and network of trading partners. Key relationships between operations and other value chain functions. Integrating operations decisions to achieve objectives. Product-process design, quality management, supply chain management, technology management, work force issues.

MOT 8114. Strategic Technology Analysis. (2 cr; A-F only. Prereq-Grad MOT major) Technology, its creation, history, and dynamics/interaction with economics, industry, and society. Role of technology in business and management. Tools/techniques for analysis of technologies. Emerging technologies, their significance.

MOT 8121. Managing Organizations in a Technological Environment. (2 cr; A-F or Aud. Prereq-Grad MOT major) General management principles for organizations, people, and business systems in technology-intensive industries. Application of managerial approaches to project, business, and corporate levels of organizations and to demands entrepreneurial/established technology firms.


MOT 8133. Communication in a Technical Environment. (2 cr; A-F or Aud. Prereq-Grad MOT major) Oral and written communication. Introductory and specialized workshops on topics such as presentation skills, memo and report writing, listening skills, and visual aid design and integration.


MOT 8213. Macroenvironment of Technology. (2 cr; A-F or Aud. Prereq-Grad MOT major) Development of scenarios of anticipated social, political, governmental, and economic forces affecting technological change. Use of scenarios to respond to industry threats, opportunities, and uncertainties. Corporate strategies, including building alliances for global competitiveness.

MOT 8214. Technology Foresight and Forecasting. (2 cr; A-F only. Prereq-Grad MOT major) Tools/techniques for technology forecasting, assessment, and strategic foresight for decision making in business/government. Technology dynamics, R&D strategy, portfolio management, resource allocation.

MOT 8224. Pivotal Technologies. (2 cr; A-F or Aud. Prereq-MOT grad major) Technologies expected to play pivotal roles in future industrial development. State-of-the-art for each technology. Barriers/opportunities for commercialization. Guest expert lectures. Students analyze potential applications of technologies to industry.

MOT 8231. Managing Information Resources in Technology-based Organizations. (1 cr; A-F or Aud. Prereq-Grad MOT major) Managing information resources/technology in an organization where technology is a critical part of value chain. Database management systems, electronic commerce. Managerial issues: strategic planning for IT/IS, infrastructure, outsourcing, competitive value, implementation.

MOT 8232. Managing Technological Innovation. (2 cr; A-F or Aud) How technological innovation is important to business success, can be managed, and may drive business strategy. Organizational dynamics of innovation, how it may be enhanced. Bringing innovations to marketplace in existing businesses and new ventures.


MOT 8234. Capstone Project. (.5-2 cr [max 2 cr]; A-F or Aud. Prereq-Completion of two semesters, grad MOT major) Applied research activity, specifically related to management of technology, in cooperation with participant’s home organization. Working with a faculty advisor and work mentor, students address an industry-based management of technology project, venture, process, or challenge. Formal presentation to capstone committee is required.

MOT 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) MOT 8330. FTE: Doctoral. (2 cr; A-F or Aud. Prereq-Grad MOT major) A capstone paper on a multidisciplinary area of research. Written assignment required.


MOT 8930. Topics in Emerging Technologies. (2 cr; A-F or Aud. Prereq-MOT grad student) Invited speakers give half- or full-day seminars on special topics in emerging technologies (e.g., energy systems, tissue engineering, thermal spray coating technology).


MOT 8950. International Management of Technology Project. (1.5 cr; A-F or Aud. Prereq-MOT grad student) On-site residency in international locations for up to two weeks. Visits to local, technology-intensive companies. Lectures/discussions with company executives, government officials, and university faculty. Comparative analysis of management of technology concepts/issues in an international business context: social, economic, cultural, and governmental perspectives. Written assignment required.

Managerial Communications (MCOM) Department of Strategic Management and Organization

Curtis L. Carlson School of Management

MCOM 5400. Managerial Communications for the HR Professional. (2 cr; A-F only. Prereq-HRHR student) Memo writing, oral presentations, and team communication required of HR professional. Emphasizes hands-on, experiential learning, including videotaping.

MCOM 5500. Strategic Managerial Communication. (2 cr; A-F only. Prereq-MBA student) Communication strategies at three levels: interpersonal, teams, and external relations. Organizational, persuasive, and language strategies.

MCOM 5510. Persuasive Writing in Business. (2 cr; A-F only. Prereq-MBA student) Writing to motivate/affect change. Form/content. Techniques of persuasion. Producing polished text. Writing with power.

MCOM 5520. Persuasive Writing in Business: Non-Native Speakers of English. (2 cr; A-F only. Prereq-MBA student, non-native English speaker) Writing to motivate/affect change. Form/content. Techniques of persuasion. Producing polished text. Writing with power.


MKTG 8809. Consumer Behavior Research Methods. (2 cr; A-F or Aud. Prereq-Doctoral student or [masters programs student, #]) Seminar. Topics related to conceptual theories/arguments about experimental design and statistical analysis of experiments. How to design experimental research for testing hypotheses and drawing conclusions.

MKTG 8810. Consumer Behavior Special Topics. (2 cr; A-F or Aud. Prereq-Doctoral student or [master’s program student, #]) Theories of consumer categorization. Literature on brand categories, category measurement, brand extensions/dilution/affect. Readings from branding literature. Theoretical analysis.

MKTG 8811. Consumer Attitudes and Persuasion II. (2 cr; Stdnt Opt. Prereq-[MBA 6210 or equiv], business admin PhD student or #) Reading, discussing, and evaluating theories of consumer attitudes and persuasion. Theoretical analysis, rather than practitioner focus.

MKTG 8812. Consumer Attitudes and Persuasion II. (2 cr; A-F or Aud. Prereq-Doctoral student or #) Science of persuasion. Principles of stickiness--universal principles that lead messages to succeed rather than fail. Principles of influence--universal psychological principles that motivate a person to say “yes.”

MKTG 8813. Consumer Judgment and Decision Making I. (2 cr; A-F or Aud. Prereq-Doctoral student or [master’s program student, #]) Different theoretical approaches taken in judgment and decision-making research. Heuristics/biases, affect in decision making, judgments/decisions over time.

MKTG 8814. Consumer Judgment and Decision Making II. (2 cr; A-F or Aud. Prereq-Doctoral student or [master’s program student, #]) Draws from work on prospect theory and its derivatives. Anomalous choice. Emphasizes on applications to Marketing theory, from inter-temporal choice to regret and counterfactual thinking in consumers/managers.

MKTG 8831. Seminar: Inter-Organizational Relations. (2 cr; Stdnt Opt. Prereq-MBA 6210 or equiv, business admin PhD student or #) From an efficiency perspective, inter-organizational networks involved in task of moving goods and services from point of production to point of consumption. Literature covering the functional, institutional, analytical, and methodological traditions, as well as the behavioral school of thought and transaction cost and relational contracting.

MKTG 8842. Quantitative Modeling I. (2 cr; A-F or Aud. Prereq-Doctoral student or [master’s program student, #]) Advanced readings seminar. Quantitative research in marketing. Topics from theoretical/empirical research in marketing, econometrics, and industrial organization. Classic/contemporary articles.

MKTG 8843. Quantitative Modeling II. (2 cr; A-F or Aud. Prereq-Doctoral student or [master’s program student, #]) Advanced readings seminar. Quantitative research in marketing. Topics from theoretical/empirical research streams in marketing, econometrics, and industrial organization. Classic/contemporary articles.
Courses

**Master of Business Taxation (MBT)**

Department of Strategic Management and Organization

**Curtis L. Carlson School of Management**

**MBT 5200. Tax Accounting Methods and Periods.** (4 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)

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.

**MBT 5210. Tax Research, Communication, and Practice.** (4 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)


**MBT 5230. Corporate Taxation I.** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)


**MBT 5323. Mergers and Acquisitions I.** (2 cr; A-F or Aud. Prereq-5230, MBT student)

Different types of acquisitions, dispossession, reorganizations, and spin-offs involving C corporations. Tax consequences of acquisition to corporations/shareholders involved. Use of 338 elections, limitations on acquired net operating losses/credits, use of covenants not to compete, consulting agreements, deferred payment terms, treatment of transaction costs.

**MBT 5335. Taxation of the Small Business Corporation.** (2 cr; A-F or Aud. Prereq-5230, MBT student)

Federal income taxation of S corporations. Election eligibility; termination of status; treatment of income and deduction items; distributions, basis of stock and debt. Compensation arrangements in closely held corporations; fiscal year issues; personal service corporations; advantages of C corporations vs. S corporations; corporation liquidation and redemption rules; S corporation's built-in gains tax.

**MBT 5340. Taxation of Partners and Partnerships.** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)

Reviews tax consequences associated with formation, operation, and dissolution of a partnership.

**MBT 5346. ASC 740 Computations and Analysis.** (2 cr; A-F or Aud. Prereq-5230, MBT student)


**MBT 5350. Wealth Transfer I (Estates and Gifts).** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)


**MBT 5352. Trusts and Estates.** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)


**MBT 5360. State and Local Taxation.** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)

Examines state levying of individual income, corporate income, property, sales, and excise taxes. Tax problems of businesses with multisate operations.

**MBT 5361. State and Local Taxation II.** (2 cr; A-F or Aud)

Income/sales tax consequences of mergers/ acquisitions, corporate reorganizations. Practical application of tax concepts. Planning ideas in drop shipments, investment holding companies, e-commerce, leasing companies, and like tax alternatives. Real property taxation, individual income taxation, state administrative tax procedures, state payroll considerations.

**MBT 5363. Compensation and Benefits.** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)

Federal income taxation of executive compensation, relevant fringe benefit programs. Benefit programs other than qualified retirement plans. Salary continuation, stock options, non-profit organization plans, health/welfare plans.

**MBT 5370. Taxation of Property Transactions.** (2 cr; A-F or Aud. Prereq-ACCT 5135, MBT student)

Determining realized gain or loss and recognized gain or loss, and tax treatment of that gain or loss on property dispositions. Consequences of property transactions including depreciation, depletion, basis, and capital gains problems.

**MBT 5380. Tax Aspects of International Business I.** (2 cr; A-F or Aud. Prereq-5230, MBT student)

Multinational business operations/transactions involving foreign income. Tax consequences of transactions with/foreign organizations/companies.

**MBT 5381. Tax Aspects of International Business II.** (2 cr; A-F or Aud. Prereq-5380, MBT student)

Foreign tax credit, Subpart F planning opportunities, international structuring (joint ventures, use of entity classification regulations). Transfer pricing, foreign currency. Legislative, regulatory, and judicial developments.

**MBT 5382. Transfer Pricing.** (2 cr; A-F or Aud. Prereq-[5230, 5380] or equiv)

Transfer pricing requirements facing multinational companies. Tax requirements of the United States and other countries that have adopted the “arm’s-length standard” or the transfer pricing guidelines adopted by the Organization for Economic Cooperation and Development. Regulations, methods, economic models, pricing policies, transaction accounting, and management of audits of managing transfer prices within a multinational company.

**MBT 5390. Topics in Taxation.** (1-4 cr [max 160 cr]; A-F or Aud. Prereq-ACCT 5135, MBT student)

Topics vary.

**MBT 5420. Current Topics in Taxation.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-ACCT 5135, MBT student)

Tax research/compliance, other tasks. Students submit summary paper.

**MBT 5500. Business, Government, and Economic Tax Policy.** (2 cr; A-F only. Prereq-ACCT 5135. MBT student)

Effects of business and government on the tax system. Social, political, economic, and cultural values affecting the tax system. Macroeconomics/its implication for taxation. History of taxes/alternate approaches to taxation, public finance, and government expenditures in theory and practice. Specific taxes, their rationale and application. How the tax system develops and changes.

**MBT 8333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

**Master of Development Practice (MDP)**

Interdisciplinary Center for Study of Global Change

**MDP 5001. Ways of Knowing and Sustainable Livelihoods.** (2 cr; A-F or Aud. Prereq-Grad MDP major or #)

Complexities of interdisciplinary study of development and a range of Oxfam’s ways of knowing and the field of development studies and sustainability. Approaches practiced by physical, biological, social science, and humanities scholars. “Ways of knowing” in different cultures/groups and from a variety of situated perspectives. Key issues and concepts and key methodological challenges facing us as we engage in interdisciplinary and international development study and practice. Sustainable livelihoods. Team taught when possible by faculty from biological, social sciences, and humanities, or at minimum will include guest lecturers who can offer a range of disciplinary perspectives on questions of development.

**MDP 5002. Research Methods for Sustainable Livelihoods.** (2 cr; A-F only. Prereq-MDP grad student or #)

Research/writing skills to support work in international development. Discussion of basic qualitative research methods/data analysis. Qualitative/quantitative data, collaborative research/analysis. Relationship between research/policy.

MATS 5771. Colloids and Dispersions. (3 cr; A-F or Aud. Prereq-Physical chemistry) Preparation, stability, coagulation kinetics, or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures.


MATS 8002. Thermodynamics and Kinetics. (3 cr; A-F or Aud. Prereq-#) First three laws of thermodynamics, free energy, equilibrium constants, fugacity and activity relationships, solution models, order-disorder transitions, phase transitions. Elementary statistical mechanics. Applications to solid systems, including surface energies, multicomponent equilibria, reaction kinetics, mass transport, diffusion.


MATS 8004. Mechanical Properties. (3 cr; A-F or Aud. Prereq-#) Defects in crystalline materials, including point defects, dislocations, and grain boundaries. Structure and movement of defects related to mechanical behavior of materials. Tools used to understand crystals and crystallography.

MATS 8005. Dislocations and Interfaces. (3 cr; A-F or Aud. Prereq-#) Structure and properties at an advanced level. Influence of bonding and crystallography on structures of dislocations cores. CSL and DSC theory of grain boundaries and of structures of phase boundaries in heterostructures including thin film epitaxies. Effect of defects on electrical, optical, magnetic, and superconducting behavior of materials.

MATS 8116. Structure and Symmetry in Soft Materials. (2 cr; A-F or Aud. Prereq-8001 or equiv or #) Molecular interactions, packing, symmetry operations/structure. X-ray/neutron scattering in soft materials, including organic/liquid crystals, amphiphiles, and polymers.

MATS 8117. Electron Microscopy of Soft Matter. (2 cr; A-F or Aud. Prereq-Mats science/engineering or chemical engineering grad major or #) Operation principles of transmission electron microscope (TEM) and scanning electron microscope (SEM). How these instruments are applied in study of soft materials (e.g., liquid, semi-liquid material systems). Unique specimen preparation techniques, low image contrast, electron-beam radiation-damage, limited signal-to-noise ratio. TEM/SEM digital imaging.

MATS 8221. Synthetic Polymer Chemistry. (4 cr; A-F or Aud. [S]CHEN 8221, CHEN 8221, MATS 8221, CHEM 4221. Prereq.- Undergraduate organic chemistry course, undergraduate physical chemistry course or #) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

MATS 8223. Electronic Structure of Solids: Basic Theory and Practical Calculations. (5 cr; A-F or Aud. Prereq.-CSE grad student; [knowledge equiv to [undergrad solid state physics or quantum chemistry courses], experience with Unix system] recommended) Theoretical and computational methods for electronic structure calculations of solids. Lab experience with popular free software for electronic structure calculations, Quantum ESPRESSO distribution.

MATS 8333, FTE: Master's. (1 cr; No grade. Prereq.-Master's student, adviser and DGS consent)

MATS 8444. FTE: Doctoral. (1 cr; No grade. Prereq.-Doctoral student, adviser and DGS consent)

MATS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq.-Doctoral student who has not passed prelim oral; no required or credit registrations. up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MATS 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq.-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

MATS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq.-Max 18 cr per semester or summer; 24 cr required)

MATS 8993. Directed Study. (1-12 cr [max 12 cr]; Stdt Opt)

MATS 8994. Directed Research. (1-12 cr [max 12 cr]; Stdt Opt)

MATS 8995. Special Topics. (1-4 cr [max 4 cr. A-F or Aud] New or experimental courses offered by department or visiting faculty.

Mathematics (MATH) School of Mathematics College of Science and Engineering

MATH 5075. Mathematics of Options, Futures, and Derivative Securities I. (4 cr; Stdt Opt. Prereq.-Two yrs calculus, basic computer skills) Mathematical background (e.g., partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods—including Monte Carlo simulation). Interest-rate derivative securities, exotic options, risk theory. First course of two-course sequence.

MATH 5076. Mathematics of Options, Futures, and Derivative Securities II. (4 cr; A-F or Aud. Prereq.-Math 5075) Math background such as partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods (including Monte Carlo simulation), interest-rate derivative securities, exotic options, risk theory.


MATH 5285H. Honors: Fundamental Structures of Algebra I. (4 cr; Stdt Opt. Prereq.-[2243 or 2573 or 2574], [2253 or 2574 or 2583]) Review of matrix theory, linear algebra. Vector spaces, linear transformations over abstract fields. Group theory, including normal subgroups, quotient groups, homomorphisms, class equation, Sylow's theorems. Specific examples: permutation groups, symmetry groups of geometric figures, matrix groups.

MATH 5286H. Honors: Fundamental Structures of Algebra II. (4 cr; Stdt Opt. Prereq.-Math 5285H) Ring/module theory, including ideals, quotients, homomorphisms, domains (unique factorization, Euclidean, principal, fundamental theorem for finitely generated modules over Euclidean domains, Jordan canonical form. Introduction to field theory, including finite fields, algebraic/transcendental extensions, Galois theory.


MATH 5345H. Honors: Introduction to Topology I. (4 cr; A-F only. Prereq-[2265 or 2574 or 2573].) Rigorous introduction to general topology. Set theory, Euclidean/metric spaces, compactness/connectedness. May include Urysohn metrization, Tychonoff theorem or fundamental group/covering spaces.

MATH 5378. Differential Geometry. (4 cr; Stdt Opt. Prereq.-[2263 or 2574 or 2573], [2243 or 2573 or 2574]) Basic geometry of curves in plane and in space, including Frenet formula, theory of surfaces, differential forms, Riemannian geometry.

MATH 5385. Introduction to Computational Algebraic Geometry. (4 cr; Stdt Opt. Prereq.-[2263 or 2574 or 2573], [2243 or 2573 or 2574]) Geometry of curves/surfaces defined by polynomial equations. Emphasizes concrete computations with polynomials using computer packages, interplay between algebra and geometry. Abstract algebra presented as needed.


MATH 5467. Introduction to the Mathematics of Image and Data Analysis. (4 cr; Stdt Opt. Prereq.-[2243 or 2573 or 2574], [2283 or 2574 or 3283 or 1F]; [2263 or 2574, 4567] recommended) Background theory/experience in wavelets, Inner product spaces, operator theory. Fourier transforms applied to Gabor transforms, multi-scale analysis, discrete wavelets, self-similarity. Computing techniques.

MATH 5485. Introduction to Numerical Methods I. (4 cr; Stdt Opt. Prereq.-[2243 or 2573 or 2575], familiarity with some programming language) Solution of nonlinear equations in one variable. Interpolation, polynomial approximation, numerical integration/differentiation, numerical solution of initial-value problems.


Courses

118 University of Minnesota Fall 2012 Graduate Education Catalog
MATH 5251. Introduction to Ordinary Differential Equations. (4 cr; Stdnt Opt. Prereq-[2243 or 2373 or 2573]. [2283 or 2574 or 3283])


MATH 5355. Dynamical Systems and Chaos. (4 cr; Stdnt Opt. Prereq-[2243 or 2573 or 2575]. [2265 or 2574 or 2574])

Dynamical systems theory. Emphasizes iteration of one-dimensional mappings. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia/Mandelbrot sets.


MATH 5587. Elementary Partial Differential Equations I. (4 cr; Stdnt Opt. Prereq-[2243 or 2573 or 2575]. [2265 or 2374 or 2574])

Emphasizes partial differential equations w/physical applications, including heat, wave, Laplace's equations. Interpretations of boundary conditions. Characteristics, Fourier series, transforms, Green's functions, images, computational methods. Applications include wave propagation, diffusions, electrostatics, shocks.

MATH 5588. Elementary Partial Differential Equations II. (4 cr; A-F or Aud. Prereq-[2243 or 2373 or 2573]. [2263 or 2374 or 2574], 5587] or #) Heat, wave, Laplace's equations in higher dimensions. Green's functions, Fourier series, transforms. Asymptotic methods, boundary layer theory, bifurcation theory for linear/nonlinear PDEs. Variational methods. Free boundary problems. Additional topics as time permits.

MATH 5594H. Honors Mathematics - Topics. (4 cr [max 4 cr] Aud. Prereq-[5593H with grade of at least B, experience in writing proofs] or #) Honors course requires students to do research in mathematics courses.

MATH 5615H. Honors: Introduction to Analysis I. (4 cr; Stdnt Opt. Prereq-[2243 or 2373]. [2263 or 2374]. [2283 or 3283])


MATH 5616H. Honors: Introduction to Analysis II. (4 cr; Stdnt Opt. Prereq-5615)


MATH 5651. Basic Theory of Probability and Statistics. (4 cr; Stdnt Opt. Prereq-[2263 or 2374 or 2573]. [2283 or 2574 or 3283] recommended; Credit will not be granted if credit has been received for: Stat 4101, Stat 5101)

Logical development of probability, basic issues in statistics. Probability spaces, random variables, their distributions/expected values. Law of large numbers, central limit theorem, generating functions, sampling, sufficiency, estimation.

MATH 5652. Introduction to Stochastic Processes. (4 cr; Stdnt Opt. Prereq-5651 or Stat 5101)

Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion.

MATH 5654. Prediction and Filtering. (4 cr; Stdnt Opt. Prereq-5651 or Stat 5101)


MATH 5705. Enumerative Combinatorics. (4 cr; Stdnt Opt. Prereq-[2243 or 2373 or 2573]. [2265 or 2283 or 2574 or 2574] or #) Basic enumeration, bijections, inclusion-exclusion, recurrence relations, ordinary/exponential generating functions, partitions, Polya theory. Optional topics include trees, asymptotics, listing algorithms, rook theory, involutions, tableaux, permutation statistics.

MATH 5707. Graph Theory and Non-Enumerative Combinatorics. (4 cr; Stdnt Opt. Prereq-[2243 or 2373 or 2573]. [2263 or 2374 or 2574], [2283 or 3283 or experience in writing proofs] recommended; Credit will not be granted if credit has been received for: 4707)

Basic topics in graph theory: connectedness, Eulerian/ Hamiltonian properties, trees, colorings, planar graphs, matchings, flows in networks. Optional topics include graph algorithms, Latin squares, block designs, Ramsey theory.

MATH 5711. Linear Programming and Combinatorial Optimization. (4 cr; Stdnt Opt. Prereq-2 sems soph math [including 2243 or 2373 or 2573])


MATH 5900. Tutorial in Advanced Mathematics. (1-6 cr [max 12 cr]; A-F or Aud) Individually directed study.

MATH 8080. Preparation for College Teaching. (1 cr [max 3 cr]; S-N or Aud. Prereq-1 math grad student in good standing or #)

New approaches to teaching/learning, issues in mathematics education, components/expectations of a college mathematics professor.

MATH 8141. Applied Logic. (3 cr; A-F or Aud. Prereq-8140 or #)


MATH 8167. Recursion Theory. (3 cr; A-F or Aud. Prereq-8166)

Sample topics: complexity theory, recursive analysis, generalized recursion theory, analytical hierarchy, constructive ordinals.

MATH 8172. Model Theory. (3 cr; A-F or Aud. Prereq-Math grad student or #)

Interplay of formal theories, their models. Elementary equivalence, elementary extensions, partial isomorphisms. Lowenheim-Skolem theorems, compactness theorems, preservation theorems. Ultraproducts.

MATH 8173. Model Theory. (3 cr; A-F or Aud. Prereq-8172 or #)

Types of elements. Prime models, homogeneity, saturation, categoricity in power. Forking.

MATH 8190. Topics in Logic. (1-3 cr [max 12 cr]; A-F or Aud)

Offered for one or one semester as circumstances warrant.

MATH 8201. General Algebra. (5 cr; A-F or Aud. Prereq-4xxx algebra or equiv or #)

Groups through Sylow, Jordan-Hoelder theorems, structure of finitely generated Abelian groups. Rings and algebras, including Characterization of Modules, including projective and injective modules, chain conditions, Hilbert basis theorem, and structure of modules over principal ideal domains.

MATH 8202. General Algebra. (5 cr; A-F or Aud. Prereq-8201 or #)

Classical field theory through Galois theory, including solvable equations. Symmetric, Hermitian, orthogonal, and unitary form. Tensor and exterior algebras. Basic Wedderburn theory of rings; basic representation theory of groups.

MATH 8207. Theory of Modular Forms and L-Functions. (3 cr; A-F or Aud. Prereq-8202 or #) Zeta and L-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, class number formulas, Riemann hypothesis, modular forms and associated L-function; Eisenstein series; Hecke operators, Poincaré series, Euler products; Ramanujan conjectures; Theta series and quadratic forms; waveforms and L-functions.

MATH 8208. Theory of Modular Forms and L-Functions. (3 cr; A-F or Aud. Prereq-8207 or #) Applications of Eisenstein series, analytic continuation and functional equations of L-functions. Trace formulas. Applications of representation theory. Computations.

MATH 8211. Commutative and Homological Algebra. (3 cr; A-F or Aud. Prereq-8202 or #)

Selected topics.
MATH 8212. Commutative and Homological Algebra. (3 cr; A-F or Aud. Prereq: 8211 or #) Solved and nilpotent groups, generalized fitting subgroups, p-groups, co-prime action on p-groups.

MATH 8245. Group Theory. (3 cr; A-F or Aud. Prereq: 8202 or #) Permutations, Sylow’s theorems, representations of groups on groups, semi-direct products, solvable and nilpotent groups, generalized fitting subgroups, p-groups, co-prime action on p-groups.

MATH 8246. Group Theory. (3 cr; A-F or Aud. Prereq: 8245 or #) Representation and character theory, simple groups, free groups and products, presentations, extensions, Schur multipliers.

MATH 8251. Algebraic Number Theory. (3 cr; A-F or Aud. Prereq: 8202 or #) Algebraic number fields and algebraic curves. Basic commutative algebra. Completion: p-adic fields, formal power series, Puiseux series. Ramification, discriminant, different. Finiteness of class number and units theorem.


MATH 8270. Topics in Algebraic Geometry. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: Math 8201, Math 8202; offered for one year or one semester as circumstances warrant) MATH 8300. Manifolds and Topology. (3 cr; A-F or Aud. Prereq: 8301 or #) Smooth manifolds, tangent spaces, embedding/immersion, Sard’s theorem, Frobenius theorem. Differential forms, integration. Curvature, Gauss-Bonnet theorem. Time permitting: de Rham, duality in manifolds.

MATH 8306. Algebraic Topology. (3 cr; A-F or Aud. Prereq: 8301 or #) Singular homology, cohomology theory with coefficients. Eilenberg-Steenrod axioms, Mayer-Vietoris theorem.

MATH 8307. Algebraic Topology. (3 cr; A-F or Aud. Prereq: 8306 or #) Basic homotopy theory, cohomology rings with applications. Time permitting: fibre spaces, cohomology operations, extra-ordinary cohomology theories.

MATH 8333. FTE: Master’s. (1 cr; No grade. Prereq: Master’s student, adviser and DGS consent) MATH 8360. Topics in Topology. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8301 or #; offered as one year or one sem cr as circumstances warrant) Selected topics.

MATH 8365. Riemannian Geometry. (3 cr; A-F or Aud. Prereq: 8301 or basic point-set topology or #) Riemannian metrics, curvature. Bianchi identities, Gauss-Bonnet theorem, Meyer’s theorem, Cartan-Hadamard theorem.

MATH 8366. Riemannian Geometry. (3 cr; A-F or Aud. Prereq: 8365 or #) Gauss, Codazzi equations. Tensor calculus, Hodge theory, spinors, global differential geometry, applications.

MATH 8370. Topics in Differential Geometry. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8301 or 8365; offered for one year or one sem as circumstances warrant) Current research in Differential Geometry.

MATH 8380. Topics in Advanced Geometry. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8301, 8365) Current research.

MATH 8385. Calculus of Variations and Minimal Surfaces. (3 cr; A-F or Aud. Prereq: 8301 or #) Calculus of variations and minimal surfaces, microlocal analysis, 4xxx partial differential equations or #) Calculus of variations, integral equations, eigenvalue problems, spectral theory. Perturbation, asymptotic methods. Artificial boundary conditions, conformal mapping, coordinate transformations. Applications to specific modeling problems.


MATH 8444. FTE: Doctoral. (1 cr; No grade. Prereq: Doctoral student, adviser and DGS consent)


MATH 8446. Numerical Analysis of Partial Differential Equations. (5 cr; A-F or Aud. Prereq: 8445 or #) Finite element and finite difference methods for elliptic boundary value problems (e.g., Laplace’s equation) and solution of resulting linear systems by direct and iterative methods.


MATH 8450. Topics in Numerical Analysis. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8445 or #; offered as one year or one sem as circumstances warrant) Selected topics.
MATH 8470. Topics in Mathematical Theory of Continuum Mechanics. (1-3 cr [max 12 cr]; A-F or Aud.) Offered for one year or one semester as circumstances warrant.

MATH 8501. Differential Equations and Dynamical Systems I. (3 cr; A-F or Aud. Prereq: 4xxx ODE or #) Existence, uniqueness, continuity, and differentiability of solutions. Linear theory and hyperbolicity. Basics of dynamical systems. Local behavior near a fixed point, a periodic orbit, and a homoclinic or heteroclinic orbit. Perturbation theory.


MATH 8505. Applied Dynamical Systems and Bifurcation Theory I. (3 cr; A-F or Aud. Prereq: 5525 or 8502 or #) Static/Hopf bifurcations, invariant manifold theory, normal forms, averaging, Hopf bifurcation in maps, forced oscillations, coupled oscillators, chaotic dynamics, co-dimension 2 bifurcations. Emphasizes computational aspects/applications from biology, chemistry, engineering, physics.

MATH 8506. Applied Dynamical Systems and Bifurcation Theory II. (3 cr; A-F or Aud. Prereq: 5525 or 8502 or #) Background on analysis in Banach spaces, linear operator theory. Lyapunov-Schmidt reduction, static bifurcation, stability at a simple eigenvalue, Hopf bifurcation in infinite dimensions invariant manifold theory. Applications to hydrodynamic stability problems, reaction-diffusion equations, pattern formation, and elasticity.

MATH 8520. Topics in Dynamical Systems. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8502) Current research.

MATH 8530. Topics in Ordinary Differential Equations. (1-3 cr [max 3 cr]; A-F or Aud. Prereq: 8502) Offered for one year or one semester as circumstances warrant.

MATH 8540. Topics in Mathematical Biology. (1-3 cr [max 12 cr]; A-F or Aud) Offered for one year or one semester as circumstances warrant.

MATH 8571. Theory of Evolutionary Equations. (3 cr; A-F or Aud. Prereq: 8502 or #) Infinite dimensional dynamical systems, global attractors, existence and robustness. Linear semigroups, analytic semigroups. Linear and nonlinear reaction-diffusion equations, strong and weak solutions, well-posedness of solutions.


MATH 8580. Topics in Evolutionary Equations. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8572 or #; offered for one or one semester as circumstances warrant)


MATH 8582. Applications of Linear Operator Theory. (3 cr; A-F or Aud. Prereq: 8581 or #) Fourier theory. Self-adjoint, compact, unbounded linear operators. Spectral analysis, eigenvalue-eigenvector problem, spectral theorem, operational calculus.


MATH 8590. Topics in Partial Differential Equations. (1-3 cr [max 3 cr]; A-F or Aud. Prereq: 8602; offered for one yr or one sem as circumstances warrant) Research topics.

MATH 8600. Topics in Advanced Applied Mathematics. (3 cr; max 12 cr; Stdt Opt) Offered for one yr or one semester as circumstances warrant. Topics vary. For details, contact instructor.


MATH 8652. Theory of Probability Including Measure Theory. (3 cr; Stdt Opt. Prereq: 8551 or #) Conditional distributions and expectations, convergence of sequences of distributions on real line and on Polish spaces, central limit theorem and related limit theorems, Brownian motion, martingales and introduction to other stochastic processes.


MATH 8655. Stochastic Calculus with Applications. (3 cr; Stdt Opt. Prereq: 8654 or 8659 or #) Stochastic integration with respect to martingales, Ito’s formula, applications to business models, filtering, and stochastic control theory.

MATH 8659. Stochastic Processes. (3 cr; Stdt Opt. Prereq: 8552 or #) Introduction to various stochastic processes and related concepts, such as Markov sequences and processes, renewal sequences, exchangeable sequences, stationary sequences, Poisson point processes, Levy processes, interacting particle systems, diffusions, and stochastic integrals.

MATH 8660. Topics in Probability. (1-3 cr [max 12 cr]; Stdt Opt) Offered for one year or one semester as circumstances warrant.

MATH 8666. Doctoral Pre-thesis Credit. (1-3 cr [max 12 cr]). No grade. Prereq. Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MATH 8668. Combinatorial Theory. (3 cr; A-F or Aud) Basic enumeration, including sets and multisets, permutation statistics, inclusion-exclusion, integer-set partitions, involutions and Polya theory. Partially ordered sets, including lattices, incidence algebras, and Mobius inversion. Generating functions.

MATH 8669. Combinatorial Theory. (3 cr; A-F or Aud. Prereq: 8668 or #) Further topics in enumeration, including symmetric functions, Schensted correspondence, and standard tableaux; non-enumerative combinatorics, including graph theory and coloring, matching theory, connectivity, flows in networks, codes, and extremal set theory.

MATH 8680. Topics in Combinatorics. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: Grad math major or #; offered as one yr or one sem as circumstances warrant) Selected topics.

Courses


MATH 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

MATH 8790. Topics in Complex Analysis. (1-3 cr [max 12 cr]; A-F or Aud. Prereq-8702 or #; offered for one yr or one sem as circumstances warrant) Current research.

MATH 8801. Functional Analysis. (3 cr; A-F or Aud. Prereq-8602 or #) Motivation in terms of specific problems (e.g., Fourier series, eigenfunctions). Theory of compact operators. Basic theory of Banach spaces (Hahn-Banach, open mapping, closed graph theorems). Frechet spaces.


MATH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

MATH 8990. Topics in Mathematics. (1-6 cr [max 24 cr]; 5-6 cr N or Aud. Prereq-#) Readings, research.

MATH 8991. Independent Study. (1-6 cr [max 24 cr]; 5-6 cr N or Aud. Prereq-#) Individually directed study.

MATH 8992. Directed Reading. (1-6 cr [max 24 cr]; 5-6 cr N or Aud. Prereq-#) Individually directed reading.

MATH 8993. Directed Study. (1-6 cr [max 24 cr]; 5-6 cr N or Aud. Prereq-#) Individually directed study.

MATH 8994. Topics at the IMA. (1-3 cr [max 6 cr]; Stdnt Opt) Current research at IMA.

MTHE 5031. Geometric Structures in School Mathematics. (3 cr; Stdnt Opt. Prereq-Enrollment in math initial licensure program or tchg exper) Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the K-8 mathematics curriculum. Instructional materials and technology appropriate for elementary or middle school arithmetic. Credit hours and targeted level vary with particular classes.

MTHE 5051. Algebraic Structures in School Mathematics. (3 cr; Stdnt Opt. Prereq-Tchg exper or instn consent) Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the algebra curriculum. Instructional materials and technology appropriate for arithmetic. Each offering of the course will focus on either elementary/middle or middle/secondary grade levels.

MTHE 5053. Rational Number Concepts and Proportionality. (3 cr; Stdnt Opt. Prereq-Math Ed student or #) The relationship between the development of rational number concepts and proportional reasoning skills. Examination of how newer school curricula treat these concepts. Application of materials in the classroom and analysis of results. Reading and responding to current research.

MTHE 5101. Teaching Elementary School Mathematics. (3 cr; Stdnt Opt. Prereq-Tchg license or student elem ed MEd or special ed or #) Modern trends, methods, and materials used to convey mathematical ideas.

MTHE 5155. Rational Number Concepts and Proportionality. (3 cr; Stdnt Opt. Prereq-Educ student or #) The relationship between the development of rational number concepts and proportional reasoning skills. Examination of how newer school curricula treat these concepts. Application of materials in the classroom and analysis of results. Reading and responding to current research.


MTHE 5170. Historical Topics in the Mathematics Classroom. (1-3 cr [max 3 cr]; Stdnt Opt) Historical underpinnings of school mathematics content and methodology. Cross-cultural contributions in the development of mathematical ideas. Development of lessons, activities, and materials for school use.

MTHE 5171. Teaching Problem Solving. (3 cr; Stdnt Opt) Investigation of fundamental concepts and principles of problem solving, reasoning, and proof. Emphasis on activities and applications appropriate for junior and senior high schools. Pedagogical experiences to prepare teachers to teach problem solving, reasoning, and proof in classrooms.

MTHE 5172. Teaching Probability and Statistics. (3 cr; Stdnt Opt) Investigation of fundamental concepts and principles of probability and statistics. Emphasis on activities and applications appropriate for junior and senior high school classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy accurately and effectively in classrooms.

MTHE 5305. Middle School Mathematics Methods. (2 cr; A-F only. Prereq-Elem ed licensure student) The unique needs of middle school students in the mathematics classroom. Mathematics content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school mathematics classroom.


MTHE 5355. Mathematics for Diverse Learners. (3 cr; Stdnt Opt. Prereq-Teaching license or student in elem ed or special ed or #) Mathematical concepts and methods for exceptional students, both low achieving and gifted. Experimental materials and methods designed for underachieving students.

MTHE 5366. Technology-Assisted Mathematics Instruction. (3 cr; Stdnt Opt) Technology—including computers, programmable and graphing calculators, and video—as instructional tools in mathematics; design and evaluation of technology-based mathematics lessons; the effect of technology on the mathematics curriculum; managing the technology-enriched classroom.

MTHE 5496. Student Teaching in Mathematics. (1-8 cr [max 8 cr]; 5-N only. Prereq-MEd/initial licensure student or #) Student teaching in secondary school mathematics classes.

MTHE 5993. Directed Studies in Mathematics Education. (2 cr [max 3 cr]; S-N or Aud. Prereq-Math ed MEd student, #) Secondary school classroom teaching project to improve specific teaching skills, planned by student, approved/directed by student’s adviser.

MTHE 8501. Theory and Critical Research in Mathematics Education. (3 cr; Stdnt Opt. Prereq-Grad math educ major) Critical review of research and relevant theoretical formulations; criteria for appraising research methods; educational implications.

MTHE 8561. School Mathematics Curricula-1850 to Present. (1-3 cr [max 3 cr]; A-F only) Historical antecedents of present day school mathematics curricula. Examine primary source materials by reviewing early mathematics texts from curriculum library.


MTHE 8591. Seminar: Mathematics Education. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-Math educ PhD student) Problems of mathematics instruction from kindergarten through junior college; opportunity to develop proposals and design models for empirical research.

MTHE 8995. Problems: Mathematics Education. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-MMA or PhD ed major with math educ concentration) Students survey most recent literature and design and prepare research reports on special topics.

122 University of Minnesota Fall 2012 Graduate Education Catalog
ME 5070. Topics in Mechanical Engineering. (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-CSE upper div or grad student) Specialized topics within areas of mechanical engineering. Emphasis on topics of current interest. Topics vary each semester.

ME 5101. Vapor Cycle Systems. (4 cr; A-F or Aud. Prereq-CSE upper div or grad student) Vapor compression and absorption refrigeration systems; heat pumps; vapor power cycle analysis, regeneration, reheat, compound cycle modifications, combines gas turbine--vapor cycle systems.

ME 5103. Thermal Environmental Engineering. (4 cr; A-F or Aud. Prereq-3331 or 3332. CSE upper div or grad) Thermodynamic properties of moist air; psychrometric charts; HVAC systems; solar energy; human thermal comfort; indoor air quality; heating and cooling loads in buildings.

ME 5105. HVAC System Design. (4 cr; A-F or Aud. Prereq-5105. [CSE upper div or grad student]) Design procedures used for heat exchangers, cooling towers, hydronic systems, and air handling systems. HVAC system design for a commercial building.

ME 5113. Aerosol/Particle Engineering. (4 cr; A-F or Aud. Prereq-CSE upper div or grad student) Kinetic theory, definition, theory and measurement of particle properties, elementary particle mechanics, particle statistics, Brownian motion and diffusion, coagulation, evaporation and condensation, sampling and transport.

ME 5115. Quality and Air Pollution Control. (4 cr; A-F or Aud. Prereq-CSE upper div or grad student) Air pollution sources, atmospheric transport, transformations, fate, and emissions control. Air pollution meteorology, dispersion, chemistry of secondary pollutant formation, standards and regulation. Control devices and techniques for gaseous and particulate emissions. Cyclones, electrostatic precipitators, wet and dry scrubbers, combustion modification.

ME 5116. Cleanroom Technology and Particle Monitoring. (4 cr; A-F or Aud. Prereq-CSE upper div or grad student) Fundamentals of cleanroom technology for microelectronics manufacturing: airborne and liquid-borne particulate contaminants; particle monitors: optical and condensation particle counters, wafer surface scanner, microscopy; filter performance and testing; cleanroom design and operation; high purity systems; particle detection in processing equipment.


ME 5228. Introduction to Finite Element Modeling, Analysis, and Design. (4 cr; A-F or Aud. Prereq-CSE upper div or grad, 3221, AEM 3031, CSCI 1113, MA5 2001) Finite elements as principal analysis tool in computer-aided design (CAD); theoretical issues and implementation aspects for modeling and analyzing engineering problems encompassing stress analysis, heat transfer, and flow problems for linear situations. One-, two-, and three-dimensional practical engineering applications.

ME 5241. Computer-Aided Engineering. (4 cr; A-F or Aud. Prereq-CSE upper div or grad, 3222, CSCI 1113 or equiv) Apply computer-aided engineering to mechanical design. Engineering design projects and case studies using computer-aided design and finite element analysis software; design optimization and computer graphical presentation of results.

ME 5243. Advanced Mechanism Design. (4 cr; A-F or Aud. Prereq-CSE upper div or grad, 3222 or equiv, basic kinematics and dynamics of machines; knowledge of CAD packages such as Pro-E recommended) Analytical methods of kinematic, dynamic, and kinetostodynamic analysis and synthesis of mechanisms. Computerized design for function, path, and motion generation based on Burmester theory.


ME 5248. Vibration Engineering. (4 cr; Stdnt Opt. Prereq-CSE upper div or grad, 3281) Apply vibration theory to design; optimize isolators, detecting mechanisms, viscoelastic suspensions and structures. Use modal analysis methods to describe free vibration of complex systems, relating to both theoretical and test procedures.


ME 5286. Robotics. (4 cr; A-F or Aud. Prereq-3281 or equiv, [upper div ME or AEM or CSE upper div student]) Manipulator forward/inverse kinematics, homogeneous transformations, coordinate frames, Jacobian/velocity control, task primitives/programming, computational issues. Determining path trajectories, reaction forces, manipulator dynamics/control. Vehicle kinematics, dynamics, and guidance. Lab project demonstrates concepts.


ME 5341. Case Studies in Thermal Engineering and Design. (4 cr; A-F or Aud. Prereq-3331, 3332, 3333, CSE upper div or grad student) Characteristics of applied heat transfer problems: nature of problem specifies 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 5351. Computational Heat Transfer. (4 cr; A-F or Aud. Prereq-3332, 3333, CSE upper div or grad student) Numerical solution of heat conduction and analogous physical processes. Develop/use a computer program to solve complex problems involving steady/unsteady heat conduction, flow and heat transfer in ducts, flow in porous media, and other special applications.

ME 5361. Plasma-Aided Manufacturing. (4 cr; A-F or Aud. [S]EE 5611, Prereq-[3331, 3332, 3333] or equiv, CSE upper div or grad) Properties of plasmas as a processing medium, process control and system design concepts using specific examples of plasma spray coating, welding, and microelectronics processing.

ME 5381. Biological Transport Processes. (4 cr; A-F or Aud. [S]CHEN 5753, BMEN 5311, Prereq-[[3332, 3333] or CHEN 5101 or #], CSE upper div or grad student, transport course) Fluid, mass, and heat transport in biological systems. Mass transfer across membranes, fluid flow in capillaries, interstitium, veins and arteries. Biotransport issues in single cells and tissues, artificial organs, membrane oxygenators, and drug delivery applications.
ME 5446. Introduction to Combustion. (4 cr; A-F or Aud. Prereq-3331, 3332, 3333, CSE upper div or grad student. May be taken in sequence with 8221 the same course.) Thermodynamics, kinetics, energy and mass transport, pollutants in reacting systems. Reactors, laminar and turbulent flows. Ignition, quenching, and flame stability. Diffusion flames. Combustion in reciprocating engines, furnaces, and turbines, with emphasis on internal combustion engine performance and emissions.

ME 5461. Internal Combustion Engines. (4 cr; A-F or Aud. Prereq-CSE upper div or grad student. MSc or better in [3332, 3333] or 3234) Basic spark ignition and diesel engine principles, air, fuel-air and actual engine cycles, cycle modeling, combustion and emissions, knock phenomena, airflow and volumetric efficiency, mixture requirements, ignition requirements and performance. Lectures/ laboratory hands-on labs.


ME 5666. Modern Thermodynamics. (4 cr; A-F only, Prereq-3331 or equiv) Applications of thermodynamics to natural phenomena. Multiscale approach. Student group projects, with undergrads and grad students in same group. Three hours/week classroom instruction, one hour/week project discussion. Project presentations at weeks 8 and 14.

ME 8001. Research Ethics and Professional Practice. (0 cr; No grade) Intellectual property, data management, social responsibility, authorship, and plagiarism, conflict of interest, and reporting misconduct. Case studies. Recent newspaper articles.

ME 8113. Advanced Aerosol/Particle Engineering. (3 cr; A-F or Aud. Prereq-CSE grad student or #) Introduction to kinetic theory, definition, theory, and measurement of particle properties; elementary particle mechanics, particle trajectories, Brownian motion and diffusion, coagulation, evaporation and condensation, sampling, and transport.

ME 8221. New Product Design and Business Development I. (4 cr; A-F or Aud. [S]ENTR 6041, BMEN 6101, ENTR 6107, Prereq-CSE grad student, some design experience) Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. ME 8222 may be taken in sequence the same year.

ME 8222. New Product Design and Business Development II. (4 cr; A-F or Aud. [S]BMEN 8402, Prereq-8221) Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence with 8221 the same year.


ME 8243. Topics in Design. (4 cr [max 12 cr]; A-F or Aud) Topics vary with each offering.

ME 8253. Computational Nanomechanics. (3 cr; Stdnt Opt. Prereq-CSE grad student) Fundamentals of mechanical properties in nanometer scale. Role of discrete structure and underlying atomic, molecular, and interfacial forces are illustrated with modern examples. Overview of computational atomistic methods. Lectures, hands-on computing using publicly available or personally developed scientific software packages.

ME 8254. Fundamentals of Microelectromechanical Systems (MEMS). (4 cr; A-F only) Major classes, components, and applications of MEMS. Principles behind operation of MEMS devices/systems. Standard microfabrication techniques. Unique requirements, environments, and applications of MEMS. Students apply microfabrication techniques/applications to design/manufacture of a MEMS device or microsystem.


ME 8285. Vehicle Dynamics and Control. (3 cr; A-F or Aud. Prereq-5281 or EE 5231 or equiv) Vehicle control systems: dynamics based in their development. Cruise control, adaptive cruise control, ABS, automated lane keeping, automated highway systems, yaw stability control, active rollover prevention, engine control, active semi-active suspensions.

ME 8287. Topics in Dynamics and Control. (2-4 cr [max 12 cr]; A-F or Aud. Prereq-5281) Topics vary with each offering.

ME 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)


ME 8341. Conduction. (3 cr; A-F or Aud. Prereq-Undergrad class in heat transfer or #) Advanced understanding/application of conduction/diffusion to heat/mass transfer problems. Solving ordinary/partial differential equations related to physics of diffusion. Special topics in numerical microscale heat transfer.

ME 8342. Convection. (3 cr; A-F or Aud. Prereq-Grad level course on fundamentals of fluid mechanics that has a substantial component on viscous flows or #) Heat transfer in fluids flowing around bodies and in tubes/ducts. Forced/natural convection. Laminar/turbulent flow regimes. Turbulent transport and modeling. High-speed flows, viscous dissipation, variable property effects. Application to heat exchange devices. Convective mass transfer.


ME 8381. Bioheat and Mass Transfer. (3 cr; Stdnt Opt. Prereq-CSE grad student, upper-division transport/fluids course; [physics, biology] recommended) Analytical/numerical tools to analyze heat/mass transfer phenomena in cryobiotechnology, hyperthermic, or other biomedically relevant applications.

ME 8390. Advanced Topics in the Thermal Sciences. (1-2 cr [max 12 cr]; A-F or Aud) Topics vary according to instructor.

ME 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)
ME 8462. Turbomachinery. (3 cr; A-F or Aud. Prereq: CSE grad student, 3231, 3232 or equiv or #) Thermodynamic analysis of energy transfer between fluid and rotor; dimensional analysis; principles of axial, mixed, and radial flow pumps, fans, compressors, and turbines; cascade performance; computer flow simulations; applications to propulsion systems and power plants. ME 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MILL 5990. The Healthcare Marketplace. (3 cr; A-F only) Physical services, hospital services, insurance, long-term care, pharmaceuticals and medical devices, and information technology. Lectures, discussions, and presentations from healthcare business leaders. MILL 5995. Medical Industry Valuation Laboratory. (2 cr; A-F only. Prereq-#) Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, inventors.

MILL 5999. Independent Study. (1-8 cr [max 16 cr]; A-F only) Independent study.

Medicinal Chemistry (MEDC)

Department of Medicinal Chemistry

College of Pharmacy

MEDC 5185. Principles of Biomolecular Simulation. (3 cr; Stdnt Opt. Prereq-Chem 3502 or #) Molecular simulation for students in medicinal chemistry, pharmacetics, biochemistry, and chemical physics

MEDC 5202. Research and Development Process of Pharmaceutical Products. (2 cr; S-N or Aud) New drug development process in the U.S. pharmaceutical industry

MEDC 5245. Introduction to Drug Design. (3 cr; A-F or Aud. [S]CHEM 5245, PHAR 6245. Prereq-Chem) Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design, mechanism of action drugs. MEDC 5404. Advanced Methods in Quantitative Drug Analysis. (3 cr; A-F or Aud. Prereq-#) Quantitative methods (HPLC, GC, TLC, and immunassays) 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 or Aud) Selected topics of contemporary interest in medicinal chemistry

MEDC 5700. General Principles of Medicinal Chemistry. (2 cr; A-F or Aud. Prereq-MedC grad student or #) Fundamental principles of molecular recognition, physicochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA

MEDC 5710. General Principles of Medicinal Chemistry. (2 cr; A-F or Aud. Prereq-MedC grad student or #) Fundamental principles of enzyme inhibitors, combinatorial chemistry and library design, drug receptor interactions and signal transduction mechanisms, and molecular modeling.

MEDC 8001. General Principles of Medicinal Chemistry. (3 cr; A-F or Aud. Prereq-MedC chem grad student or #) Fundamental principles of molecular recognition, physicochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA.

MEDC 8002. General Principles of Medicinal Chemistry. (3 cr; A-F or Aud. Prereq-Med chem grad student or #) Fundamental principles of molecular recognition, physicochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA

MEDC 8050. RECIPIATION IN MECHANISTIC ORGANIC CHEMISTRY. (3 cr; S-N only. Prereq-First-year Medical Chemistry grad student) Recitation-based organic chemistry reaction mechanisms course. Actively solve organic chemistry reaction mechanisms/related organic chemistry problems during course meeting times with faculty guidance.

MEDC 8100. Medicinal Chemistry Seminar. (1 cr [max 6 cr]; Stdnt Opt. Prereq-Grad major or #) Current topics.

MEDC 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

MEDC 8520. Natural Products Chemistry. (3 cr; A-F only. Prereq-[CHEM 8320, biochemistry] or equiv or course director approval) Biosynthesis of natural products with an emphasis on how these biochemical principles can be used in drug discovery and design through metabolic engineering and combinatorial biosynthesis. Natural product isolation, structure determination, target identification, and the role of synthetic organic chemistry.

MEDC 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

MEDC 8471. High Throughput Drug Discovery. (3 cr; A-F only. Prereq-Undergraduate chemistry [or biochemistry] or #) Combinatorial chemistry, multi-compound based technologies, their use in screening bioassays to discover lead compounds. Solid-phase synthesis, designing compound libraries, pharmacological assay design, data interpretation, biological target selection, compound lead optimization.

MEDC 8500. Design of Chemotherapeutic Agents. (2 cr; A-F or Aud. Prereq-5600 or #) Modern aspects of designing chemotherapeutic agents. Strategies for enzyme inhibition and metabolic blocks in development of anticaner, antimicrobial, and antiviral agents.

MEDC 8600. Chemical Aspects of Drug Metabolism and Bioactivation. (2 cr; A-F or Aud. Prereq-5600 or #) Chemical and enzymatic mechanisms of biotransformation and bioactivation of drugs and other xenobiotics. Reactivity and fate of bioactivatedmetabolites.

MEDC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MEDC 8700. Advanced Concepts in Drug Design. (2 cr; A-F or Aud. [S]CHEM 8700, PHAR 6247H. Prereq-5600 or #) Current approaches to rational design of drugs.

MEDC 8753. MOLECULAR TARGETS OF DRUG DISCOVERY. (3 cr; A-F only. Prereq-5710 or 8002 or CHEM 5412 or structural biochemistry or #) Structure of biological macromolecules that are targets of drugs. Techniques to accelerate directed drug discovery. Protein structure/interactions. Popular target classes. Computational tools for visualizing/analyzing protein-ligand and protein-protein interactions. Structural characterization at a level sufficient for definitions of course numbers, abbreviations, and symbols, see page 3.
to underpin critical data evaluation. Biophysical techniques to assess weak ligand binding and suitable for fragment-based lead discovery.

MEDI 8760. Design of Peptidomimetics. (2 cr; A-F or Aud. Prereq: 8600 or #) Current approaches to design and synthesis of mimetics of biologically active peptides. Structural and conformational rationale used in peptidomimetic design.

MICA 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only])

MICA 8800. Medical Chemistry Laboratory Techniques. (1-2 cr [max 4 cr]; S-N or Aud. Prereq: Grad chem major or #) Experiential rotations in medical chemistry research laboratories.

MICA 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq: Max 18 cr per semester or summer; 24 cr required)

MICA 8900. Research in Medical Chemistry. (1-4 cr [max 8 cr]; A-F or Aud. Prereq: Grad chem major or #) Study and experimental investigation.

Medieval Studies (MEST)
Center for Medieval Studies
College of Liberal Arts
MEST 5610. Advanced Topics in Medieval Studies. (3-4 cr [max 15 cr]; Stdnt Opt. Prereq: One yr work in some area of Middle Ages, reading knowledge of appropriate language, #) From late antiquity through end of Middle Ages (circa 300-1500 A.D.). Topics specified in Class Schedule.

MEST 5993. Directed Studies in Medieval Studies. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq: One yr work in some area of Middle Ages, reading knowledge of appropriate language, #) Directed study with one of the core faculty of medieval studies program.

MEST 8010. Medieval Studies Colloquium. (3 cr [max 9 cr]; Stdnt Opt) Lectures by and discussions with faculty and visiting speakers.

MEST 8110. Seminar in Medieval Studies. (3-5 cr [max 48 cr]; A-F or Aud. Prereq:Appropriate languages, #) Offered when feasible.

Microbial Engineering (MICE)
BioTechnology Institute
College of Biological Sciences
MICE 5309. Biocatalysis and Biodegradation. (3 cr; Stdnt Opt. [S]BIOC 5309. Prereq:chemistry through organic chemistry; knowledge of word processing, e-mail, access to World Wide Web, access to college-level science library recommended) Assessing validity of information on biocatalysis and biodegradation; fundamentals of microbial catabolic metabolism as it pertains to biodegradation of environmental pollutants; biocatalysis for specialty chemical synthesis; display of this information on the World Wide Web.

MICE 5355. Advanced Fermentation and Biocatalysis Laboratory. (1 cr; S-N only. Prereq: [BIOC 3501 or MICE 5301], [grad student in microbial engineering or upper-div major in [microbiology or chem engineering or biochemistry]], #) Methods in industrial microbiology, lab, and pilot scale fermentation/biocatalysis engineering. Lab experiments carried out in fermentation pilot plant. Operation of bench/pilot scale bioreactors. Designing bioreactors. Process optimization, monitoring, and control. Scale-up experiments, data analysis.

MICE 8333. FTE: Master's. (1 cr; No grade. Prereq: Master's student, adviser and DGS consent)

MICE 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only])

MICE 8920. Teaching Practicum. (1 cr [max 4 cr]; Stdnt Opt. Prereq: Grad MICE major) Supervised experience in classroom, laboratory, and/or recitation instruction; develops skills in effective use of instructional techniques, materials, tests, and measurements.

MICE 8990. Biotechnology Seminar. (1 cr [max 2 cr]; Stdnt Opt. Prereq: First-yr students enroll S-N, as they do not make a presentation; second-yr students enroll A-F, as they present a seminar) Student presentations of thesis research and presentations by invited speakers.

Microbiology, Immunology, and Cancer Biology (MICA)
Department of Microbiology Medical School
MICA 5000. Practicum: Teaching. (0 cr; No grade) Supervised experience in lab instruction. Use of instructional materials, tests/measurement.

MICA 8002. Structure, Function, and Genetics of Bacteria and Viruses. (4 cr; A-F or Aud. Prereq:[One undergrad or grad course each in [microbiology, genetics, biochemistry]] or #) Structure, function, and metabolism of microorganisms. Molecular genetics. Molecular virology.

MICA 8003. Immunity and Immunopathology. (4 cr; Stdnt Opt. Prereq:Upper level undergrad immunology course or #) Lymphocyte activation, signal transduction in lymphocytes, antigen receptor genetics, antigen presentation, lymphoid anatomy, adaptive immune responses to microbes, immunodeficiency, immunopathology, cytokines, transplantation, autoimmunity.


MICA 8005. Topics in Microbiology, Immunology, and Cancer Biology. (1-4 cr [max 4 cr]; Stdnt Opt. Prereq: 8001, two of [8002 or 8003 or 8004]) Colloquium format. Readings/discussion on specialized topic.

MICA 8006. Protein Sequence Analysis. (3 cr; Stdnt Opt. Prereq:Biochem course, knowledge of UNIX operating system recommended) DNA and protein sequence and protein structure databases; protein sequence analysis; methods for display of sequence comparison and prediction results; Genetics Computer Group (GCG) sequence analysis programs; and current literature and research problems.

MICA 8007. Cell Biology and Biochemistry of the Extracellular Matrix. (3 cr; A-F or Aud. [S]BIOC 8007, Prereq:8002 or 8004 or #) Concepts in cell adhesion and tissue composition and importance of cell adhesion in tissue function and disease. Topics range from structure/function/assembly of tissue components to cellular adhesion mechanisms.


MICA 8010. Microbial Pathogenesis. (3 cr; A-F or Aud. Prereq:MICA grad student or instr) Molecular mechanisms of bacterial/viral pathogenesis. Strategies of disease causation/interaction with host, regulation of virulence factors, mechanism of virulence factor transmission to other microbes.

MICA 8011. Current Topics in Immunology. (3 cr; A-F or Aud. Prereq:MICa 8003 or #) Seminar format. In-depth reading, discussion.

MICA 8012. Writing and Reviewing a Research Proposal. (2 cr; A-F only. Prereq: First or second year MICA grad student) Assist first/second year graduate students to prepare research proposals for funding.

MICA 8013. Translational Cancer Research. (2 cr; A-F only. Prereq: 8004 or #) Clinical issues in cancer research. Discuss translation research projects as they pertain to a variety of cancers.

MICA 8014. Small RNA Biology. (2 cr; A-F or Aud. Prereq: BIOC 8002 or MICA 8004 or equiv or #) Small RNAs as major regulators of gene/protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Biology of small RNAs and their role in health and disease.

MICA 8094. Research in Microbiology, Immunology, and Cancer Biology. (1 cr [max 5 cr]; S-N or Aud. Prereq:First yr MICA grad student) One-on-one research training from faculty adviser during laboratory rotation.

MICA 8320. Readings in Neurobiology. (1-4 cr [max 4 cr]; Stdnt Opt) Topics in neurobiology and neurophysiology.

MICA 8333. FTE: Master's. (1 cr; No grade. Prereq:Master's student, adviser and DGS consent)

MICA 8371. Mucosal Immunobiology. (3 cr; A-F or Aud. [S]BIOJ 8371, CHB 8371, Prereq:8001 or #) Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces, interactions/ responses of various mucosal tissues to pathogens, current approaches being used to target protective vaccination to mucosal tissues. Lectures, journal club format.

MICA 8444. FTE: Doctoral. (1 cr; No grade. Prereq:Doctoral student, adviser and DGS consent)
Molecular Cellular Developmental Biology and Genetics (MCDG)
College of Biological Sciences
MCDG 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)
MCDG 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)
MCDG 8666. Doctoral Pre-Thesis Credits. (1 cr; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MISMS 5910. Topics in Moving Image Studies. (2-4 cr [max 8 cr]; A-F only)
Special topics in moving image studies.

MISMS 8801. Theories of the Moving Image. (3 cr; A-F only)
Study of the moving image as the intersection between critical media studies and film studies. Not a historical overview, but rather current discussions in these areas contextualized with relevant readings in classical film and media theory.

MISMS 8803. Historiography of the Moving Image. (3 cr; A-F only)
Genealogies of the moving image. "Crisis" of film in debates about "old" and "new" media; Hollywood’s role in defining commercial and oppositional forms of moving images; approaches to the writing of history in relation to media historiography.

Museum Studies (MST)
Department of Design, Housing, and Apparel
College of Design
MST 5011. Museum History and Philosophy. (3 cr; A-F or Aud. Prereq-#)
Historical and philosophical roots of museum development in Europe and North America from the Renaissance to modern day museums and history centers. Emerging philosophical issues faced by museums today.

MST 5012. Museum Practices. (3 cr; A-F or Aud. Prereq-5011 or #)
Practical aspects of museum work. Standards, practices, responsibilities, and issues, all set in greater museum context. Curatorial and educational duties, collections management, security, funding, boards, public relations, installation, and budgeting.

MST 5020. Internship. (1-6 cr [max 32 cr]; S-N or Aud. Prereq-5011, 5012, %)
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.

MST 5993. Directed Study in Museum Studies. (1-4 cr [max 16 cr]; A-F or Aud. Prereq-5012 or [P]5012, %)
Study by a student, largely self directed with consultation of a faculty member, on a topic not covered (or not covered in depth) by another course. Program of study is determined jointly by student and advising faculty member.

Music (MUS)
School of Music
College of Liberal Arts
MUS 2101. Piano Pedagogy I. (2 cr; Stdnt Opt. Prereq-8 cr in MusA 1301 or MusA 1401 or #)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

MUS 2102. Piano Pedagogy II. (2 cr; Stdnt Opt. Prereq-8 cr in MusA 1301 or MusA 1401 or #)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

MUS 2150. Body Awareness in Activity: The Alexander Technique for Musicians. (2 cr [max 4 cr]; Stdnt Opt)
Alexander technique with specific applications to music performance. Emphasis on body/mind awareness to promote technical ease and freedom.

MUS 3101. Organ Literature I. (3 cr; A-F or Aud. Prereq-3502, 3503, sr or grad or #)
Organ literature from the 14th century to the mid-18th century. Influence of organ design of various periods and national schools on the literature and its performance.
Courses

MUS 5152. Organ Literature II. (3 cr; A-F or Aud. Prereq-3502, 3603 or grad major or #) Organ literature of J. S. Bach and of other 19th- and 20th-century composers. Influence of organ design of various periods and national schools on the literature and its performance.

MUS 5160. Instrumental Accompanying Skills and Repertoire. (2 cr [max 4 cr]; A-F or Aud. Prereq-Accomp major) Performance class in accompanying skills particular to orchestral reductions and non-sonata instrumental accompanying. Repertoire to include, but not be limited to, classical and romantic string concertos, and “en core” pieces.

MUS 5181. Advanced Piano Literature I. (2 cr; A-F or Aud. Prereq-grad piano major or #) Literature for piano from late Baroque period to mid-20th century.

MUS 5182. Advanced Piano Literature II. (2 cr; A-F or Aud. Prereq-grad piano major or #) Literature for piano from late Baroque period to mid-20th century.

MUS 5230. Chorus. (1-2 cr [max 16 cr]; Stdnt Opt. Prereq-Choral and/or instrumental music background; audition, #) University Women's Chorus, Men's Chorus, Concert Choir and Choral Union. Chorists 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. University Singers. (1 cr [max 8 cr]; A-F or Aud. Prereq-Audition, #) Mixed chorus with members of former chamber singers and concert choir. Programs exploring Western/non-Western repertoire from Middle Ages through 20th century. Concerts include touring and collaborative campus and community performances.

MUS 5241. Vocal Literature I. (3 cr; A-F or Aud. Prereq-[12 cr in MusA 1304, grad music student] or #) Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice.

MUS 5242. Vocal Literature II. (3 cr; A-F or Aud. Prereq-12 cr in MusA 1104 or MusA 1304, grad music major or #) Vocal literature of major and minor composers from 17th century to present; structure, style, and performance practice.


MUS 5271. Diction for Singers I. (2 cr; A-F or Aud. Prereq-12 cr in MusA 1304 or grad music major or #) Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

MUS 5272. Diction for Singers II. (2 cr; A-F or Aud. Prereq-12 cr in MusA 1304 or grad music major or #) Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

MUS 5275. Vocal Pedagogy I. (3 cr; Stdnt Opt. Prereq-Sr vocal major or #) Advanced study of mind/body preparations for singing, anatomy, and physiology of the vocal mechanism. Voice use and care, historical and comparative pedagogy, learning theories, models and guidelines for teaching, instructional techniques, and diagnosing and solving vocal problems.

MUS 5276. Vocal Pedagogy II. (3 cr; A-F or Aud. Prereq-Sr vocal major or #) History of solo vocal performance; selection and preparation of beginning level solo vocal repertoire; development of vocal performance skills (interpretation, expression, artistry), recital programming, and career counseling.


MUS 5331. Jazz Improvisation I. (2 cr; A-F or Aud. Prereq-Music major or #) Rudiments, analysis, improvisation on blues in three major keys and on standard American popular jazz compositions from swing era to early bebop. Applications of major/minor scales. Ear training.

MUS 5333. Post-tonal Theory and Analysis II. (3 cr; A-F only. Prereq-[42504 with a C- or better] or equiv diagnostic test) Art music composed since 1945. Develop skills in analyzing and interpreting this literature.

MUS 5336. Jazz Arranging. (S; A-F or Aud. Prereq-3502 or #) Beginning techniques of arranging for jazz combo and jazz ensemble, vocal and instrumental.

MUS 5340. Jazz Ensemble. (1 cr [max 6 cr]; A-F or Aud. Prereq-audition, #) A 20-member performing orchestra covering significant jazz compositions and arrangements written specifically for this medium.


MUS 5400. University and Campus Bands. (1 cr [max 10 cr]; Stdnt Opt) Lab course.

MUS 5410. University Wind Bands. (1 cr [max 14 cr]; A-F or Aud. Prereq-audition, #) Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate.

MUS 5420. Orchestra. (1 cr [max 8 cr]; A-F or Aud. Prereq-audition, #) Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate.

MUS 5421. Suzuki Violin Pedagogy I. (1 cr; A-F or Aud. Prereq-Violin major or #) Philosophy and teaching techniques of Japanese pedagogue Shinichi Suzuki and their applications in Western culture. Discussion, playing experience, and observation of children's lessons in the MacPhail Center Suzuki Program.

MUS 5422. Suzuki Violin Pedagogy II. (2 cr; A-F or Aud. Prereq-5421 or #) Philosophy and teaching techniques of Japanese pedagogue Shinichi Suzuki and their applications in Western culture. Discussion, playing experience, and observation of children’s lessons in the MacPhail Center Suzuki Program.

MUS 5423. Suzuki Pedagogy Practicum. (1 cr; A-F or Aud. Prereq-[((P[5424] or [P]5425), grad music student] or #, grad consent) Supervised teaching of both individual and group lessons. Instructor assesses his periodic critiques from observation of live or videotaped lessons.


MUS 5425. Advanced Suzuki Violin Pedagogy II. (2 cr; A-F or Aud. Prereq-5424 or #) Intensive examination of Suzuki techniques for intermediate and advanced violin students in Western society. Discussion, playing experience, observation of children’s lessons in the MacPhail Center Suzuki Program, and practical teaching experience.

MUS 5427. Violin Pedagogy I. (2 cr; A-F or Aud. Prereq-Violin or viola major or #) Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.

MUS 5430. Contemporary Music Workshop. (1 cr [max 8 cr]; A-F or Aud. Prereq-#) Generation/performance of new chamber works set within context to situate musical works within dynamic field of historical, philosophical, and expressive import.

MUS 5440. Chamber Ensemble. (1 cr [max 8 cr]; A-F or Aud. Prereq-audition, #) Performance of music in chamber music, duos, trios, quartets, quintets, and other ensemble combinations for instruments and/or voices.

MUS 5450. Orchestral Repertoire. (1-3 cr [max 9 cr]; A-F or Aud. Prereq-#) Investigation of practical and performance problems in standard orchestral repertoire with regard to style and interpretation.


MUS 5461. Guitar Literature I: History and Repertoire before 1900. (2 cr; Stdnt Opt) Early history of classical guitar through its repertoire/composers. Related instruments such as renaissance lute, vihuela, baroque guitar, and baroque lute. Development of modern classical instrument.

MUS 5462. Guitar Literature II: History and Repertoire since 1900. (2 cr; Stdnt Opt) Repertoire/composers, concert/recording artists, and instrumental innovation of Segovia/post-Segovia eras.

MUS 5464. Cello Pedagogy. (2 cr; A-F or Aud) 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 5471. Woodwind Literature and Pedagogy I. (2 cr; A-F or Aud. Prereq-Music major or #) A study of the major teaching materials for the five woodwind instruments including methods, duets, and solos used primarily for pedagogical reasons.

MUS 5472. Woodwind Literature and Pedagogy II. (2 cr; A-F or Aud. Prereq-Music major or #) A study of chamber music involving one or more woodwind instruments. May include additional instructional materials such as piano, string, and/or voice.

MUS 5480. University Brass Choir. (1 cr [max 8 cr]; Stdnt Opt. Prereq-audition, #) The University Brass Choir is an ensemble of 16 brass and percussion players exploring unique literature that spans 400 years. From the rich antiphonal music of Giovanni Gabrieli (1557-1612) to works of the 20th century. The Brass Choir performs in Twin Cities churches and concert halls.
MUS 5481. Trumpet Pedagogy. (2 cr; Stdnt Opt. Prereq-Sr or grad in music or #) Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids.

MUS 5485. Transcription for Winds. (2 cr; Stdnt Opt. Prereq-3502 or #) Principles of music manuscript and examination of transcription examples. Transcription projects with score and parts. Smaller projects that involve arrangements and original compositions.

MUS 5490. Percussion Ensemble. (1 cr [max 10 cr]; A-F or Aud. Prereq-#) Practice and performance of standard and contemporary compositions for percussion instruments in various combinations.

MUS 5491. Percussion Literature I. (2 cr; A-F or Aud. Prereq-Jr or sr or grad or #) Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

MUS 5492. Percussion Literature II. (2 cr; A-F or Aud. Prereq-Jr or sr or grad or #) Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

MUS 5533. Music Since 1945. (3 cr; A-F only. Prereq-4504, #) Art music composed since 1945. Skills in analyzing and interpreting this literature.

MUS 5541. 16th-Century Counterpoint. (3 cr; A-F or Aud. Prereq-[3501, 3508] or pass basic skills exam) Polyphonic counterpoint in modal style of Renaissance. Writing exercises in species counterpoint and in two, three, and four parts. Cantus firmus techniques, mixed values, invertible counterpoint, canon. Representative works by Josquin, Lassus, Palestrina, Victoria, and others. Renaissance treatises by Artusi, Banchieri, Diruta, Morley, Zarlino, and others.

MUS 5550. Class Composition. (2 cr [max 8 cr]; A-F or Aud. Prereq-[4504, 4514 [with C- or better]] or #) Original works in various forms. Development of individual compositional style in a post-tonal idiom. Various forms, performing forces, techniques.

MUS 5561. Orchestration I. (3 cr; A-F or Aud. Prereq-3502) Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.

MUS 5562. Orchestration II. (3 cr; A-F or Aud. Prereq-5561) Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.

MUS 5571. Schenkerian Analysis for Performers. (3 cr; A-F or Aud. Prereq-3502) Theory/analysis of tonal music using principles developed by Heinrich Schenker. Basic concepts/notation, their application to excerpts/short pieces from 18th/19th centuries.

MUS 5573. Analysis of Late-Romantic Orchestral Literature. (3 cr; A-F or Aud. Prereq-3502 or Theory IV Exam or #; [4504 or equiv] recommended) Advanced tonal analysis. Dramatic orchestral music by Wagner, Strauss, Tchaikovsky, Rimsky-Korsakov, Mussorgsky, and Rahnnauff as focus for projects/discussions related to chomatic harmony, form, and orchestration.

MUS 5574. Wagner’s Ring: Conception, Coherence, Consequence. (3 cr; A-F only. Prereq-3502 or equiv) Enrich process of listening to Wagner’s Ring by providing analytic insight into Wagner’s compositional technique and the dramatic, tonal, and motivic structure of the work. Analytic approach broadened with a number of interdisciplinary forays.

MUS 5597. Music and Text. (3 cr; A-F or Aud. Prereq-3502) Designed for music majors only, this course gives an introduction to the analysis of music with texts such as art song and opera.


MUS 5620. Topics in Opera History. (3 cr [max 6 cr]; A-F or Aud. Prereq-grad music major or #) Study of specific operas. Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Periods/countries vary each semester.

MUS 5621. Baroque Music and Its Contexts. (3 cr; A-F only. Prereq-Grad student in music or #) Genres, styles, and contexts of music composed in Western Europe between 1600 and 1750. Emphasizes works typically covered in undergraduate music history classes. Individual works as representative of larger aesthetic, social, political, and theological issues.

MUS 5624. Music of J. S. Bach. (3 cr; A-F or Aud. Prereq-Grad student in music or #) Issues of musical style, historical context. Moves chronologically through Bach’s career. Relationships between his duties and works he composed. Genesis, function, relationships: work to genre and performing forces. Lectures, presentations, research/analysis assignments.

MUS 5647. 20th-Century European/American Music. (3 cr; Stdnt Opt. Prereq-3603 or equiv, 5501 or equiv, 12 undergrad cr in music history) Emphasizes major artistic movements, stylistic turning points, social relations, and some of the most high art, popular, ethnic musics; contributions of men and woman as composers and performers.

MUS 5658. History of the Symphony in the 20th Century. (3 cr; A-F or Aud. Prereq-3603, 5501 or #) History of symphony (and related genres) in Europe and America, ca. 1890 to present. Changing aesthetic concerns, structural, harmonic, and timbral innovations. Sociocultural contexts; analysis and criticism.

MUS 5668. Beethoven’s Symphonies. (3 cr; A-F or Aud. Prereq-3603, #) Analytical overview of selected movements from Beethoven’s 9 symphonies. Principles of sonata analysis (norm and deformation); introduction to wider contexts of interpretation and understanding (generic, expressive, social).

MUS 5804. Folk and Traditional Musics: Selected Cultures of the World. (3 cr; A-F or Aud. Prereq-1801 or 1804 or music grad or #) A study of selected music traditions from 5 to 7 world cultures. Genres, set, music. Cultures and other world musics. Emphasis on research paper.

MUS 5993. Directed Studies. (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-# or [B]) Guided individual reading or study.


MUS 8100. Sonata Seminar. (2 cr [max 8 cr]; A-F or Aud. Prereq-Grad student in music or #) Performance in standard Baroque, Classical, and Romantic sonatas for piano and violin, cello, viola, flute, clarinet, or oboe.


MUS 8131. Advanced Keyboard Skills. (2 cr; A-F or Aud. Prereq-Grad student in music or #) Diatonic/chromatic harmonic language applied to keyboard. Emphasizes harmonization, transposition, and improvisation. Open score and clef reading using alto, tenor, and soprano clefs.

MUS 8133. Seminar in Basso Continuo. (3 cr; A-F or Aud. Prereq-Grad student in music or #) Realization of figured basses (bass lines annotated with Arabic numerals indicating harmony) and performance of continuo parts in European concerted music from 17th/18th centuries at keyboard. Emphasizes development of stylistic accompaniment skills at harpsichord/organ.

MUS 8151. Seminar in Organ Repertoire. (3 cr; A-F or Aud. Prereq-Grad student in music or #) Repertoire for pipe organ. Readings/presentations on selected areas of repertoire of 15th through 20th centuries. Organ design/construction at various European and American schools, as well as relevant performance practices.

MUS 8170. Advanced Vocal Accompanying Skills and Repertoire. (2 cr [max 8 cr]; A-F or Aud. Prereq-[French, German, Italian diction, accompanying or DMA voice emphasis or MM voice emphasis by audition]) Advanced performance (Lieder, melodie, opera) emphasizing coaching techniques and performance skills of pianists and singers.

MUS 8171. Song Repertoire and Performance for Pianists and Singers: German Lieder. (2 cr; A-F or Aud. Prereq-[Grad student with major in vocal performance or in accompanying or in piano], #) Surveys standard German-language song repertoire: Mozart, Schubert, Schumann, Brahms, Strauss, Wolf.

MUS 8181. Operatic Accompaniment Skills and Repertoire. (2 cr; A-F or Aud. Prereq-Grad student with major in accompanying or in conducting) Development of skills required in operatic accompanying/coaching work. Standard opera arias, cultivation of orchestral sound at the piano, stylistic traditions, working with conductors.

MUS 8182. Opera History in Context: Monteverdi and Mozart. (3 cr; A-F only. Prereq-Grad student in music or #) Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas.

MUS 8183. Opera History in Context: Verdi and Britten. (3 cr; A-F only. Prereq-Grad student in music or #) Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas.

MUS 8193. Score Study: Choral. (3 cr; A-F or Aud. Prereq-#) Analysis of various choral scores ranging from Renaissance through 20th century. Reading of choral and choral/orchestral scores at piano, including scores with C clefs and transposing instrument.
MUS 8555. Choral Literature: Baroque Era to the Present. (3 cr; A-F or Aud. Prereq-#) Survey of sacred and secular choral works.

MUS 8599. Performance in Choral Conducting. (3 cr; A-F or Aud. Prereq-#) Preparation and performance of choral conducting recital, with supporting paper.

MUS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

MUS 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

MUS 8582. Schenkerian Theory and Analysis II. (3 cr; A-F or Aud. Prereq-8581 or Application of Schenkerian theory to 18th-/19th-century music, coordinated with critical study of major music treatises from that era.

MUS 8584. Current Issues in the Analysis of 19th-Century Music. (3 cr; A-F only. Prereq-[35502, 35152] or equiv placement exam); #) Grad-level Schenkerian analysis recommended


MUS 8631. Seminar: Music in Medieval Europe. (3 cr; A-F or Aud. Prereq-Undergrad music degree) Selected genres of polyphonic and monophonic music, 9th-14th centuries, for analysis and cultural criticism. Social roles of music and performance traditions; current musical issues.

MUS 8632. Seminar: Music in Early Modern Europe. (3 cr; A-F or Aud. Prereq-Undergrad music degree) Transformation of chanson, madrigal, mass, and motet from 1400 to 1580. Analysis and cultural criticism; social roles of music and performance traditions; current musical issues.

MUS 8640. Seminar in Musicology. (3 cr; max 12 cr; A-F or Aud. Prereq-Musicology or theory emphasis or #) Topics vary; readings, research, strategies, and methods.


MUS 8651. Sonata Theory. (3 cr; A-F or Aud. Prereq-#) Principles of the classic sonata: norms, types, and deformations. Structural analysis, analytical methodologies, and fundamentals of sonata formalities.

MUS 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr) No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.

MUS 8777. Thesis Credits: Master’s. (1-18 cr max 50 cr) No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only)


MUS 8888. Thesis Credit: Doctoral. (1-24 cr max 100 cr; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

MUS 8994. Directed Research. (1-3 cr max 12 cr; A-F or Aud. Prereq-#) Directed research.

MUS 8999. Recital Credits: Doctoral. (4 cr max 20 cr; A-F or Aud. Prereq-DMA student, #) Registration for recital credits coincides with performance of D.M.A. recital (five recitals for 20 credits).

Music Applied (MUSA)

School of Music

College of Liberal Arts

MUSA 5101. Piano: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5102. Harpsichord: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5103. Organ: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5104. Voice: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5105. Violin: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5106. Viola: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5107. Cello: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5108. Double Bass: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5109. Flute: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5111. Oboe: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5112. Clarinet: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5113. Saxophone: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5114. Bassoon: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5115. French Horn: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.

MUSA 5116. Trumpet: Elective (graduate non-major in music) (2 cr max 8 cr; A-F or Aud. Prereq-%) Private instruction.
MUSA 5171, Trombone: Elective (graduate non-major in music). (2 cr [max 8 cr]; A-F or Aud. Prereq-%) Private instruction.

MUSA 5118, Euphonium: Elective (graduate non-major in music). (2 cr [max 8 cr]; A-F or Aud. Prereq-%) Private instruction.

MUSA 5119, Tuba: Elective (graduate non-major in music). (2 cr [max 8 cr]; A-F or Aud. Prereq-%) Private instruction.

MUSA 5121, Percussion: Elective (graduate non-major in music). (2 cr [max 8 cr]; A-F or Aud. Prereq-%) Private instruction.

MUSA 5123, Guitar: Elective (graduate non-major in music). (2 cr [max 8 cr]; A-F or Aud. Prereq-%) Private instruction.

MUSA 5401, Piano: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5402, Harpsichord: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5403, Organ: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5404, Voice: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5405, Violin: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5406, Viola: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5407, Cello: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5408, Double Bass: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5409, Flute: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5411, Oboe: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5412, Clarinet: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5413, Saxophone: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5414, Bassoon: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5415, French Horn: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5416, Trumpet: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5417, Trombone: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5418, Baritone: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5419, Tuba: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5421, Percussion: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5423, Guitar: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5425, Harpsichord: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5426, Organ: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5427, Voice: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5428, Violin: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5429, Viola: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5430, Cello: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5431, Bassoon: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5432, Clarinet: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5433, Saxophone: Music Major Secondary (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5434, Bassoon: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5435, French Horn: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5436, Trumpet: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5437, Trombone: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5438, Baritone: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5439, Tuba: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5440, Percussion: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5441, Violin: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5442, Viola: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5443, Cello: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5444, Bassoon: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.

MUSA 5445, Clarinet: Music Major (graduate). (2-4 cr [max 24 cr]; A-F or Aud. Prereq-Audition, %) Private instruction.
MUED 5550. Student Teaching in Instrumental Music. (4–8 cr [max 8 cr]; A-F or Aud. Prereq-Music ed major, #) Supervised teaching and observing of instrumental music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MUED 5621. African Performing Arts in Education. (3 cr; A-F only. Prereq-Grad student in [music or other arts or education] or #) Representation of African performing arts in educational settings outside Africa. Performance practices, principles, techniques. Analyzing, listening, playing instruments, dancing. Performing with master artists, developing educational materials, reviewing resources, designing integrated arts projects.

MUED 5647. Teaching the Percussion Instruments. (2 cr; A-F or Aud) Contemporary approaches for teaching percussion in the schools; development of curricular materials and practice in performance techniques.

MUED 5650. Student Teaching Seminar. (2 cr; A-F or Aud. Prereq-At least C- in all required [music, music education, professional education] courses) Reflective practice during student teaching. Developing materials for professional employment (e.g., resume, portfolio).

MUED 5664. Teaching Music with Technology. (5 cr; A-F or Aud) Home page development techniques, software/materials, audio/video utilities, research applications.

MUED 5669. Psychology of Music. (5 cr; A-F or Aud, Prereq-Psy 1001 or Psy 5604 or #) Basic study of the psychology and psychoacoustics of music including hearing, music perception and cognition, values and preferences, musical abilities, musical systems, media music effects, the influence of music on human behavior, and psycho-socio-physiological effects involved in musical behavior.

MUED 5680. Topics in Music Education. (1-4 cr [max 16 cr]; A-F or Aud. Prereq-Grad student in [music education/therapy or education] or #) Focuses on single topic, specified in Class Schedule.

MUED 5800. Group Music Leadership Skills. (5 cr; A-F or Aud. Prereq-[[Completion of [MUS 1151, MUS 1152] or MUS 1153], music therapy major] or #) Role of group music experiences in human development. Relations specific to music therapy. Students develop repertoire of music applications/techniques for various age groups/populations. Standards for group leadership. Precision teaching skills.


MUED 5805. Music Therapy Methods and Procedures II. (2 cr; A-F only. Prereq-S5804 or #) Second course in professional sequence for music therapy. Topics include psychotherapy techniques and other music therapy approaches. Practicum in the community, in-class lab.

MUED 5806. Career Preparation. (4 cr; A-F or Aud. Prereq-S5805 or #) Ethics, grant writing, resume/CV preparation, supervision, board certification, professional responsibilities. Students design evidence/research-based music therapy program, present their proposals to class/comprehensive exam.

MUED 5807. Psychiatric Music Therapy. (3-5 cr [max 4 cr]; A-F only. Prereq-Grad music therapy student or #) Psychiatric populations. How music therapy can be implemented as evidence-based practice. Students design original research and role-play music therapy interventions for psychiatric populations. Practicum component on designing music therapy interventions.

MUED 5808. Medical Music Therapy. (3-5 cr [max 4 cr]; A-F only. Prereq-Grad music therapy major or #) Role/scope of music therapy in medical treatment. Medical diagnoses. How to program appropriate music therapy interventions to address patient needs.

MUED 5855. Music Therapy Internship. (1-13 cr [max 13 cr]; S-N or Aud. Prereq-Music Therapy major, #) Six-month resident internship in music therapy at an affiliated, approved hospital or clinic.

MUED 5991. Independent Study. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Music ed or music therapy major or grad, #) Independent study project organized by the student in consultation with the appropriate instructor.

MUED 8112. Introduction to Research Methods and Design in Arts Education. (3 cr; A-F or Aud. Prereq-Grad student in [music or music education], %) Methods and research designs employed in investigating education issues in the arts. Reporting results. Proposal development. Bibliographic skills for conducting a review of related research literature. Common analytical techniques.

MUED 8115. Assessment in Arts Education. (3 cr; A-F or Aud. Prereq-Grad student in [music or music education], %) Methods for assessing unique challenges in artistic achievement: performances, products, and other artistic achievements. Assessment design. Interpretation for large-/small-scale assessments in performance, classroom, and clinical settings.

MUED 8118. Qualitative Research in Arts Education. (3 cr; A-F or Aud. Prereq-Grad student in [arts or education], %) A theoretical, practical and systematic approach to qualitative research in arts education. Students participate in a joint field exploration or work in a setting relevant to their long-term research interests.

MUED 8119. Advanced Applications of Research Methods. (3 cr; A-F only. Prereq-Grad music education student or #) Application of research methods/design. Emphasizes both quantitative and qualitative methods. Contemporary perspectives/theories of data collection, management, analysis, and interpretation.

MUED 8211. Foundations of Music Education. (3 cr; A-F or Aud. Prereq-Grad student in [music or music education] or #) Major historical, philosophical, sociological, and psychological foundations of music education. Primary literature in the field. Role and current state of music education.

MUED 8280. Seminar: Current Trends in Music Education. (3 cr [max 30 cr]; A-F only. Prereq-#%) Current issues/trends in music education: philosophical, historical, psychological, and pedagogical. Course’s focus varies, reflecting the dynamic nature of the field.


MUED 8282. Seminar: Historical Issues. (3 cr; A-F or Aud. Prereq-Doctoral student in music or music education or #) Issues in historical foundations of music education.

MUED 8283. Seminar: Psychological Issues. (3 cr; A-F or Aud. Prereq-Doctoral student in music or music education or #) Issues in psychological foundations of music education.

MUED 8284. Seminar: Research and Scholarly Issues. (3 cr; A-F or Aud. Prereq-Doctoral student in music or music education or #) Scholarly/professional expectations of music educators and music therapists in academia and other positions of leadership. Writing for a variety of professional purposes/publications.

MUED 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)


MUED 8900. Seminar: Music Education Doctoral Seminar. (1 cr [max 8 cr]; A-F only. Prereq-#) Research-oriented collaboration between students and faculty. Models the manner in which research is conceived, primary literature evaluated, methods designed, and research projects carried through to completion.

MUED 899A. Directed Research. (1-8 cr [max 8 cr]; A-F or Aud. Prereq-#)

NPSE 8001. Introduction to Nanoparticle Science and Engineering. (3 cr; A-F or Aud) A broad, interdisciplinary overview of the emerging field of nanoparticle science and engineering. This introductory course, designed for students with diverse backgrounds in science and engineering, covers a wide spectrum of topics—from the synthesis of nanoparticles, to nanoparticle growth and transport, to characterization methods for nanoparticles, to novel nanoparticle-based materials and devices.

NPSE 8002. Nanoparticle Science and Engineering Laboratory. (3 cr; A-F or Aud. Prereq-S8001, [CSE grad student or #) Practical exposure to computational and experimental techniques in nanoparticle research. Required for Ph.D. students minoring in nanoparticle science and engineering.

NPSE 8101. Nanoparticle Science and Engineering Seminar. (1 cr; S-N or Aud. Prereq-CSE grad student or #) Broad overview of current research in nanoparticle science and engineering. Topics include areas of nanoparticle synthesis, nanoparticles characterization, nanoparticle-based materials and devices, environmental impact of nanoparticles, and instrumentation for nanoparticle research. Speakers from the University of Minnesota as well as external experts.
Neuroscience (NSC)
Department of Neuroscience

NSC 5031W. Perception. (3 cr; Sdnt Opt. Prereq-Psy 3051 or Psy 3051 or #) Cognitive, computational, and neuroscience perspectives on visual perception. Color vision, pattern vision, image formation in eye, object recognition, reading, impaired vision. Course is biennial: offered fall of odd years.

NSC 5037. Psychology of Hearing. (3 cr; Sdnt Opt. Prereq-Psy 3051 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 5040. Brain Networks: From Connectivity to Dynamics. (4 cr; A-F or Aud) Brain networks. Application of emerging science of complex networks to studies of the brain. Network approaches that provide fundamental insights into the integrative nature of brain function and its relation to the brain structure. Organization of brain networks and dynamics at multiple spatial scales, ranging from the microscale of single neurons and synapses, to mesoscale of anatomical cell groupings and their projections, and to the macroscale of brain regions and pathways. Experimental studies, including electrophysiology, voltage-sensitive dye imaging, electrophysiology, magnetoencephalography and functional magnetic resonance imaging, that allow mapping network elements and structural/functional connectivity between them at different temporal and spatial scales will be considered. Experimental theoretical perspectives.


NSC 5461. Cellular and Molecular Neuroscience. (4 cr; A-F or Aud. Prereq-NSc grad student or #) Lectures by team of faculty, problem sets in important scientific literature. Models from current theoretical neuroscience literature.

NSC 5481. Invertebrate Neurobiology. (3 cr; A-F or Aud) Fundamental principles/concepts underlying cellular bases of behavior and “systems” neuroscience. Particular invertebrate preparations. Offered annually the last 10 weeks of spring semester.

NSC 5540. Advanced Survey of Biomedical Neuroscience. (2 cr; A-F or Aud. Prereq-Q; intended for members of biomedical community or students with advanced scientific background) Current topics in biomedical neuroscience, accompanied by supporting, fundamental concepts. Intensive, one week course.

NSC 5551. Itasca Cell and Molecular Neurobiology Laboratory. (4 cr; S-N or Aud. Prereq-Neuroscience grad or #) 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 5661W. Behavioral Neuroscience. (3 cr; A-F or Aud. Prereq-Grad NSc major or grad NSc minor or #) Neural coding/representation of movement parameters. Neural mechanisms underlying higher order processes such as memorization, memory scanning, and mental rotation. Emphasizes experimental psychological studies in human subjects, single cell recording experiments in subhuman primates, and artificial neural network modeling.

NSC 5667. Neurobiology in Disease. (2-5 cr [max 3 cr]; S-N or Aud. SNSU 5667. Prereq-#) Basic clinical/pathological features, pathogenic mechanisms. Weekly seminar course.


NSC 8014. Small RNA Biology. (2 cr; A-F or Aud. Prereq-BIOC 3002 or MICA 3002 or equiv or #) Small RNAs as major regulators of gene/protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Small RNAs and their role in health and disease.


NSC 8207. Seminar: Psychopharmacology. (1-3 cr [max 12 cr]; Sdstn Opt. [S] JPY 6070, PHCL 8207. Prereq—#) Faculty and postdoctoral fellows interested in psychotropic drugs and chemicals participate. Some seminars devoted to biomedical ethics. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables.


NSC 8211. Developmental Neurobiology. (3 cr; A-F or Aud. Prereq—Neuroscience grad student or #) How neuronal types develop. Emphasizes general mechanisms. Experimental data demonstrating mechanisms.

NSC 8216. Selected Topics in Autonomic and Neuroendocrine Regulation. (1 cr; S-N or Aud. Prereq—#) Advanced seminar. Course is offered fall and spring semesters.

NSC 8217. Systems and Computational Neuroscience. (2 cr; S-N or Aud. Prereq—#) Advanced seminar. Course is offered fall and spring semesters.


NSC 8222. Central Regulation of Autonomic Function. (3 cr; A-F or Aud. Prereq—#) Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Course is offered fall of odd-numbered years.


NSC 8248. Directed Readings in Auditory Physiology. (1-2 cr [max 2 cr]; Sdstn Opt.) Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.

NSC 8250. Readings in Neurobiology. (1-4 cr [max 4 cr]; Sdstn Opt.) Topics in neurobiology and neurophysiology.

NSC 8321. Career Skills and Understanding Responsibilities as a Neuroscientist. (5 cr [max 2 cr]; S-N or Aud. Prereq—Neuroscience grad major or #) Information that falls outside of core neuroscience academic curriculum. Areas of practical value for graduate school and career development. Career skills, writing skills, responsible conduct in research.

NSC 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser approval) FTE: Master’s

NSC 8334. Laboratory Neuroscience. (1-3 cr [max 10 cr]; S-N or Aud. Prereq—Grad NSC major) Guided research.

NSC 8411. Teaching in Neuroscience. (1 cr [max 4 cr]; S-N or Aud. Prereq—insr approval) Grad students serve as primary instructors in 4151 and work with fellow students and faculty mentors to design curriculum, classroom sessions, exams, and course evaluations.

NSC 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent) Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmacological/pharmacological issues specific to direct drug delivery to CNS.

NSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Doctoral Pre-Thesis Credits

NSC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade) Thesis Credits: Master’s

NSC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required) Neuroscience Department (NSCI)

Department of Neuroscience

Medical School

NSCI 5101. Introduction to Neuroscience for Graduate Students. (3 cr; A-F or Aud. Prereq—[BioC 3021 or BioC 4331], %; intended for grad students outside neuroscience program who require comprehensive intro) Basic principles of cellular/molecular neurobiology and nervous system. A term paper supplements lectures. Multiple-choice exams.

NSCI 5110. Dental Neuroscience for Graduate Students. (2 cr; A-F or Aud. Prereq—[BioC 6110; BioC 3021, Biol 4004], %; intended for grad students who require a comprehensive grad-level neuroscience course) Structure/function of human nervous system. Lectures and reading assignments emphasize topics pertinent to dentistry.

NSCI 5111. Medical Neuroscience for Graduate Students. (5 cr; A-F or Aud. Prereq—[S]; 6110; BioC 3021, Biol 4004, %; intended for grad students who require a comprehensive medically-oriented neuroscience course) Survey of molecular, cellular, and systems neuroscience as related to medicine. Lecture/lab.

NSCI 5540. Advanced Survey of Biomedical Neurosciences. (2 cr; Sdstn Opt. Prereq—#; intended for members of biomedical community or students with advanced scientific backgrounds) Current topics in biomedical neuroscience. Supporting fundamental concepts. Intensive, one week course.

NSCI 5913. BrainU 101: Neuroscience in the Classroom. (3 cr; A-F or Aud. Prereq—[Elementary or middle school or high school or preschool] teacher, %, application) One-week summer workshop. Focuses on introducing neuroscience content to children. Follow-up activities held during academic year include BrainU staff/faculty classroom presentations, use of training materials, and peer mentoring sessions.

NSCI 5914. BrainU 202: Neuroscience in the Classroom. (3 cr; A-F or Aud. Prereq—[5913 or Biol 5190], %; application) One-week summer workshop. Focuses on critiquing previously implemented neuroscience class activities, developing assessment tools, learning peer mentoring, and expanding neuroscience content knowledge. Follow-up activities held during academic year include BrainU staff/faculty classroom presentations, use of training materials, and peer mentoring sessions.

NSCI 5915. BrainU 303: Neuroscience in the Classroom. (2 cr; A-F or Aud. Prereq—[5913 or Biol 5190], 5914, %, application) One-week summer workshop. Focuses on critiquing previously implemented neuroscience class activities and assessment tools, and expanding neuroscience content knowledge. Follow-up activities held during academic year include BrainU 303 participants. Use of training materials and implementation of neuroscience investigations.


Neurology (NSU)

Department of Neurology

Medical School


NSU 8318. Neuroradiological Conference. (1 cr; S-N or Aud) Neuroradiological conference.

NSU 8320. Neurosurgical Conference. (1 cr; S-N or Aud) Neurosurgical conference.


Nursing (NURS)

School of Nursing

NURS 5010. Foundations of Interprofessional Communication and Collaboration. (1 cr; S-N only. Prereq—Nursing student) First of three phases of the interprofessional [HEALTH curriculum: teamwork, professionalism, and basic ethical concepts.

NURS 5011. Interprofessional Diabetes Experience. (2 cr; A-F only. Prereq—2nd or 3rd year in nursing curriculum) Explore diabetes mellitus through active, hands-on learning in an interprofessional environment. Week-long simulated experience of living with diabetes. Online learning activities focused on interprofessional teamwork for optimal care to patients with diabetes.

NURS 5016. Critical Reading of Scientific Literature in Adolescents. Health. (1 cr; Sdstn Opt. Prereq—Grad-level research methods course, inferential statistics course or #) Application of skills, from research methods and statistics courses to critical reading of empirical literature on adolescent health. Relevance of research findings to adolescent health practice.
NURS 5029. Introduction to Nursing Interventions. (4 cr; A-F only. Prereq-Admission to master of nursing [MN] program. [P][5030]) Evidence-based interventions for safe, culturally appropriate, and ethical nursing practice. Experiential learning activities in laboratory and clinical settings build skills in assessment, planning, implementation, and evaluation.


NURS 5034. Clinical Seminar: Nursing Care of Clients With Complex Health Conditions. (2 cr; A-F or Aud. Prereq-5033, 8100, Nursing postbaccalaureate certificate prog) Exemplar care cases from students, clinical settings used as basis for development of clinical decision-making. Critical analysis of current/emergent nursing care issues associated with caring for complex/diverse populations.

NURS 5035. Practical Nursing Care for Complex Health Conditions. (4 cr; A-F or Aud. Prereq-Nursing postbaccalaureate certificate program or master of nursing program) Clinical decision-making, comprehensive nursing care of clients with complex health problems. In collaboration with a clinical preceptor and a faculty advisor, students develop an individualized learning contract.

NURS 5040H. Seeking Solutions to Global Health Issues. (3 cr; A-F or Aud. Prereq-Grad student or Open invxors & Honors #) Global health issues from an interdisciplinary perspective. Ethical and cultural sensitivity, complexities. Students propose realistic actions to resolve issues.

NURS 5113. Web-based Teaching and Learning Strategies. (2 cr; S-N or Aud) Skills necessary to design, produce, implement, and evaluate effective technology enhanced learning environments. Pedagogical/technological issues surrounding teaching with technology.

NURS 5115. Interprofessional Health Care Informatics. (2 cr; A-F or Aud) Implications of informatics for practice, including nursing, public health, and health care in general. Electronic health record issues. Ethical, legislative, political, and global/future informatics issues.

NURS 5116. Consumer Health Informatics. (1 cr; A-F only, Prereq-Grad student or #) Examines issues from consumer’s perspective in acquisition, understanding, use or provision of health information. Online strategies for improving health. Impact on consumer-provider relationships/ethical and legal issues.

NURS 5117. Consumer Health Informatics Practicum. (1 cr; S-N only. Prereq-[Grad student, [5116] or [P][5116]) or #) Apply student knowledge to analysis of health needs and consumer health principles, theories, and research related to a consumer health infomation project.


NURS 5170. Research Topics. (1-16 cr; max 16 cr; Stndt Opt. [SPUBH 6170]) Exploration of research topic to meet individual student needs.

NURS 5172. Decision Making in Health Care. (2 cr; Stndt Opt. Prereq-Grad student, #) Selected classical conceptual models of decision making, their premises/limitations/usefulness for decision making about health care issues. Models/components used to assess, evaluate, teach, or help healthy people, patients, families, health care professionals, or policy making groups in making health care decisions.

NURS 5183. Scholarly Leadership. (1 cr; S-N or Aud. Prereq-Advanced doctoral nursing student, #) Implications of dissertation research on advancing science, clinical practice, and leadership in nursing and health care. Principles of scholarly collaboration.

NURS 5190. Essentials of Holistic Health Assessment. (3 cr; A-F only. Prereq-Admission to MN Program) Health assessment knowledge/skills for nursing practice across life span. History taking, interviewing techniques, technical skills to perform complete, systematic health assessment, focused assessments for acute care settings.

NURS 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr; Stndt Opt. Prereq-Grad student or professional master of nursing [MN] student) Health assessment knowledge/skills for advanced nursing practice with patients across age span, including pregnancy. Selected nursing interventions, complementary therapies for application to specific populations/illnesses.


NURS 5205. Comprehensive Assessment of the Older Adults. (3 cr; A-F only. Prereq-Grad student, #) Assessment of the biological, physical, functional, cognitive, psychological, and social changes of aging.

NURS 5221. Refugee Health: Trauma, Stress, and Coping. (3 cr; Stndt Opt. Prereq-Grad student or #) War, displacement, and associated stressors affecting psychosocial health of refugees. Migration experiences, family/community dynamics, approaches for recovery. Creating community-based interventions to support refugee health.


NURS 5223. Assessment of Psychopathology for Advanced Practice Psychiatric/Mental Health Nursing. (4 cr; Stndt Opt. Prereq-Nurs grad or #) Advanced concepts from nursing theory and research, social sciences, neuropsychology, and neurophysiology used in the assessment of psychiatric symptoms and disorders across the age continuum. During clinical, develop proficiency in the assessment of psychopathology in clients with psychiatric symptoms.


NURS 5228. Pharmacology for Advanced Practice Nursing. (2 cr; A-F or Aud. Prereq-Grad nursing student or #) Overview of pharmacological principles for commonly used medication classes. Each drug class, related physiology. Pharmacodynamics and pharmacokinetics of drug classes and specific medications.


NURS 5300. Health Behavior Intervention: Theory and Application. (3 cr; Stndt Opt. Prereq-Grad or #) Interdisciplinary course examines theoretical foundations and research base of intervention strategies to promote health behavior acquisition, behavioral change, and maintenance for individuals (and groups). Critical examination of health behavior and patterns and health risk assessment; approaches to program creation.

NURS 5310. Interprofessional Teamwork for Health Professionals. (1 cr; S-N or Aud. Prereq-Student in [nursing or dentistry or medicine or pharmacy or public health or masterís in health care administration]) Introductory experience to interprofessional teamwork skills. Focuses on patient-centered care.

NURS 5340. Group as a Health-Care Intervention. (2 cr; Stndt Opt. Prereq-Grad or #) Theoretical concepts and research findings from the areas of group therapy and dynamics are applied in the development of a model for using group as an intervention for various client populations.

NURS 5501. Professional Issues in Nurse-Midwifery. (1-2 cr; max 2 cr) S-N or Aud. Prereq-Nurs grad major, #) Analysis of professional issues that confront and impact the practice of certified nurse-midwives. History and development of the professional organization including certification, legislation, ethical dimensions, public policy, and clinical practice issues.
Courses

NURS 5522. Sociopolitical Context of Women’s Health. (1-2 cr [max 3 cr]; S-N or Aud. Prereq-Grad student or #) Women’s health issues from multidisciplinary perspective. Sexual/reproductive health issues across life span. Sociocultural issues affecting health, such as poverty/violence.

NURS 5604. Advanced Health Assessment and Interventions with Adolescents. (2 cr; Stdnt Opt. Prereq-CPsy 5303 or equiv or #) Integrates knowledge from nursing, public health, health behavior, and adolescent development as framework for developing health assessment/intervention strategies for clinical practice with adolescents.

NURS 5800. Nursing Topics. (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-#) Course allows students to study a topic not included in regular courses, or for faculty to offer a course to determine interest in a topic.


NURS 5803. Transcultural Nursing: Theories and Issues. (2 cr; Stdnt Opt. Prereq-Cultural anth course or #) Study of cultural factors that influence theories, issues, and nursing care practices in diverse cultures and subcultures. Emphasis on nursing within international systems of health care and nursing practices related to various health-illness systems in this country and worldwide.

NURS 5805. The ‘M’ Technique. (1 cr; S-N or Aud. Prereq-Undergrad nursing student or grad student in health sciences or health professional) Scientific/theoretical foundations/practice of ‘m’ technique, a touch therapy for promoting relaxation by topically administering essential oils. Appropriate applications. Demonstration/practice of technique. Interdisciplinary course.


NURS 5808. American Indian Health and Health Care. (2 cr; Stdnt Opt. Prereq-Upper div or grad student or #) Examines health care and health care delivery in diverse nations in Minnesota within historical/cultural contexts. Epidemiology of major health conditions, health services, traditional Indian medicine, health beliefs. Opportunities for contact with Native American community.

NURS 5812. Global Health Through Study Abroad. (2-3 cr [max 3 cr]; S-N only. Prereq-#) Nursing as a global profession and the issues that impact health of populations worldwide.


NURS 5830. Advanced Clinical Nursing. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-Grad nursing major, #) Independent study or faculty seminar on special clinical topic.

NURS 5900. Introduction to Principles and Practice of Anesthesia. (6 cr; A-F or Aud. Prereq-Grad student in nurse anesthesia) Administration of anesthesia. Application in operating room setting under one-to-one guidance of Certified Registered Nurse Anesthetist (CRNA).


NURS 5902. Research Dissemination. (2 cr; A-F or Aud. Prereq-5910) Examination/application of principles used to deliver anesthesia by nurse anesthetists to special populations.


NURS 5912. Theoretical Foundations of the Discipline. (3 cr; Stdnt Opt. Prereq-5810 or equiv, knowledge of phi of sci) Paradigms in nursing and related methods of inquiry, knowledge structure and projection of needs for further knowledge development and testing.

NURS 5913. Theory Development in Nursing. (3 cr; S-N or Aud. Prereq-8100 or equiv, 8112 or #) Strategies for theory development; synthesis of theoretical formulations in nursing using selected inductive and deductive theory development strategies.

NURS 5915. Integrated Seminar in Nursing Informatics. (3 cr; A-F or Aud. Prereq-Doctoral student, #) Problem-based topics related to nursing and health informatics theory, measurement, and ethical/policy issues. Interdisciplinary, cross-institutional relationships. Interpersonal dynamics that support trust-building exchanges.

NURS 5916. Clinical Decision Support: Theory and Application. (3 cr; A-F only. Prereq-5115 or [HINF 5430, HINF 5431] or #) Principles/concepts of knowledge management and decision making. Students design a clinical decision support intervention. Legal, ethical, and practical issues related to its implementation and maintenance of CDS interventions.

NURS 5921. Health Behaviors and Illness Responses. (3 cr; A-F or Aud. Prereq-Doctoral student or #) Theories of health behaviors and responses to illness are analyzed/evaluated. Multivariate research designs. Speciation of testable, descriptive, dynamic models for health/illness that incorporate culture, biology, environment, and health systems for diverse individuals, families, communities, and populations.

NURS 5924. Family Health Theory. (2-3 cr [max 3 cr]; Stdnt Opt. Prereq-8100 or #) Emerging theory in family nursing science. Related theories. Research on family systems for structuring a systemic framework to examine clinical problems related to family health care. Applications to selected phenomena of interest to health care.

NURS 5934. Interventions and Outcomes Research. (3 cr; A-F or Aud. Prereq-8121, PhD student, #) Design/evaluation of intervention/outcomes research. Use of advanced experimental design and multivariate statistical approaches to evaluate theory-based interventions with longitudinal outcomes in context.

NURS 5940. Moral and Ethical Positions in Nursing. (3 cr; Stdnt Opt. Prereq-Grad nurs major or #) Synthesis of ethical positions, from nursing perspective, on health-related issues at individual, group, population, and policy levels. Normative ethics, theoretical basis for positions taken, and contextual implications for subsequent action.

NURS 5952. Scholarship in Health Care Ethics. (3 cr; A-F only. Prereq-Doctoral student or #) Analyze the underlying values in the concepts and discourses of health/disease. Evaluate ethical frameworks regarding their capability to address issues in health care. Analyze/discuss issues related to the responsible and ethical conduct of research.

NURS 5970. Research in Nursing. (3 cr; Stdnt Opt. Prereq-[P|B]8170 or inferential stat course taken within two yrs) Research process/methods appropriate for problems relevant to nursing. Critique of research studies, proposal development.

NURS 5971. Qualitative Research Design and Methods. (5-6 cr [max 4 cr]; Stdnt Opt. Prereq-8170 or equiv) Overview and comparative analysis of selected qualitative research methods and analytic strategies. Focuses on developing rigorous qualitative designs that contribute to development of nursing and health care knowledge for diverse populations.

NURS 8173. Principles and Methods of Implementing Research. (3 cr; Stdt Opt. [S] SAPH 8173. Prereq-8114 or other 8xxx grad research methods course, 2 grad stat courses) Integrates scientific, statistical, and practical aspects of research. Integrates new relationships among design, sample selection, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences required.


NURS 8176. Research on Decision Making in Health Care. (3 cr; Stdt Opt. Prereq-One graduate-level research course) Conceptualization of the research on decision making about health care. Formulating research proposals to investigate health care decisions by health care professionals, health care policy makers, patients/clients, or families.

NURS 8177. Advanced Nursing Research Practice: Competencies. (3 cr; Prereq-PhD nursing student, #, adviser consent) Students collaborate with research team under supervision of faculty mentor in designing/conducting a health-related research project.

NURS 8178. Methods for the Study of Family Health Phenomena. (3 cr; Stdt Opt. Prereq-B124, B100 or equiv or #) Conceptual and methodological approaches in study of family health phenomena from nursing perspective. Research designs formulated to study questions in this area.


NURS 8180. Doctoral Proseminar I: Scholarly Development. (1 cr; S-N or Aud. Prereq-Doctoral nursing student) Transition to doctoral study. Begins socialization process to role of nursing scholar/scientist. Career trajectories of nursing scholars who have pursued various roles.

NURS 8182. Policy Implications of Nursing Research. (1 cr; S-N only. Prereq-Nursing doctoral student or #) Nursing research as a foundation for health policy. Research utilization for resolution of global, national, and state policy issues affecting population health and health service delivery. Political analysis to effect policy change.

NURS 8185. Qualitative Data Analysis for Health Care Research. (3-4 cr [max 4 cr]; Stdt Opt. Prereq-B171 or grad course in qualitative research methods) Techniques for descriptive, interpretive, and analytic data. Data preparation, management, and analysis. Transforming data from multiple texts to theoretical conceptualizations. Writing, dissemination of findings.

NURS 8190. Critical Review in Health Research. (2 cr; A-F or Aud. Prereq-Advanced statistics coursework or #) Skills needed to critique a body of scientific literature in focused areas of nursing research and related fields. Construction of literature reviews for planning research projects and for research utilization.

NURS 8195. Special Topics in Nursing Research. (1-6 cr [max 6 cr]; Stdt Opt. Prereq-#) Seminar and/or individual study of research design, methodologies, or instruments.

NURS 8194. Problems in Nursing - Plan B. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-[B100 or [P]B100], [B170] or [P][B170]) Using a scholarly process to address a specific issue relevant to science/practice of nursing

NURS 8195. Mixed Methods in the Social, Behavioral, and Applied Health Sciences. (3 cr; A-F only, Prereq-#) Integrate qualitative strategies with quantitative approaches in research designs. Strengths/challenges of using mixed-methodological frameworks when studying the etiology of phenomena or evaluating clinical interventions.

NURS 8240. Advanced Practice Nursing: Roles and Issues. (2 cr; Stdt Opt. Prereq-Admission to advanced practice area of study or #) Most current relevant professional/health care issues affecting diverse advanced practice nursing roles. Role theory, practice models, interdisciplinary team functions, reimbursement, certification, scope of advanced nursing practice.

NURS 8241. Health Care Leadership for a Changing World. (2 cr [max 3 cr]; Stdt Opt. Prereq-AHC grad student or #) Application of leadership theory/research to strengthen students’ capacity to facilitate change in health care delivery system.

NURS 8242. Population Focused Health Care Delivery Systems. (2 cr; Stdt Opt. Prereq-Grad nurs student or #) Health care organizations/delivery systems, their relation to health of diverse populations. Models of population focused care, use of research to improve health care delivery, effect of economic/social factors on health care/services.

NURS 8311. Specialized Focus in Research-Based Clinical Reasoning and Management in Acute Care. (3 cr; Stdt Opt. Prereq-[B200, B201, B140, B170, B240, B303, B305, B309, advanced pharmacology, [pathophysiology or immunobiology]) Synthesis/utilization of knowledge/research in care of adults with acute/critical illness. Participation in a clinical area of interest in advanced decision making and in management of clients requiring restorative care.

NURS 8314. Intervention Models for Adults/Elders with Chronic Health Conditions. (3-4 cr [max 4 cr]; A-F or Aud. Prereq-[B522, B500, B100, B140, B170]) Development of theory-/research-based nursing intervention models for adults/elders with chronic health conditions. Students implement/evaluate intervention models in an advanced practice role with chronically ill adults/elders.

NURS 8315. Advanced Practice Nursing for Adults. (4-5 cr [max 5 cr]; A-F or Aud. Prereq-[B522, B500, B100, B140, B170]) Development of clinical expertise in provision of advanced nursing care to adults with acute health problems needing restorative care. Students utilize theory/research to manage/evaluate acute health problems in a selected adult specialty area.

NURS 8316. Implementing Advanced Practice Roles in Adult Nursing. (4 cr; A-F or Aud. Prereq-[B522, B500, B100, B170, 8131, 8315]) Clinical nurse specialist roles of case management, teaching, consultation, and collaboration. Students use theory/research to provide advanced nursing care to adults. Graduate level course for nurses having specialty role in adult nursing.

NURS 8320. Multidisciplinary Seminar on Social Perspectives of Aging. (3 cr; Stdt Opt) Literature/policy on key social aspects of aging, emphasizing service, policy, and ethical implications; generation of research questions.


NURS 8322. Primary Health Care for Elders. (3-5 cr [max 6 cr]; A-F or Aud. Prereq-B8231, #) Data-based primary care management of common acute/chronic conditions of elderly. Physiological, psychosocial, and pharmacological interventions. Age-related, cultural, family, and community variations. Implementation, evaluation of interventions.

NURS 8323. Advanced Nursing Care of the Elderly II: For Nurse Practitioners. (5-6 cr [max 6 cr]; A-F or Aud. Prereq-B8322, 8xxx advanced gerontological nurs course, grad nurs major, #) Synthesis and application of theory and research to effectively implement advanced gerontological nursing practice. Focuses on comprehensive primary care management across settings, evaluation of care, role implementation, and influences of contextual factors on health care services for the elderly.

NURS 8324. Advanced Nursing Care of the Elderly II: For Clinical Nurse Specialists. (6 cr; A-F or Aud. Prereq-B8322, 8xxx advanced gerontological nurs course, grad nurs major, #) Synthesis and application of theory and research to effectively implement as an advanced gerontological nurse. Comprehensive client care management across settings, evaluation of care, role implementation, and influences of contextual factors on health care services for the elderly.

NURS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

NURS 8340. Advanced Practice Psychiatric/Mental Health Nursing with Individuals and Their Families. (7 cr; S-N or Aud. Prereq-Grad nurs major, #) Clinical practice provides experiences for developing advanced practice roles in variety of healthcare settings.

NURS 8341. Advanced Practice Psychiatric/Mental Health Nursing in Groups and Community. (7 cr; Stdt Opt. Prereq-[B5340, B5340, [P]B8240, [P]B8240]) Application of theory and research to advanced practice psychiatric/mental health nursing with groups and community systems, including populations at risk. Clinical practice provides experiences for developing advanced practice roles in variety of healthcare settings.

NURS 8360. Advanced Clinical Nursing. (1-6 cr [max 6 cr]; Stdt Opt. Prereq-Grad nurs major, #) Independent study or faculty seminar on special clinical topic when indicated.

NURS 8361. Special Topics in Nursing. (1-4 cr [max 4 cr]; Stdt Opt. Prereq-Grad nurs major, #) Students select and study a topic of interest.
Focus on age-specific, family-centered nursing assessment and intervention of minor acute and chronic conditions of children within family context. Emphasis on nursing intervention strategies include diagnostics, therapeutics, education, and follow-up evaluation of outcomes.


NURS 8459. Advanced Nursing Care of Children With Acute Illness for Pediatric Clinical Nurse Specialists. (2 cr; Stdt Opt. Prereq-Nursing grad student admitted to pediatric clinical nurse specialist area of study or #) Application of theory/research to effectively implement pediatric clinical nurse specialist role. Focuses on comprehensive care management across settings, evaluation of care, role implementation, and contextual factors affecting health care for children with special health needs and families.


NURS 8451. Primary Care Practicum: Health Assessment and Care of Well Children. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-8500, [P]8450, #) Focus on age-specific, family-centered nursing assessments/interventions to promote wellness of children, infants through adolescence. Emphasizes compiling/evaluating interventions for children/families. Practicum includes exposure to models of primary prevention.


NURS 8502. Reproductive Health Care for Women at Risk. (2-6 cr [max 6 cr]; Stdt Opt. Prereq-8503 or 8520) Theoretical and research basis for advanced practice nursing care of women and infants at risk for medical and/or psychosocial problems. Selected high-risk perinatal and complicated gynecological and neonatal conditions.
Occupational Therapy (OT)

Department of Physical Medicine and Rehabilitation

OT 5121. Issues in Mental Health. (1 cr; S-N or Aud. Prereq-One course gen psych, one course abnorm psych) Psychiatric/neuropsychological assessment/treatment. Issues related to medical/community management and to roles of OT/PT with respect to clients with mental health needs. Interaction between physical/mental health and disability.

OT 5122. Descriptive Neurology. (2 cr; A-F or Aud. Prereq-OT student or #) Relates neuroanatomical/neuropsychological principles to neurological conditions commonly seen in occupational/physical therapy practice.


OT 5182. Functional Neuroanatomy and Neuropsychology. (4 cr; A-F or Aud. Prereq-Registered occupational therapy student or #) Neuronalanatomy structures as functional systems, basic neurophysiologic concepts. Emphasizes applications for understanding/treating physical dysfunctions.

OT 5300. Concepts for Occupational Therapy Practice. (4 cr; A-F or Aud. Prereq-enrolled OT student or #) Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.

OT 5313. Therapeutic Occupation. (4 cr; A-F or Aud. Prereq-enrolled OT student or #) Occupational therapy philosophy, history, and frames of reference. Activity analysis applied to purposeful, therapeutic activities for individuals and groups.


OT 5342. Compensatory Rehabilitation: Evaluation and Intervention II. (4 cr; A-F or Aud. Prereq-5300, 5313 or #) Assessment of daily living performance areas; adaptation techniques to compensate for performance deficits. Level I fieldwork experience.

OT 5343. Speciality Topics: Evaluation and Intervention III. (4 cr; A-F or Aud. Prereq-5342 or #) Applies critical thinking model to assessment/intervention of selected patient populations with mental/physical problems requiring specialized approaches. Focus on habilitation/rehabilitation of populations with multiple performance component deficits. Fieldwork.

OT 5344. Neurorehabilitation: Evaluation and Intervention IV. (5 cr; A-F or Aud. Prereq-5343 or #) Assessment/intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance component deficits.

OT 5360. Dynamics of Group Models. (2 cr; A-F or Aud. Prereq-5313 or #) Application of group/team dynamics in diverse professional settings.

OT 5370. Theory of Occupation. (1 cr; A-F or Aud. Prereq-enrolled OT student or #) Occupational therapy frames of reference, role of activity, and historical development of profession.

OT 5375. Community Resources and Health-Care Issues. (2 cr; A-F or Aud. Prereq-5300, 5342 or #) Analysis of community health-care systems, including cultural/family influences on individual health and decision making. Students identify current trends in health care and determine responses to them at social, political, or legislative level.

OT 5376. Adult Education and Planning. (1 cr; A-F or Aud. Prereq-5313 or #) Skills needed to plant, implement, and evaluate adult educational programs/materials for patient/family education, peer/professional education, and education of others in order to carry out therapeutic interventions. Student teaching unit, community based activity.
Courses

OT 5380. Management of Occupational Therapy Services. (3 cr; A-F or Aud. Prereq-[5360, 5375, 5376] or #) Administration/management of occupational therapy services within managed care environment. Issues in Medicare, HMOs, TQM, consultation, human resources, promotion of profession. Emphasizes program development in current organizational structures.

OT 5391. Occupation Across the Life Span. (3 cr; A-F or Aud. Prereq-[5375, 5376] or #) The well elderly, school therapy, work-related injuries/industrial rehabilitation. Fieldwork.

OT 5392. Research in Occupational Therapy. (3 cr; A-F or Aud. Prereq-5333 or #) Analysis of scientific literature, development of research proposals.

OT 5393. Functional Anatomy and Kinesiology. (4 cr; A-F or Aud. Prereq-enrolled OT student or #) 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.

OT 5394. Orthotics. (3 cr; A-F or Aud. Prereq-5341 or #) Design, analysis, and construction of orthotic devices.


OT 8301. Clinical Problems in Occupational Therapy. (1-6 cr [max 16 cr]; S-N or Aud. Prereq-5392 or Plan B OT student or #) Individual, concentrated study of a problem in occupational therapy. Completion of Plan B project.

OT 8302. Fieldwork Education in Occupational Therapy I. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-Occupational therapy student or #) Supervised clinical practice in affiliated hospitals and community agencies. Students apply critical thinking through supervised application of theory/skills.

OT 8303. Fieldwork Education in Occupational Therapy II. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-Occupational therapy student or #) Supervised clinical practice in affiliated hospitals and community agencies. Students apply critical thinking through supervised application of theory/skills.

OT 8304. Fieldwork Education in Occupational Therapy III: Optional. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-Occupational therapy student or #) Optional fieldwork experience involving supervised practice in clinic or community agency with speciality focus. Sample topics: hand therapy, school therapy, clinical research. Students apply critical thinking through supervised application of theory/skills.

OT 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

OT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Ojibwe (OJIB) Department of American Indian Studies College of Liberal Arts

OJIB 5106. Advanced Ojibwe Language I. (3 cr [max 12 cr]; A-F or Aud) Focuses on immersion method.

OJIB 5109. Advanced Ojibwe Language II. (3 cr [max 12 cr]; A-F or Aud) Focuses on immersion method.

Ophthalmology (OPH) Department of Ophthalmology Medical School

OPH 8101. Clinical Ophthalmology. (5 cr; Stdnt Opt)

OPH 8103. Pediatric Ophthalmology, Strabismus, and Hereditary Disorders. (2 cr; Stdnt Opt)

OPH 8106. Strabismus Management. (1 cr; Stdnt Opt. Prereq-Med grad or grad in vet med)

OPH 8110. Optics, Refraction, and Contact Lens. (2 cr; Stdnt Opt)

OPH 8111. Intraocular Inflammation, Uveitis, Ocular Tumors. (2 cr; Stdnt Opt. Prereq-Grad physician or grad in vet science)

OPH 8112. Retina and Vitreous. (2 cr; Stdnt Opt)

OPH 8113. Basic and Clinical Neuro-ophthalmology. (2 cr; Stdnt Opt)

OPH 8116. Glaucoma, Lens, and Anterior Segment Trauma. (2 cr; Stdnt Opt. Prereq-Grad physician or grad in vet science)

OPH 8117. Orbit, Plastics, and Trauma. (2 cr; Stdnt Opt. Prereq-Physician or vet med student)

OPH 8118. General Medical Problems. (2 cr; Stdnt Opt. Prereq-Grad physician or grad in vet science)

OPH 8119. Clinical Pathological Correlations in Ophthalmology. (1 cr; Stdnt Opt. Prereq-Physician or vet med student)

OPH 8120. Scope of Ophthalmic Pathology. (1 cr; Stdnt Opt. Prereq-Physician or vet med student)

OPH 8125. Diseases of the Cornea and External Eye. (2 cr; Stdnt Opt)

OPH 8126. Diseases of the Cornea and External Eye. (2 cr; Stdnt Opt)

OPH 8131. Practical Ocular Surgery. (2 cr; Stdnt Opt)

OPH 8142. Ophthalmic Pathology Laboratory. (1 cr; Stdnt Opt)

OPH 8153. Research in Ophthalmology. (0 cr; Stdnt Opt)

OPH 8154. Seminar: Ophthalmology. (0 cr; Stdnt Opt)

OPH 8155. Special Topics in Ophthalmology. (1-2 cr [max 2 cr]; Stdnt Opt)

OPH 8701. Neuro-ophthalmology. (1 cr; Stdnt Opt)

Oral and Maxillofacial Surgery (OSUR) Department of Diagnostic and Surgical Sciences School of Dentistry

OSUR 5257. Ambulatory General Anesthesia for the Oral and Maxillofacial Surgeon. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Clinical rotation involving experience in outpatient management and using intravenous sedation and general anesthesia.

OSUR 5276. Medicine Rotation for the Oral and Maxillofacial Surgeon. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Clinical rotation at Fairview-University Medical Center under the direction of the Internal Medicine Department. Involves workup, admission, and daily management of patients on medical service, specifically cardiology and pulmonary.

OSUR 5277. Physical Diagnosis for Oral Surgery Residents. (0-6 cr [max 6 cr]; A-F or Aud. Prereq-Participation in oral and maxillofacial surgery training program) Six-week didactic course coupled with evaluation of patients.

OSUR 8250. Oral and Maxillofacial Surgery Rotation for the Oral and Maxillofacial Surgeon. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Rotations at assigned oral and maxillofacial surgery clinics and operating rooms at Fairview-University Medical Center, Hennepin County Medical Center, Veterans Administration Medical Center.


OSUR 8253. Case Presentations and Chief Conference. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Topic-oriented journal reviews. Guest oral surgeons, specialists, or chief resident present topics in case-based format.

OSUR 8254. Oral and Maxillofacial Surgery Resident Presentations. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Contemporary subjects researched and presented by current residents.

OSUR 8255. General Surgery Rotation for the Oral and Maxillofacial Surgeon. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Clinical rotation on general surgery, neurosurgery, and surgical intensive care unit at Hennepin County Medical Center. Seminars, clinics, and operating room experience.

OSUR 8256. Contemporary Anesthesia Literature Review. (0-6 cr [max 6 cr]; S-N only. Prereq-Participation in oral and maxillofacial surgery training program) Seminar presentation format of current publications that address anesthesia management for the oral and maxillofacial surgery patient.
OLPD 5061. Ethnographic Research Methods. (3 cr; Stdnt Opt)
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.

OLPD 5080. Special Topics: Educational Policy and Administration. (1-3 cr [max 24 cr]; Stdnt Opt)
Topical issues in educational policy/administration.

OLPD 5087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr]; Stdnt Opt)
Shared responsibility of students/instructor in presentation of topics.

OLPD 5095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr]; Stdnt Opt)
Course or independent study on specific topic within department program emphasis.

OLPD 5096. Internship: Educational Policy and Administration. (1-9 cr [max 24 cr]; Stdnt Opt)
Internship in elementary, secondary, general, or postsecondary administration, or other approved field related setting.

OLPD 5102. Knowledge Constructions and Applications in International Development Contexts. (3 cr; Stdnt Opt)
Interrelationships of knowledge capital (noetic symbolic resources) and culture through intrinsic, cross/multicultural perspectives. Distinguishing knowledge from information/data. National/ international developments occurring along basic/ applied knowledge paths.

OLPD 5103. Comparative Education. (3 cr; Stdnt Opt)
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.

OLPD 5104. Strategies for International Development of Education Systems. (3 cr; A-F or Aud. Prereq-Grad student)
Strategies for improving quality/efficiency of schooling in developing countries. Introduction to current research on what policy/programmatic interventions have proven most successful in increasing access, raising quality, and improving efficiency of education in developing countries.

OLPD 5211. Educational Reform in International Context. (5 cr; Stdnt Opt)
Critical policy analysis of educational innovation and reform in selected countries. Use theoretical perspectives and a variety of policy analysis approaches to examine actual educational reforms and their implementation.

OLPD 5212. Critical Issues in International Education and Educational Exchange. (3 cr; Stdnt Opt)
Analysis of comprehensive policy-oriented frameworks for international education; practices of U.S. and other universities; conceptual development of international educational exchange and its practical application to programs, to employment choices, and to pedagogy.

OLPD 5216. Anthropology of Education. (3 cr; Stdnt Opt. [SANTH 5218])
Insights from educational anthropology for educators to address issues of culture, ethnicity, and power in schools.

OLPD 5312. Intercultural Education and Training: Theory and Application. (3 cr; Stdnt Opt)
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.

OLPD 5411. Global Youth Policy and Leadership: Comparative Youth Policy and Leadership. (1 cr; A-F or Aud)
Comparative approach to public responses at global level to youth development and leadership issues. Social systems such as education, health, employment, and recreation. Role of individuals, communities, governments, and international organizations in providing programs/services.

OLPD 5412. Youth Futures in International and Global Contexts. (3 cr; A-F only. Prereq-CIDE 5211 or 5212)
Strategic trends in global youth development. Implications. Reconciling trends with normative scenarios with respect to presence, absence, and projected likelihood of suitable policies, marketable collaborations, and funding.

OLPD 5414. Cultural Models, Simulations, and Games. (3 cr; Stdnt Opt. Prereq-Upper division or grad student)
Use of dynamic educational models, simulations, and games in international education/development courses. Storytelling, simulated intercultural encounters, imagination, knowledge construction/applications, time, ethics, computer simulations, games, systems.

OLPD 5420. Special Topics in International Education. (1-8 cr [max 12 cr]; Stdnt Opt)
Exploration of issues, methods, and knowledge in areas of adult education.

OLPD 5501. Strategies for Teaching Adults. (3 cr; A-F or Aud. Prereq-Grad student only)
Psychological theories of adult learning; learning styles and personality types; teaching styles; group and team learning; moderating and studying circles; teaching technologies and distance learning; gender, race, and cultural communication. Applications of strategies.

OLPD 5502. Perspectives of Adult Learning and Development. (3 cr; Stdnt Opt)
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.

OLPD 5503. Methods of Teaching Adult Literacy. (3 cr; Stdnt Opt)
Approaches to teaching reading, writing, and mathematics to adults. Technology as a teaching tool. Teaching students with disabilities or with cultural/ gender differences.

OLPD 5504. Designing the Adult Education Program. (3 cr; A-F or Aud)
Designing and implementing educational programs for adults. Application of concepts, theories, and models in different adult learning situations.

OLPD 5505. Introduction to the Undereducated Adult. (1 cr; A-F or Aud)
Definitions of literacy in workplace, community, and family. Issues: poverty/welfare, ethnicity, cultural diversity, social class, language/learning, immigrants.

OLPD 5512. Introduction to Adult Literacy in the Workplace. (1 cr; A-F or Aud. Prereq-5211 or ADED 5211)
Review workplace literacy programs, funding, program planning, and needs assessment. Reaching/recruiting workers. Role of employers and the unions. Writing for low literacy employees.

OLPD 5513. Introduction to Adult Literacy in the Community. (1 cr; A-F or Aud. Prereq-5211 or ADED 5211)
Community programs in United States. Literacy building. Family literacy skills. Correctional education in reintegrating offenders back into community. Integrating people with disabilities through community literacy programs. Literacy/development in developing countries. Reaching/recruiting indigenous, migrant, immigrant groups. Social action approaches to literacy education.

OLPD 5524. Formal Assessment of Adult Literacy. (1 cr; A-F or Aud. Prereq-5211 or ADED 5211)
Assessment of adult English/literacy skills for work, family, community, and continuing education. Formal testing policy, techniques, standardized tests. Assumptions about testing, cultural bias, and interpretation of formal tests. Test preparation programs.

OLPD 5525. Informal Assessment of Adult Literacy. (1 cr; A-F or Aud. Prereq-5211 or ADED 5211)
Informal assessment of adult English/literacy skills for work, family, community, and further education. Informal testing techniques, setting educational goals, formal versus informal assessment.

OLPD 5526. Advanced Assessment of Adult Literacy. (1 cr; A-F or Aud. Prereq-5211 or ADED 5211)
Applications/case studies. Educational planning for work, family, community.

OLPD 5533. Methods of Teaching Beginning Adult Literacy. (1 cr; A-F or Aud. Prereq-5211 or ADED 5211)
Learning English/literacy as an adult. Initial approaches to teaching reading, writing, and communications skills. Theories of learning, curriculum design. Technology as teaching tool. Teaching students with disabilities or with cultural/ gender differences.

OLPD 5534. Methods of Teaching Intermediate Adult Literacy. (1 cr; A-F or Aud. Prereq-[5211 or ADED 5211]. [5233 or ADED 5233])
Learning English/literacy as an adult. Approaches to teaching reading, writing, and communications skills. Communication/comprehension in oral/written English. English reading/oral communication skills for workplace. Evaluating commercial materials/software.

OLPD 5535. Methods of Teaching Advanced Adult Literacy. (1 cr; A-F or Aud. Prereq-[5211 or ADED 5211], [5234 or ADED 5243])
Approaches to teaching reading, writing, study, and communication skills. Preparing students for college/ continuing education. English in workplace and on Internet. Problem solving, analytical thinking. Technology as teaching tool. Evaluating commercial material/software.

OLPD 5596. Field Experience in Adult Education. (3-6 cr [max 6 cr]; S-N or Aud)
Supervised fieldwork and practice. Preparations and evaluations of adult education practices.

OLPD 5602. Educational Policy: Context, Inquiry, and Issues. (3 cr; Stdnt Opt)
Review of social science concepts/research in considering educational policies/issues, process of inquiry that affect policy development, implementation, evaluation. Focus on pre-K-12. Role of educational leaders, administrators.

OLPD 5610. Data-Driven Decision Making I. (1 cr; Stdnt Opt. Prereq-Broadband Internet access, a newer computer)
Data-driven decision making for schools/advertisers. Focuses on data collection/analysis needs of educational organizations and on use of appropriate software/databases to collect, manage, analyze, and report school information.

OLPD 5611. Data-Driven Decision Making II. (1 cr; Stdnt Opt. Prereq-[5310 or EdPA 5310], broadband Internet access, newer computer)
Continuation of 5310. Data-driven decision making for schools/administrators. Hands-on training in students’ own school context and methodology to analyze data to make educational decisions.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>OLPD 5314</td>
<td>School Technology Safety and Security. (1 cr; Stdnt Opt. Prereq-Broadband Internet access, a newer computer)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5321</td>
<td>The Principal as Leader of High-Performing Schools. (3 cr; Stdnt Opt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5322</td>
<td>Leaders in the Superintendency and Central Office. (3 cr; Stdnt Opt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5323</td>
<td>Women in Leadership. (3 cr; Stdnt Opt. Prereq-Technology access)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5324</td>
<td>Strategic Financial Planning and Policy for Educational Leaders. (3 cr; Stdnt Opt. Prereq-Grad student pursuing license as elementary-secondary [principal or superintendent])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5331</td>
<td>The American Middle School. (3 cr; Stdnt Opt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5344</td>
<td>School Law. (3 cr; Stdnt Opt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5346</td>
<td>Politics of Education. (3 cr; A-F or Aud. Prereq-postbac, MED, or grad student)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5348</td>
<td>Leaders of Human Resources Administration. (3 cr; Stdnt Opt. Prereq- Designed for students working on licensure for [dir of community educ or superintendent or K-12 principal or dir of special educ])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5356</td>
<td>Disability Policy and Services. (3 cr; Stdnt Opt)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5361</td>
<td>Project in Teacher Leadership. (5 cr [max 6 cr]; S-N or Aud. [SCI 5178. Prereq-MED student in Teacher Leadership Program])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5364</td>
<td>Context and Practice of Educational Leadership. (3 cr; A-F or Aud) Current research/practice on educational leadership. Foci on creating school culture conducive to continuous improvement/change. Strategies for personal/organizational leadership in PK-12 settings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5368</td>
<td>Leadership for Special Education Services. (3 cr; Stdnt Opt. Prereq-Administrator or supervisor or professional responsible for managing general or special or alternative education program)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5372</td>
<td>Youth in Modern Society. (3 cr; Stdnt Opt) Youth in advanced societies and as a social entity; functions and roles in industrial society, family, politics and government, economy and work, welfare and religions, social movements, and subcultures; empirical research and cross-cultural perspectives.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5374</td>
<td>Leadership for Professional Development. (4 cr; Stdnt Opt. Prereq- Postbaccalaureate, at least 3 yrs teaching experience)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5377</td>
<td>Project in Teacher Leadership. (5 cr [max 6 cr]; S-N or Aud. [SCI 5178. Prereq-MED student in Teacher Leadership Program])</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5380</td>
<td>The Search for Children and Youth Policy in the U.S. (3 cr; Stdnt Opt) 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5385</td>
<td>Licensure Seminar: Program Policies and Inclusionary Leadership. (3 cr; S-N or Aud) Preparation for licensure program. Program overview, preassessment, reflective practice, APA writing, exit panel review, administrative employment interview.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5386</td>
<td>Leadership Portfolio Seminar. (1 cr; S-N or Aud. Prereq-5385 or [P]5385 or EDPA 5385) Development of electronic administrative licensure portfolio to earn endorsement for license as school superintendent, K-12 principal, director of special education, or director of community education.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5388</td>
<td>Leadership for Master(ful) Scheduling. (2 cr; Stdnt Opt. Prereq-5387 or EDPA 5387) Work of high-performing professional learning communities. Implications for moving from building a master schedule to leadership for master(ful) scheduling of time, space, motion, and people. Hands-on work with infinite campus software/scheduling-building logic.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5389</td>
<td>Community Education Leadership. (3 cr; Stdnt Opt) Competencies of leadership, community relations, communication, community assessment, program development, program evaluation. Philosophy/administration of community/alternative education programs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5391</td>
<td>Special Education Law for Leaders. (1 cr; Stdnt Opt. Prereq-Designed for students working on licensure in PK-12 administration) Competencies of leadership, policy, and political influence. Legal/regulatory applications focusing on special education law.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5392</td>
<td>Special Education Finance: Program Models, Policy, and Law. (2 cr; Stdnt Opt. Prereq-[5324 or [P]5324 or EDPA 5324 or [PEDPA 5324], knowledge of special education) How special education revenue is a resource to accomplish student-related objectives. Revenue sources, compliance, budget monitoring. Key policy, case law, program models from perspective of director of special education.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5393</td>
<td>Leading School Finance Elections. (1 cr; S-N or Aud) Comprehensive planning model for conducting school finance elections. Emphasizes systems, strategies, and campaign tactics.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5394</td>
<td>Leadership in Community Education Finance and Law. (1 cr; S-N or Aud. Prereq-[5324 or EDPA 5324 or [PEDPA 5324] recommended) Interplay between finance and laws directly applicable to community education. MN Statute 124D, revenues/expenditures, and UFARS approached from frame of resource development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5396</td>
<td>Field Experience in PK-12 Administration: Authentic Practice in Leadership. (3 cr; max 12 cr); S-N or Aud. Prereq-#) Field experience or internship arranged for students seeking licensure as PK-12 principal/superintendent. Content/credit depend on licensure requirements specified in individual field experience agreement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5403</td>
<td>Tourism Studies Capstone Seminar. (3 cr; S-N or Aud. Prereq-Tourism studies major) Students present, critique, and discuss implications of supporting programs for tourism.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5404</td>
<td>The Business of Tourism. (3 cr; A-F or Aud) Introduction to major theories, concepts, skills, and techniques influencing tourism business/industry.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5405</td>
<td>Critical Issues in Business and Industry. (3 cr; Stdnt Opt) Identification and analysis of major current issues in business and industry education.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5411</td>
<td>Teaching Marketing Promotion. (3 cr; A-F or Aud) 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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OLPD 5452</td>
<td>Methods of Teaching Business and Marketing Concepts. (3 cr; A-F or Aud) Recent research/developments in teaching business concepts related to economics, business organization/management, business law, entrepreneurship, marketing, international business, information systems, accounting, risk management, and personal finance.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For definitions of course numbers, abbreviations, and symbols, see page 3.
OLPD 5454. Technical Development: Specialized. (1-12 cr [max 12 cr]; A-F or Aud.)
Students select/study technical processes/principles based on subjects they plan to teach, integrate specialized technical instruction in advanced/emerging areas.

OLPD 5457. Methods of Teaching Business Employment and Marketing Employment. (3 cr; A-F or Aud.)
Recent research/developments in teaching for business employment. Administrative support positions, accounting/information processing, marketing, sales, computer operations, other occupations using desktop computing.

OLPD 5475. Curriculum Development for Business and Marketing Education. (3 cr; A-F or Aud.)
Introduction to conceptual models for design/delivery of business/marketing education programs in secondary/postsecondary schools, in adult education settings, and in business/industry. Preparing programs of instruction for secondary/postsecondary level. Making decisions regarding course content.

OLPD 5476. Field Based Projects in Business and Industry. (1-4 cr [max 4 cr]; S-N or Aud)
Curricular, instructional, developmental, or evaluative problems and projects applicable to local school or business and industry situations.

OLPD 5480. Special Topics in Business and Industry Education. (1-4 cr [max 4 cr]; Stdnt Opt) Content varies by offering.

OLPD 5493. Directed Study in Business and Industry. (1-4 cr [max 4 cr]; Stdnt Opt) In-depth individual inquiry in the content areas related to business and industry.

OLPD 5496. Occupational Experience in Business and Industry. (1-10 cr [max 10 cr]; S-N or Aud. Prereq-)
Observation/employment in business/industry to develop technical/occupational competencies. Includes 100 clock hours of supervised work experience per credit.

OLPD 5501. Principles and Methods of Evaluation. (3 cr; Stdnt Opt. [S] 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.

OLPD 5502. Theory and Models of Evaluation. (3 cr; Stdnt Opt. Prereq-5501 or EPSY 5243 or introductory program evaluation course)
Evaluation theories/models currently available to practitioners. Communication with clients about value/utility of program. Systems theory.

OLPD 5521. Cost and Economic Analysis in Educational Evaluation. (3 cr; Stdnt Opt)
Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluation of educational programs and programs.

OLPD 5524. Evaluation Colloquium. (1 cr [max 24 cr]; S-N or Aud. [S] EPSY 5246. Prereq-5501 or EDPA 5245])
Informal seminar of faculty/students. Issues/problems of program evaluation.

OLPD 5528. Focus Group Interviewing Research Methods. (3 cr; Stdnt Opt)
Skills needed to conduct focus group interviews. Students conduct a focus group study and report results at final class session.

OLPD 5601. Foundations of Human Resource Development. (1 cr; Stdnt Opt)
Introduction to human resource development as a field of study and practice.

OLPD 5602. Economic Foundation of Human Resource Development. (1 cr; Stdnt Opt. Prereq-5601 or HRD 5301)
Introduction to economics as core discipline supporting theory/practice of human resource development.

OLPD 5603. Psychological Foundation of Human Resource Development. (1 cr; Stdnt Opt. Prereq-5601 or HRD 5301)
Introduction to psychology as core discipline supporting theory/practice of human resource development.

Introduction to system theory as a core discipline supporting the theory and practice of human resource development.

OLPD 5605. Strategic Planning through Human Resources. (3 cr; A-F or Aud. Prereq-5607 or 5615 or HRD 5201 or HRD 5301)
Strategic nature of organizations. How HRD can align its goals with those of organization. Strategic planning, systems thinking. Ways HRD managers can become strategic players in organization.

OLPD 5606. Evaluation in Human Resource Development. (3 cr; A-F or Aud.)
Evaluation of human resource development efforts from the perspective of impact on organizations, work processes, and individuals, plus follow-up decisions.

OLPD 5607. Organization Development. (3 cr; A-F or Aud. Prereq-Grad student only)
Introduction to major concepts, skills, and techniques for organization development/change.

OLPD 5610. Survey of Research Methods and Emerging Research in Human Resource Development. (3 cr; A-F or Aud. Prereq- [Registered, in attendance] at conference of Academy of HRD)
Role of research in HRD. Standards/criteria for evaluating research, critique of conference research papers, identification of emerging research themes. Offered in conjunction with the annual conference of Academy of HRD.

OLPD 5611. Facilitation and Meeting Skills. (1 cr; Stdnt Opt)
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.

OLPD 5612. International Human Resource Development. (3 cr; Stdnt Opt. Prereq-Grad students only; urgd seniors with instr consent) Problems, practices, programs, theories, and methodologies in human resource development as practiced internationally.

OLPD 5615. Training and Development of Human Resources. (3 cr; A-F or Aud. Prereq-Grad student only)
Training/development of human resources in organizations. Process phases of analysis, design, development, implementation, and evaluation.

OLPD 5616. Training on the Internet. (3 cr; Stdnt Opt. Prereq-Grad student only)
Major concepts, skills, and techniques for giving and receiving training on the Internet.

OLPD 5619. Planning and Decision-Making Skills. (1 cr; Stdnt Opt)
Introduction to basic theories of planning and decision making typically used in process improvement interventions. Tools and methods for facilitating group decisions and problem solving.

OLPD 5620. Internship: Human Resource Development. (3 cr [max 6 cr]; A-F only. Prereq-5001)
Engage in international travel/study for one week with an HRD faculty leader. Visit a variety of sites in business and industry to become aware of how HRD is practiced outside the United States.

OLPD 5697. International Field Study in Human Resource Development. (5 cr [max 6 cr]; A-F only. Prereq-5001)
Issues, methods, and knowledge in HRD areas. Topics vary.

OLPD 5699. Internship: Human Resource Development. (1-10 cr [max 10 cr]; S-N or Aud. Prereq-[[3901 or HRD 3601], [5696 or HRD 3196], [3620 or 3640 or HRD 3201 or HRD 3301], [3202 or ADED 3101], undergrad] or [[5607 or HRD 5201 or HRD 5301], [5801 or WHRE 5001], grad student]) * Students apply/contract for human resource development positions.

OLPD 5701. U.S. Higher Education. (3 cr; Stdnt Opt)
U.S. higher/postsecondary education in historical/contemporary perspective. Emphasizes structure, history, and purposes of system as a whole.

OLPD 5704. College Students Today. (3 cr; Stdnt Opt. [S]EPSY 5451)

OLPD 5721. Race and Ethnicity in Higher Education. (3 cr; Stdnt Opt)
Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty. Historical perspectives.

OLPD 5724. Leadership and Administration of Student Affairs. (2-5 cr [max 3 cr]; Stdnt Opt. [S] EPSY 5421)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

OLPD 5728. Two-Year Postsecondary Institutions. (2-3 cr [max 3 cr]; Stdnt Opt)
Present status, development, functions, organization, curriculum, and trends in postsecondary, but nonbaccalaureate, institutions.

OLPD 5732. The Law and Postsecondary Institutions. (3 cr; Stdnt Opt)
Analysis of court opinions and federal regulations affecting postsecondary educational institutions.

OLPD 5734. Institutional Research in Postsecondary Education. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-[[5701, [EPSY 5231 or EPSY 8261], grad student]] * Scope, role, administration, research strategies, and evaluation of institutional research in postsecondary institutions. Methodologies, disciplinary foundations of research. Use of institutional, state, and national databases in addressing institutional missions/functions.

OLPD 5795. Plan B Research Design. (3 cr [max 6 cr]; A-F or Aud. Prereq-Grad student)
Foundation to design Plan B research project relevant to student’s professional interests. Literature review strategies to establish conceptual framework for project. Relates research question to design alternatives and to associated qualitative/quantitative analysis techniques. Issues such as human subjects and APA guidelines for preparing research papers.

University of Minnesota Fall 2012 Graduate Education Catalog

144

OLPD 5804. Leadership in WHRE. (2 cr; Stdnt Opt) Leadership, leadership roles/responsibilities. Application to work and human resource education.


OLPD 5808. Student and Trainee Assessment. (2 cr; A-F or Aud. [SHRD 5001]) Developing learning progress reporting systems/tests for skills instruction in business/industry. Evaluating instructional effectiveness. Applying tests/evaluation instruments to assess/report learning. Students develop each type of test and evaluation plan for a course.

OLPD 5811. Education for Work. (3 cr; Stdnt Opt) Examination of contextual bases underlying education for work; implications for practice.


OLPD 5813. Enhancing Work-based Learning Through Collaboration. (2 cr; Stdnt Opt) Interagency planning issues/programs relating to special populations for educational, business, and human service organization personnel, family members, and advocates.


OLPD 5815. Research in Postsecondary Developmental Education. (3 cr; Stdnt Opt. Prereq-Bachelor's degree, courses in [intro psychology, basic statistics]) Strategies for conducting three types of research that are critical to developmental education: placement test validation, program evaluation, and classroom research. Students read examples and learn what constitutes best practices in each type.

OLPD 5816. Distance Learning in Adult Education and Training. (3 cr; A-F or Aud) Distance learning concepts, theory, history, present practice, delivery systems, course design, major issues, future directions.


OLPD 5823. Work-Based Learning Policies. (2 cr; Stdnt Opt) Aims/purposes of federal, state, and local policies, related to work-based learning.


OLPD 5829. Course Development for Business and Industry. (2 cr; A-F or Aud) Designing instructional programs/courses that help learners develop desired competencies. Designing instruction for performance-based training and vocational/technical education. Developing course syllabus components that clarify course expectations. Developing academic/community-based elements that complement course goals. Reflect on and compare performance-based instruction with other curriculum models for the field.

OLPD 5841. Evaluation of WHRE. (3 cr; Stdnt Opt) Designing/conducting project, program, and systems evaluations in work and human resource education contexts/settings.

OLPD 5842. Global Program Delivery Techniques and Technology of Extension. (2 cr; A-F or Aud) 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.

OLPD 5851. Methods for Change in Developing Countries. (3 cr; A-F or Aud) Sociocultural and contextual parameters as they pertain to 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.

OLPD 5861. Instructional Methods for Business and Industry. (2 cr; Stdnt Opt) Theory/practice in instructional methods for career/technical education (CTE) instructors and human resources/development (HRD) professionals. How to select various teaching methods and plan for their delivery. Preparing an instructional methods plan to clarify course content, teaching methods selected, rationale for their selection, and how a student organization might facilitate student learning.

OLPD 5871. Teaching Entrepreneurship: Small Business Management. (3 cr; Stdnt Opt) Methods, organization, curriculum development and modification, and implementation of educational programs for entrepreneurs.

OLPD 5890. Special Topics in Work and Human Resource Education. (1-4 cr [max 4 cr]; Stdnt Opt) Topics vary.

OLPD 5893. Directed Study in WHRE. (1-4 cr [max 4 cr]; Stdnt Opt) Self-directed study, with faculty advice, in areas not covered by regular courses.

OLPD 5896. Teaching Internship: Introduction. (1 cr; S-N only. Prereq-Aomination to initial licensure program) Initial experiences in teaching profession. Observation of school organization/administration, seminars, relationship building with cooperating teachers, reflection on personal involvement as a beginning student teacher.


OLPD 5898. Teaching Internship. (3-8 cr [max 8 cr]; Stdnt Opt. Prereq-Aomination to initial licensure program) Teaching experience in a school system that provides programs for grades 5-12.

OLPD 5899. Teaching Internship: Extended. (1 cr; Stdnt Opt. Prereq-5898 or WHRE 5686) Teaching experience in a school system that provides programs for grades 5-12.

OLPD 8002. Critical Issues in Contemporary Education. (3 cr; Stdnt Opt. Prereq-EdPA or PhD student) Meanings of difference from sociological, psychological, historical, and cultural perspectives as related to current and emerging critical issues in education. Participants help design, facilitate, and present the course.

OLPD 8011. Doctoral Research Seminar I. (1 cr; S-N or Aud. Prereq-EdPA or WHRE doctoral student) Introduction/planning for individual program development, preliminary examinations, and dissertation prospectus. Modes of inquiry used in current research in education, databases relating to education, recent writings on literature synthesis, key contributions to education literature.

OLPD 8012. Doctoral Research Seminar II. (1 cr; S-N or Aud. Prereq-EdPA doctoral student) Introduction to quantitative/qualitative research approaches/methods. Nature of research, role of researcher, philosophical perspectives on research, ethical issues in conducting research.

OLPD 8013. Doctoral Research Seminar III. (1 cr; S-N or Aud. Prereq-EdPA doctoral student) Introduction to most important quantitative/qualitative approaches employed in educational policy research.


OLPD 8015. Research Design and Educational Policy. (3 cr; A-F only. Prereq-[8011 or EDPA 8011], OLDP PhD student) Logic of research design, from research questions and audience considerations, to selecting a design for collecting/analyzing quantitative, qualitative, and mixed-method data.

OLPD 8016. Research Design and Educational Policy. (3 cr; [max 6 cr]; Stdnt Opt. Prereq-[8015 or EDPA 8015], CEHD doctoral student, #) Logic of research design, from research questions to selecting a design for collecting/analyzing quantitative, qualitative, and mixed-method data. Writing proposals that build a reasoned statement of research problem.
OLPD 8020. Leadership: From Theory to Reflective Practice. (3 cr; A-F or Aud. Prereq-[5001 or EDPA 5001 or equiv], doctoral student) Leadership theory. Emphasizes seminal scholars’ work from related social science disciplines. Implications of theory for practice of leadership. Knowledge, behaviors, values, and skills needed in educational and other public settings.

OLPD 8022. Education and Globalization: Anthropological Perspectives. (3 cr; A-F or Aud) Anthropological/comparative perspectives used to understand educational processes in a globalized world. What can be gained by adopting translocal view of educational phenomena.

OLPD 8087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr]; Stdnt Opt) Topical issues.

OLPD 8095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr]; Stdnt Opt) Independent study on issues of educational policy/administration. Arranged with instructor.

OLPD 8096. Internship: Educational Policy and Administration. (1-9 cr [max 24 cr]; Stdnt Opt) Internship on issues of educational policy/administration. Arranged with instructor.

OLPD 8103. Comparative Education. (5 cr; A-F or Aud. Prereq-Doctoral student or #) Doctoral-level course. History, methodologies, and major debates in the field of comparative education.


OLPD 8121. Doctoral Seminar: Comparative and International Development Education. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-EdPA PhD candidate) Focuses on needs of students while writing the dissertation; general guidance in how to construct the thesis.

OLPD 8124. Classic Readings in Anthropology and Education. (5 cr; A-F or Aud) Major contributions to theory or working paradigms.

OLPD 8143. Integrative Seminar in Global Youth Policy and Leadership. (1 cr [max 3 cr]; A-F only. Prereq-CIDE student or #) Integrates ideas/concepts from 5141 and 5142 into alternative knowledge, policy, and futures profiles. Students use WebCT Vista and beyond to interact with each other, with students abroad, and with global experts to apply perspectives, theories, methods, and research to real-world situations.


OLPD 8303. Modeling the Learning Organization. (5 cr [max 4 cr]; Stdnt Opt) Computer software, perspectives on learning organization used to study global education, human service organizations.

OLPD 8304. Leadership and Ethics. (3 cr; Stdnt Opt) Review of major leadership theories, their application to problems of practice in educational organizations. Studies of leadership behavior illustrate major emerging issues in educational management.

OLPD 8311. Understanding and Using Research for Educational Improvement. (3 cr; A-F only. Prereq-Statistics) Research design principles to identify when findings best contribute to local decisions. Frameworks for evaluating/synthesizing findings to incorporate research in personal/team decision-making.

OLPD 8312. Inquiry for School Improvement Part I. (3 cr; A-F only. Prereq-8311 or EDPA 8311) First of two-course sequence. How to draw upon data sources, select/design data-collection instruments, and synthesize data to guide action planning. Role of leader in creating conditions for collaborative inquiry.

OLPD 8313. Inquiry for School Improvement Part II. (3 cr; A-F only. Prereq-8312 or EDPA 8312) Continuation of 8312. Data collection/analysis techniques that carry out realistically/effectively alongside improvements within school/ district. Role of leader in sustaining collaborative inquiry.

OLPD 8314. Data Analysis for Educational Management. (3 cr; Stdnt Opt) Managers of educational organizations are faced with problems that require analysis of a wide range of information. Outlines a frame for data analysis and introduces a set of computer-based tools suited to the practice of educational administration.

OLPD 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, advisor and DGS consent) Individual research in business and industry education.

OLPD 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, advisor and DGS consent) Independent study on an issue in theory or practice of program evaluation.

OLPD 8485. Research Problems: Business and Industry. (3-6 cr [max 6 cr]; S-N or Aud. Prereq-Adviser approval) Individual research in business and industry education.

OLPD 8502. Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives. (3 cr; Stdnt Opt. Prereq-5501 or EDPA 5501 or EDPA 5501 or E EPSY 5423) Concepts, approaches, models, and theoretical frameworks for program evaluation that have developed since the 1960s.

OLPD 8505. Evaluation Problems. (1-6 cr [max 24 cr]; Stdnt Opt. [SEP] 8295. Prereq-[5001 or EDPA 5501 or EPSY 5243], #) Independent study of an issue in theory or practice of program evaluation.

OLPD 8595. Evaluation Internship. (1-9 cr [max 24 cr]; Stdnt Opt. Prereq-[5501 or EDPA 5501 or EPSY 5243], #) Hands-on experience in conducting program evaluation in real-world setting under supervision of evaluation professional.

OLPD 8601. Advanced Training and Development of Human Resources. (3 cr; A-F or Aud. Prereq-5615 or HRD 5201) Personnel training/development research. Critical review of selected/innovative practices.

OLPD 8602. Advanced Organization Development. (3 cr; A-F or Aud. Prereq-5607 or HRD 5301) Organization development research. Critical review of selected, innovative practices.

OLPD 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prerequisite or no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Pre-thesis credit.

OLPD 8702. Administration and Leadership in Higher Education. (3 cr; Stdnt Opt. Prereq-[5001 or EDPA 5001], [5701 or EDPA 5701]) Leadership, governance, and administration in higher education through theoretical perspectives and practical analysis. Planning, change, decision making, organizational culture, budgets, conflict.

OLPD 8703. Public Policy in Higher Education. (3 cr; A-F or Aud. Prereq-[5001 or EDPA 5001], [5701 or EDPA 5701]) Theories, analytic methods, and critical issues in postsecondary education policy at national/state levels. Equality of educational opportunity, affirmative action, system governance/coordination, research funding, student financial aid, public accountability.


OLPD 8726. Economics of Higher Education. (2-3 cr [max 3 cr]; Stdnt Opt) Institutional responses to changing external economic factors. Economic effects resulting from higher education’s output in teaching, research, and service. Research on institutional and governmental policies.


OLPD 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

OLPD 8800. Work and Human Resource Education Colloquium. (0-3 cr [max 12 cr]; Stdnt Opt) Selected topics of significance to work and human resource education professionals. Topics based on interest and demand.

OLPD 8801. Advanced Theory in Human Resource Development and Adult Education. (3 cr; A-F or Aud. Prereq-5801 or ADED 5001) Theory of individuals/organizations as adaptive entities. Roles of human resource development and adult education in mediating complex demands.

Orthodontics (OTHO)

Department of Diagnostic and Surgical Sciences

School of Dentistry

OTHO 8121. Orthodontic Seminar. (0-5 cr; A-F or Aud. Prereq-Orthodontic grad student) Evaluating orthodontic literature, including preparation and presentation of literature reviews.

OTHO 8122. Orthodontic Seminar. (0-5 cr; A-F or Aud. Prereq-Orthodontic grad student) Evaluating orthodontic literature, including preparation and presentation of literature reviews.

OTHO 8123. Orthodontic Seminar. (0-5 cr; A-F or Aud. Prereq-Orthodontic grad student) Evaluating orthodontic literature, including preparation and presentation of literature reviews.

OTHO 8131. Topics in Orthodontics. (0-5 cr; A-F or Aud. Prereq-Orthodontic grad student) Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management.

OTHO 8132. Topics in Orthodontics. (0-5 cr; max 5 cr; A-F or Aud. Prereq-Orthodontic grad student) Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management.

OTHO 8133. Topics in Orthodontics. (0-5 cr; max 5 cr; A-F or Aud. Prereq-Orthodontic grad student) Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management.

OTHO 8141. Research in Orthodontics. (0-5 cr; max 5 cr; A-F or Aud. Prereq-Orthodontic grad student) Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature.

OTHO 8142. Research in Orthodontics. (0-5 cr; max 5 cr; A-F or Aud. Prereq-Orthodontic grad student) Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature.

OTHO 8143. Research in Orthodontics. (0-5 cr; max 5 cr; A-F or Aud. Prereq-Orthodontic grad student) Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature.

Otolaryngology (OTOL)

Department of Otolaryngology

Medical School

OTOL 5010. Introduction to the Basic Sciences in Otolaryngology I: Ear. (2 cr; A-F or Aud. Prereq-Otolaryngology major or #) Multidisciplinary introduction to the basic sciences of the ear. Acoustics and psychoacoustics, temporal bone anatomy, external and middle ear mechanisms, cochlear physiology, auditory neurophysiology, ear embryology, ear biochemistry, immunology, fine structures, vestibular mechanisms and measurement. S-N grading option for nonmajors only.

OTOL 5020. Introduction to the Basic Sciences in Otolaryngology II: Head and Neck. (2 cr; A-F or Aud. Prereq-Otolaryngology major or #) Multidisciplinary introduction to the basic sciences of the head and neck. Laryngeal anatomy and physiology, nasal anatomy and physiology, immune biology, embryology of head and neck. S-N grading option for nonmajors only.

OTOL 5993. Directed Studies. (1-12 cr; max 24 cr; Stdtnt Opt. Prereq-#) Directed readings and preparation of reports on selected topics.

OTOL 8230. Clinical Otorhinolaryngology. (4 cr; A-F or Aud. Prereq-Grad otol major) Diagnostic and management instruction and experience in all phases of clinical otorhinolaryngology. Both inpatient and outpatient services are provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practice and weekly special group conferences.

OTOL 8231. Surgery of the Ear, Nose, and Throat. (3 cr; A-F or Aud. Prereq-Grad otol major) Surgical training and experience with broad scope of surgical problems encountered in otorhinolaryngology provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practice and weekly special group conferences.

OTOL 8232. Maxillofacial Surgery. (1 cr; A-F or Aud. Prereq-Grad otol major) Basic science and management principles of maxillofacial diseases. Problems of maxillofacial trauma. Experience with these problems in the hospitals of the training program, especially the county hospitals.


OTOL 8234. Anatomy of the Head and Neck and Temporal Bone Dissection. (2 cr; Stdtnt Opt. Prereq-Grad otol major or #) Head and neck anatomy studied from cadaver through programmed learning. Temporal bones dissected to learn anatomy and to practice otologic surgical procedures. S/N for nonmajors only.

OTOL 8235. Roentgenology of the Head and Neck. (1 cr; max 12 cr; A-F or Aud. Prereq-Grad otol major) Principles and procedures in roentgenology for otolaryngologic and head and neck problems.

OTOL 8236. Pharmacology in Otolaryngology. (1 cr; A-F/Aud. Prereq-Grad otol major) Principles of pharmacology as they relate to otolaryngology.

OTOL 8237. Endoscopy. (1 cr; max 12 cr; A-F or Aud. Prereq-Grad otol major) Didactic and practical instruction in laryngoscopy, esophagoscopy, bronchoscopy, and mediastinoscopy. General management principles emphasized.

OTOL 8238. Pathology of the Ear, Nose, and Throat. (1 cr; max 12 cr; A-F or Aud. Prereq-Grad otol major) Gross pathology and histopathology of diseases of the ear, nose, throat, and related regions.

OTOL 8239. Otoneurology. (1-2 cr; max 12 cr; Stdtnt Opt. Prereq-Otolaryngology major or #) Instruction and experience in diagnosis and management of otorhinolaryngologic problems, including training in electroencephalographic analysis of vestibular function.

OTOL 8240. Allergy. (1 cr; max 12 cr; A-F or Aud. Prereq-Grad otol major) Concepts and management of otolaryngologic allergy.

OTOL 8241. Cancer of the Head and Neck. (1 cr; max 12 cr; A-F or Aud. Prereq-Grad otol major) Clinical head and neck oncology, etiology, treatment (both surgical and nonsurgical), and other principles of management.

OTOL 8242. Audiology and Speech Pathology. (2 cr; Stdtnt Opt. Prereq-Grad otol major or #) Clinical audiology and speech-language pathology, including diagnosis and treatment of conductive, sensorineural, and central hearing loss; voice disorders; swallowing disorders; velopharyngeal insufficiency related to cleft lip/palate and craniofacial anomalies; alaryngeal speech; and speech disorders related to head and neck cancer.

OTOL 8243. Introduction to Research Methodology. (1 cr; Stdtnt Opt. Prereq-Grad otol major or #) Statistical methods, experimental design, and execution of otorhinolaryngologic research. Ethics of research with human and animal subjects.

OTOL 8244. Seminar: Current Literature. (1 cr; Stdtnt Opt. Prereq-Grad otol major or #) Presentation and discussion of selected articles. Required for all otorhinolaryngology graduate students.
Courses


OTOL 8248. Directed Readings in Auditory Physiology. (1-2 cr [max 2 cr]; Stdnt Opt. [S]NSC 8248. Prereq-#) Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.


OTOL 8250. Advanced Biochemistry of the Auditory System. (1 cr; Stdnt Opt. Prereq-MdSc 6100, MdSc 6010 or equiv or #) Review of recent progress in biochemical aspects of auditory end organs.

OTOL 8251. Molecular Carcinogenesis of Head and Neck Squamous Cell Carcinoma. (2 cr [max 6 cr]; Stdnt Opt. Prereq-MICA 8009 or [P]MICA 8009 or #) Current topics in molecular carcinogenesis of head and neck squamous cell carcinoma.

OTOL 8262. Advanced Clinical Audiology. (2 cr; Stdnt Opt. Prereq-Grad otol major, 8242 or #) Comprehensive reading and practicum in auditory evaluation of patients. Assumes basic knowledge of clinical audiology. Each session devoted to aspect of auditory evaluation or aural rehabilitation, including behavioral audiology, electrophysiological evaluation, hearing aid selection, and cochlear implants.

OTOL 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) OTOL 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) OTOL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

OTOL 8777. Thesis Credits: Master’s. (1-16 cr [max 50 cr]; No grade. Prereq-Max 16 cr per semester or summer; 10 cr total required [Plan A only]) OTOL 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Pediatric Dentistry (PDEN)

Department of Dentistry Primary Care Administration

School of Dentistry

PDEN 8010. Pediatric Dentistry Diagnosis and Treatment Planning. (1 cr [max 5 cr]; A-F or Aud) Systematic approach to diagnosis of and treatment planning for various pediatric dentistry problems. Faculty/peer review of selected patient cases managed by students. Patient care is reviewed/discussed to ensure appropriate treatment protocols and quality of care.

PDEN 8031. Independent Study in Pediatric Dentistry. (2 cr; A-F or Aud) Independent readings from pediatric dentistry textbooks in preparation for an oral exam. May include additional clinical experiences.

PDEN 8100. Hospital Pediatric Dentistry. (1 cr; S-N or Aud) Faculty-supervised diagnosis/treatment of pediatric dentistry problems at Fairview-University Medical Center and Hennepin County Medical Center. Rotation seminars in pediatrics/anesthesia. Pre/post-operative discussion/evaluation of treatment plans.

PDEN 8110. Pediatric Dentistry Outreach Experiences. (1 cr [max 3 cr]; S-N or Aud) Faculty-supervised diagnosis and treatment of pediatric dentistry problems at Hennepin County Medical Center, the CUHCC Clinic, and other off-site locations. Participants prepare for rotation basis in seminars in pediatrics and anesthesia. Pre/postoperative seminar discussion and evaluation of treatment plans.

Periodontics (PERO)

Department of Dentistry Primary Care Administration

School of Dentistry

PERO 5123. Practice Management Externship. (1 cr; Stdnt Opt. Prereq-Resident in advanced education program in periodontology) Periodontal students with the private practice environment and prepares them to select the type of practice they want to purchase or build and successfully manage their office.

PERO 8000. Advanced Clinical Periodontology. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Resident in advanced education program in periodontology) Clinical training in examination, diagnosis, treatment planning, and various phases of prevention and treatment of periodontal diseases in patients.

PERO 8200. Clinical Seminars. (1 cr; Stdnt Opt. Prereq-Resident in advanced education program in periodontology)

PERO 8250. Anatomy of the Periodontium. (1 cr; A-F or Aud. Prereq-Resident in advanced education program in periodontology) Gingival tissues, cementum, periodontal ligament, and alveolar bone discussed from histological, physiological, and pathological point of view.

Pharmaceutics (PHM)

Department of Pharmaceutics

College of Pharmacy


PHM 8100. Seminar: Pharmaceutics. (1 cr [max 4 cr]; S-N or Aud. Prereq-Grad Phm major) Current literature.

PHM 8110. Readings in Pharmaceutics. (1 cr [max 4 cr]; S-N or Aud. Prereq-Grad Phm major) Current literature.

PHM 8120. Readings in Central Nervous System (CNS) Drug Delivery. (1 cr [max 4 cr]; S-N only. Prereq-#) Weekly discussion of recent publications or new techniques, methods, and analyses on delivery of drugs to central nervous system. Topics vary. Informal presentations from CNS drug delivery researchers.

PHM 8150. Pharmacokinetics Research Seminar. (1 cr [max 12 cr]; S-N or Aud. [S]PHAR 6223, Prereq-Grad Phm major) Current concepts and literature review.

PHM 8295. Research Problems in Pharmaceutics. (1 cr [max 20 cr]; S-N or Aud. Prereq-#) Experimental investigation of problems in pharmaceutics.

PHM 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PHM 8411. Stabilization of Pharmaceuticals. (3 cr; Stdnt Opt. Prereq-Physical and organic chem survey courses) Application of physicochemical principles (e.g., chemical kinetics) to elucidate and minimize stability problems in pharmaceutical systems.

PHM 8421. Advanced Pharmacokinetics. (4 cr; A-F or Aud) Topics in kinetics of drug absorption, distribution, metabolism, and excretion.


PHM 8441. Solubility and Solid-State Properties of Drugs. (3 cr; A-F or Aud. [S]NSC 8441, CMG 8441. Prereq-#) Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS.

PHM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PHM 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PHM 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

PHM 8900. Spec Topics in Pharmaceutics. (1-4 cr; A-F or Aud)

Pharmacology (PHCL)

Department of Pharmacology

Medical School

PHCL 5101. Pharmacology for Pharmacy Students. (3 cr; A-F or Aud. Prereq-2nd yr pharmacy student or #) Action/fate of drugs. Lectures, lab.

PHCL 5102. Pharmacology for Pharmacy Students. (2 cr; A-F or Aud. Prereq-5101 or #) Action/fate of drugs.
PHIL 5010. Ancient Philosophers. (3 cr [max 6 cr]; Stdnt Opt. Prereq-1001 or #) Major work of selected ancient philosophers (e.g., Plato’s Parmenides, Plato’s Sophist, Aristotle’s Metaphysics). Works discussed vary.

PHIL 5040. Rationalists. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5005 or #) Major work of selected early modern rationalists (e.g., Descartes’ Principles of Philosophy, Spinoza’s Ethics, Conway’s Principles of the Most Ancient and Modern Philosophy, Leibniz’s Discourse on Metaphysics). Works discussed may vary from offering to offering.

PHIL 5050. Empiricists. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5005 or #) Major work of selected early modern empiricists (e.g., Locke’s Essay Concerning Human Understanding, Berkeley’s Principles of Human Knowledge, Hume’s Treatise of Human Nature). Works discussed may vary from offering to offering.

PHIL 5055. Wittgenstein. (3 cr; Stdnt Opt. [S]) PHIL 4055. Prereq-5005 or 4231 or #) Major work (e.g., Philosophical Investigations).


PHIL 5210. Symbolic Logic II. (4 cr; Stdnt Opt. Prereq-5210 or #) Elements of set theory, including the concepts of enumerability and nonenumerability. Turing machines and recursive functions; the results of Church, Godel, and Tarski and the philosophical significance of those results.

PHIL 5311. Modal Logic. (4 cr; Stdnt Opt. Prereq-5210 or #) Axiomatic and semantic treatment of propositional and predicate modal logics; problems of interpreting modal languages.

PHIL 5321. Philosophy of Logic. (3 cr; Stdnt Opt. Prereq-5210 or #) Attempts to answer, “What is logic?” Scope of logic. Disputes about alternative logics. Theories concerning logical truth (e.g., conventionalism: view that logical truths are contingent).

PHIL 5322. Philosophy of Mathematics. (3 cr; Stdnt Opt. Prereq-College level logic or mathematics course or #) 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, Brouwer, Godel, Quine.

PHIL 5323. Education and Social Change. (4 cr; A-F or Aud. [S]PHIL 4325) Connection between education, social change. Theories of democratic/popular education, their application through in-depth practicum in community education setting.


PHIL 5350. Catching Lives Worth Living: Participation in the Growth of a Living-Learning Community. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-Application, #) Involvement in a democratic living-learning community built by students/instructors. Students participate in community activities and daily instructor meetings. Four-seven day offerings each summer.

PHIL 5415. Philosophy of Law. (5 cr; Stdnt Opt. Prereq-1003 or 1004 or 3302 or social science major or #) Analytical accounts of law and legal obligation.


PHIL 5601. History of the Philosophy of Science. (3 cr; Stdnt Opt. Prereq-#) History of logical empiricism, from its European origins in first half of 20th century to its emergence as nearly universal account of science in post-war Anglo-American philosophy.

PHIL 5602. Scientific Representation and Explanation. (3 cr; Stdnt Opt. Prereq-#) Contemporary issues concerning representation and explanation of scientific facts.

PHIL 5605. Space and Time. (3 cr; Stdnt Opt. [S]PHIL 4605. Prereq-Courses in [philosophy or physics or #]) Philosophical problems concerning nature/structure of space, time, and space-time.

PHIL 5606. Philosophy of Quantum Mechanics. (3 cr; Stdnt Opt) Problems of interpretation in ordinary (nonrelativistic) quantum mechanics. Two-slit experiment, Schrodinger cat paradox (measurement problem), Einstein-Podolsky-Rosen paradox. Leading approaches to interpretation (Copenhagen, hidden variables, universal wave function) and their connections with philosophical issues.


PHIL 5760. Selected Topics in Philosophy. (3 cr [max 9 cr]; Stdnt Opt. Prereq-3xxx-5xxx course in phil or #) Philosophical problems of contemporary interest. Topics specified in Class Schedule.

PHIL 5993. Directed Studies. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-#; %, [B]) Guided individual reading or study.


PHIL 8110. Seminar: Metaphysics. (3 cr [max 6 cr]; Stdnt Opt. Prereq-4101 or #) Topics vary by offering.


PHIL 8131. Epistemology Survey. (3 cr; Stdnt Opt) Survey, against background of traditional issues, of contemporary developments in theory of knowledge.

PHIL 8133. Feminist Theories of Knowledge. (3 cr; Stdnt Opt. [S]GWSS 8103) Interdisciplinary seminar; feminist approaches to knowledge and criticism of paradigms of knowledge operative in the disciplines. Feminists’ use of concepts of subjectivity, objectivity, and intersubjectivity; feminist empiricism, standpoint theory, and contextualism, and postmodern and postcolonial theorizing.

PHIL 8180. Seminar: Philosophy of Language. (3 cr [max 6 cr]; Stdnt Opt. Prereq-4231 or #) Topics vary by offering.

PHIL 8182. Formal Semantics of Natural Language. (3 cr; A-F or Aud. [S]LING 8221. Prereq-Phil 5210 or #) Truth-conditional model-theoretic semantics applied to treatment of opacity, intensification, quantification, and related phenomena in natural language.

PHIL 8200. Workshop in Logic and Philosophy of Mathematics. (1 cr [max 4 cr]; Stdnt Opt. Prereq-[[P]4xxx log or 4xxx phi of math], #) Topics vary by offering.

PHIL 8210. Seminar: Logical Theory. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5201, 5205 or #) Topics vary by offering.

PHIL 8220. Seminar: Philosophy of Mathematics. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5202 or [4xxx or 5xxx] math course or #) Topics such as significance of limitative metatheorems (Goedel, et al), assessment of major foundational programs (set theoretic, modern Hilbertian constructivist), modal/structuralist alternatives to standard platonism.

PHIL 8300. Workshop in Moral and Political Philosophy. (1 cr [max 4 cr]; Stdnt Opt. Prereq-[P]4xxx moral phi or 4xxx pol phi) #) Topics vary by offering.
PHIL 8310. Seminar: Moral Philosophy. (3 cr [max 9 cr]; Stdnt Opt. Prereq-4210 or 4320 or 4530 or #)

Concepts/problems relating to ethical discourse.

PHIL 8320. Seminar on Medical Ethics. (3 cr [max 6 cr]; Stdnt Opt. Prereq-[4xxx or 5xxx] ethics course or #)

Patients’ rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, maternal/fetal conflicts, allocation of medical resources.

PHIL 8333, FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PHIL 8410. Seminar: Philosophy of Law. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5415 or #)

Primarily for law students and advanced political science, history, or sociology majors or minors.

PHIL 8420. Seminar: Political Philosophy. (3 cr [max 6 cr]; Stdnt Opt. Prereq-5415 or #)

Topics vary by offering.

PHIL 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

PHIL 8500. Workshop in Aesthetics. (1 cr [max 4 cr]; Stdnt Opt. Prereq-[P]4xxx aesthetics course, #)

Topics vary by offering.

PHIL 8510. Seminar: Aesthetics Studies. (3 cr [max 6 cr]; Stdnt Opt)

Topics vary by offering.

PHIL 8550. Seminar: Philosophy of Religion. (3 cr [max 6 cr]; Stdnt Opt. Prereq-4521 or 4441 or #)

Topics vary by offering.

PHIL 8600. Workshop in the Philosophy of Science. (1 cr [max 4 cr]; Stdnt Opt. Prereq-[P]4xxx phil of sci course, #)

Topics vary by offering.

PHIL 8606. Seminar: Philosophy of Medicine and the Biomedical Sciences. (3 cr; Stdnt Opt)

Aims and goals of medicine; concepts of health, illness, and disease; nature of reasoning in clinical medicine; theoretical evolution in medicine; and role of values in practice of medicine and healthcare.


Topics specified in [Class Schedule].

PHIL 8620. Seminar: Philosophy of the Biological Sciences. (3 cr [max 6 cr]; Stdnt Opt)

Topics vary by offering.


Philosophical framework for analyzing cognitive sciences. Recent developments in metaphysics/epistemology. Nature of scientific theories, methodologies of cognitive sciences, relations among cognitive sciences. Relation of cognitive science to epistemology and to various philosophical problems. Topics vary by offering.


Review of recent work; analysis of theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

PHIL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 50 combined cr)

PHIL 8670. Seminar: Philosophy of Science. (3 cr [max 6 cr]; Stdnt Opt. Prereq-#)

Topics vary by offering.

PHIL 8710. Seminar: Feminist Philosophy. (3 cr [max 6 cr]; Stdnt Opt. Prereq-6622 or 5622 or WoSt 4122 or WoSt 5122 or #)

Topics vary by offering.

PHIL 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PHIL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

PHIL 8993. Directed Study. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-#)

PHIL 8994. Directed Research. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-#)

**Physical Medicine and Rehabilitation (PMED)**

**Department of Physical Medicine and Rehabilitation**

**Medical School**


PMED 8207. Basic and Applied Psychiatry. (1 cr; Stdnt Opt. Prereq-enrolled in PMed residency training program)


PMED 8212. Electromyography. (1-15 cr [max 15 cr]; Stdnt Opt. Prereq-enrolled in PMed residency training program)

PMED 8214. Readings in Electromyography. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-enrolled in PMed residency training program)


**Physical Therapy (PT)**

**Department of Physical Medicine and Rehabilitation**

**Medical School**

PT 8131. Research Seminar I. (1 cr; S-N or Aud. Prereq-Grad PT major)

Scientific thinking in physical therapy. Preparation to execute research project or literature review. Analysis of current literature. Basic features of research design. Elements of evaluating treatment efficacy. Students interact with their research adviser and with research faculty in various specialties.

PT 8132. Research Seminar II. (1 cr; A-F or Aud. Prereq-8131, grad PT major)

Scientific thinking in physical therapy. Preparation for research project or literature review. Current literature. Features of research design. Evaluating treatment efficacy. Students interact with research adviser and faculty in various specialties.

PT 8193. Research Problems in Physical Therapy. (1-7 cr [max 7 cr]; A-F or Aud. Prereq-Grad PT major)

Process of developing/completing a scholarly research project or literature review related to rehabilitation science. Type of research experience is determined by adviser.

PT 8533, FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Physics (PHYS)**

School of Physics and Astronomy

**College of Science and Engineering**

**PHYS 5001. Quantum Mechanics I. (4 cr; Stdnt Opt. Prereq-4101 or equiv or #)**


**PHYS 5002. Quantum Mechanics II. (4 cr; Stdnt Opt. Prereq-5001 or equiv)**

Symmetry in quantum mechanics, space-time symmetries and the rotation group, Clebsch-Gordan coefficients and the Wigner-Eckart theorem. Scattering theory. Method of second quantization with elementary applications. Relativistic wave equations including Dirac equation.

**PHYS 5011. Classical Physics I. (4 cr; Stdnt Opt. Prereq-4001, 4002 or #)**

Classical mechanics: Lagrangian/Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity.

**PHYS 5012. Classical Physics II. (4 cr; Stdnt Opt. Prereq-5011 or #)**

Classical electromagnetism: electrostatics, magnetostatics, Maxwell’s equations, electromagnetic waves, radiation, interaction of charged particles with matter.


**PHYS 5041. Mathematical Methods for Physics. (4 cr; Stdnt Opt. Prereq-2601 or grad student)**

Survey of mathematical techniques needed in analysis of physical problems. Emphasizes analytical methods.

**PHYS 5042. Analytical and Numerical Methods of Physics II. (4 cr; Stdnt Opt. Prereq-5041 or #)**

Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems.
PHYS 5071. Physics for High School Teachers: Experimental Foundations and Historical Perspectives. (3 cr; Stdnt Opt. Prereq-Gem physics, #; no cr for physics grad or grad physics minor) In-depth examination of a conceptual theme in physics, its experimental foundations and historical perspectives. Kinematics and dynamics from Aristotle through Einstein; nature of charge and light; energy and thermodynamics; electricity, magnetism, and quantized fields; structure of matter.

PHYS 5072. Best Practices in College Physics Teaching. (1-3 cr; Stdnt Opt) Pedagogies for introductory physics classes. Topics from educational research/practice as applied to classroom.


PHYS 5402. Radiological Physics. (4 cr; Stdnt Opt. Prereq-1502 or 1402) Signal analysis, medical imaging, medical x-rays, tomography, radiation therapy, nuclear medicine, MRI, and similar topics.

PHYS 5621. Introduction to Plasma Physics. (3 cr; Stdnt Opt. Prereq-CSE grad student, working knowledge of waves/electromagnetism) Basic properties of collisionless, magnetized plasmas, single particle motion, plasmas as fluids, magnetohydrodynamics, waves in plasmas, equilibrium, instabilities, kinetic theory/shocks. Introduction to Phase Transitions.

PHYS 5701. Solid-State Physics for Engineers and Scientists. (4 cr; Stdnt Opt. Prereq-Grad or advanced undergrad in physics or engineering or the sciences) Crystal structure and binding; diffraction; phonons; thermal and dielectric properties of insulators; free electron model; band structure; semiconductors.

PHYS 5702. Solid State Physics for Engineers and Scientists. (4 cr; Stdnt Opt. Prereq-5701 or #) Diamagnetism and paramagnetism; ferromagnetism and antiferromagnetism; optical phenomena; lasers; superconductivity; surface properties; ferroelectricity.

PHYS 5950. Colloquium Seminar. (1 cr; S-N or Aud. Prereq-[Grad student or advanced undergrad in physics, %] Colloquium of School of Physics and Astronomy.

PHYS 5970. Physics Journal Club. (1-3 cr [max 3 cr]; S-N only. Prereq-2601, 2605 or equiv; intended for 2nd yr grad students in physics) Weekly student-led presentation, discussion, and critical analysis of important papers.

PHYS 5980. Introduction to Research Seminar. (1 cr [max 3 cr]; S-N or Aud. Prereq-Grad or upper div phys major) Introduction to the research activities of the School of Physics and Astronomy.

PHYS 5993. Directed Studies. (1-5 cr [max 15 cr]; Stdnt Opt. Prereq-9, %) 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]; Stdnt Opt. Prereq-Jr, %) Problems, experimental or theoretical, of special interest to students. Written reports.

PHYS 8001. Advanced Quantum Mechanics. (3 cr; Stdnt Opt. Prereq-5002 or #) Topics in non-relativistic quantum mechanics; second quantization. Introduction to Dirac and Green’s function techniques and to relativistic wave equations. Application of relativistic perturbation theory to particle interactions with electromagnetic field. Invariant interactions of elementary particles.


PHYS 8013. Special Topics in Quantum Field Theory. (3 cr; Stdnt Opt. Prereq-8012 or #) Includes non-perturbative methods in quantum field theory, supersymmetry, two-dimensional quantum field theories and their applications, lattice simulations of quantum fields, topological quantum field theories, quantum field theory methods applied to condensed matter physics, and string theory.

PHYS 8100. Seminar: Problems of Physics Teaching and Higher Education. (1 cr [max 3 cr]; Stdnt Opt) Lectures and informal discussions of courses and curricula, techniques, and materials important in undergraduate physics instruction; relation to general problems of higher education.

PHYS 8161. Atomic and Molecular Structure. (3 cr; A-F only. Prereq-Level of mathematics associated with BS in physical sciences) Emphasizes interpretation of quantum numbers and selection rules in terms of symmetry. Experimental data summarized and compared with theoretical predictions.

PHYS 8200. Seminar: Cosmology and High Energy Astrophysics. (1 cr [max 6 cr]; S-N or Aud. Prereq-#) Current topics in cosmology and high energy astrophysics.

PHYS 8300. Seminar: Biological and Medical Physics. (1 cr [max 6 cr]; S-N or Aud. Prereq-#) Current research in biological and medical physics arrangement.


PHYS 8312. Biological Physics of Macroscopic Systems. (3 cr; Stdnt Opt. Prereq-[(5201 or CHEN 4707), 5011 or #)] Macroscopic systems, based on physics such as fluid dynamics, statistical mechanics, non-linear dynamics, and chaos theory. Super-molecular aggregates. Biological physics of the cell. Biological physics of populations.

PHYS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PHYS 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

PHYS 8500. Plan B Project. (4 cr; Stdnt Opt. Prereq-#; may be taken once to satisfy Plan B master’s project requirement; no cr toward PhD) Prereq-topic arranged between student and instructor. Written report required.


PHYS 8502. General Relativity and Cosmology II. (3 cr; Stdnt Opt. Prereq-8501 or #) Theory of plasma waves and instabilities in plasmas, magnetohydrodynamics, nonlinear waves in plasmas, wave propagation in inhomogeneous plasmas.

PHYS 8600. Seminar: Space Physics. (1 cr [max 6 cr]; S-N or Aud) Current topics in space physics and plasma physics.


PHYS 8602. Plasma Physics II. (3 cr; Stdnt Opt. Prereq-8601 or #) Theory of plasma waves and instabilities, collisions, radiation, transport, nonlinear wave-particle and wave-wave interactions, instabilities in inhomogeneous plasmas.

PHYS 8611. Cosmic Rays and Plasma Astrophysics. (3 cr; Stdnt Opt. Prereq-5012 or #) Properties of energetic particles in heliosphere and in astrophysical environments; solar physics, including radiation and magnetic effects; solar wind and magnetosphere physics; physics of radiation belts.

PHYS 8650. Advanced Topics in Space and Plasma Physics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-8602 or 8611 or #) Topics in plasma waves and instabilities, solar physics, cosmic ray physics, atmospheric physics or planetary physics.
Physiology (PHSL)

PHYS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PHYS 8700. Seminar: Condensed Matter Physics. (1 cr [max 6 cr]; S-N or Aud. Prereq-#) Current research.


PHYS 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PHYS 8800. Seminar: Nuclear Physics. (1 cr [max 6 cr]; S-N or Aud) Current research topics.


PHYS 8802. Nuclear Physics II. (3 cr; Stdnt Opt. Prereq-8801 or #) Properties of nuclei based on hadronic and quark-glueu degrees of freedom. Relativistic field theory at finite temperatures and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nucleus-nucleus collisions, astrophysics and cosmology.

PHYS 8850. Advanced Topics in Nuclear Physics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-8802 or #) Research topics.

PHYS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

PHYS 8900. Seminar: Elementary Particle Physics. (1 cr [max 6 cr]; S-N or Aud) Elementary particle physics, high energy physics, particle astrophysics and cosmology.


PHYS 8950. Advanced Topics in Elementary Particle Physics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-8902 or #) Research topics.


Ph Biology (PHSL)

Physiology (PHSL)

PHSL 5061. Principles of Physiology for Biomedical Engineering. (4 cr; Stdnt Opt. Prereq-Biomedical engineering grad, one yr college chem and physics and math through integral calculus) Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, renal, gastrointestinal, endocrine, muscle, central and peripheral nervous systems), cellular transport processes, and scaling in biology.

PHSL 5094. Research in Physiology. (1-5 cr [max 20 cr]; Stdnt Opt. Prereq-#) Independent laboratory project in physiology, supervised by physiology faculty.

PHSL 5095. Problems in Physiology. (1-5 cr [max 20 cr]; Stdnt Opt. Prereq-#) Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty. Research topics.

PHSL 5096. Integrative Biology and Physiology Research Advances. (1 cr [max 4 cr]; S-N only. Prereq-#) Attend/participate in IBP Fall/Spring seminar series. Seminars given by faculty, invited speakers, students. Exposure to key topics. How to present seminars.


PHSL 5144. Muscle. (3 cr; Stdnt Opt. Bioc 5444 or Bioc 5061 or Bioc 5061 or Bioc 4231 or Bioc 4331 or #) Muscle membranes: structures, mechanisms, and physiological roles of channels/pumps. Muscle contraction: force generation by actin/myosin.

PHSL 5510. Advanced Cardiac Physiology and Anatomy. (2-3 cr; Stdnt Opt. Prereq-#) Fundamental concepts, advanced topics related to clinical/biomedical cardiac physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

PHSL 5511. Advanced Neurornuscular Junction Physiology. (2-3 cr; Stdnt Opt. Prereq-#) Fundamental concepts and advanced topics related to clinical/biomedical aspects of neuromuscular junction physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

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


PHSL 5700. Cell Physiology. (4 cr; A-F only. Prereq-Two semesters of physics/chemistry, calculus, one semester of systems-level physiology or #) Control mechanisms in maintaining homeostasis with respect to critical cell functions. Regulation of pH, volume, nutrient transport, intracellular electrolyte composition, membrane potential. Aspects of intercellular communication.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Plant Biology (PBIO)

Department of Plant Biology


PBIO 5301. Plant Genomics. (3 cr; Sdtnt Opt. [SP]PLPA 5301. Prereq-Intro course in genetics, intro course in biochemistry or #) Introduction to genomics. Emphasizes plants and relevant model organisms. DNA marker/sequencing technology, comparative genomics, whole genome sequencing, DNA chips/microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, visualization tools.

PBIO 5109. Current Questions in Plant Pathology. (2 cr; A-F or Aud) 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.

Plant Pathology (PLPA)

Department of Plant Pathology

College of Food, Agricultural and Natural Resource Sciences

PLPA 5003. Diseases of Forest and Shade Trees. (3 cr; Sdtnt Opt) Diseases of trees in urban and forested areas. Biology, ecology, and control of tree diseases. Identifying disease agents, integrated control procedures. Laboratory.


PLPA 5202. Field Plant Pathology. (2 cr; Sdtnt Opt)
PLPA 5203. Introduction to Fungal Biology. (3 cr; Stdnt Opt. Prereq-BIOL 1009 or equiv) Fungi are a critical component of the diversity and function of terrestrial ecosystems, affecting decomposition, plant nutrient uptake, and agricultural practices. Key components of fungal biology, including ecology, genetics, life cycles and diversity. Labs provide hands on experience with a diverse range of organisms.

PLPA 5300. Current Topics in Molecular Plant Pathology. (1-2 cr [max 2 cr]; S-N only. Prereq-#) Interactive class. Students read, discuss, and critique publications in molecular plant pathology. Focus on articles, examining from different dimensions (underlying principles, experimental strategies, data analysis, impact on the broader discipline).

PLPA 5301. Plant Genomics. (3 cr; Stdnt Opt. [S]) PBIO 5329. Prereq-Intra course in genetics or #) Plants and model organisms. DNA sequencing, comparative genomics, genome structure and function, DNA chips/microarrays, RNA expression, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, and visualization tools.

PLPA 5444. Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions. (3 cr; A-F or Aud. Prereq-Intra course in genetics or #) Concepts and recent research in the ecology, epidemiology, and evolutionary/coevolutionary biology of plant-microbe interactions spanning the range from parasitic to mutualistic in agricultural and natural habitats.


PLPA 5660. Plant Disease Resistance and Applications. (3 cr; A-F only. Prereq-2001, BIOL 4003) Fundamentals of disease resistance in plants and the genetics of host-paraite interactions as they relate to the sustainable control of plant diseases. Examples explored at the Mendelian, populational, and molecular level of organization.

PLPA 5999. Special Topics in Plant Pathology. (1-4 cr [max 4 cr]; Stdnt Opt) Workshops on topics in plant pathology. See Class Schedule or department for current offerings.

PLPA 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. [S]BBE 8005, SOIL 8005, AGRO 8005, LAAS 8005, HORT 8005, Prereq-#) Teaching experience in one of the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

PLPA 8090. Advanced Procedures and Research in Plant Pathology. (1-8 cr [max 8 cr]; Stdnt Opt) Special assignment in lab and field problems in pathological research.


PLPA 8105. Plant Bacteriology. (2 cr; Stdnt Opt. Prereq-5480) For graduate students interested in bacteria that cause plant diseases. Disease cycles, epidemiology, pathogenesis, and means of disease control. The lab section will focus on techniques used to identify bacteria, for inoculating plants, and isolating bacteria from plant material.


PLPA 8200. Seminar. (1 cr; A-F only) Critical review and presentation of current problems and progress in plant pathology.

PLPA 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) PLPA 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

PLPA 8500. Perspectives in Plant Pathology. (2 cr [max 4 cr]; S-N or Aud) Integrative overview of the field. For Ph.D. students nearing end of formal classroom experience.

PLPA 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 63rd/4th registrations, up to 24 combined credit; doctoral student admitted before summer 2007 may register up to four credits (up to combined cr)

PLPA 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PLPA 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Polish (PLSH)

Department of Slavic Languages/Literatures

College of Liberal Arts

PLSH 5900. Topics. (1-4 cr [max 5 cr]; Stdnt Opt) Topics specified in Class Schedule.

PLSH 5993. Directed Studies. (1-3 cr [max 3 cr]; Stdnt Opt) Guided individual reading or study in Polish language, literature, and culture.

Political Science (POL)

Department of Political Science

College of Liberal Arts


POL 5252. Renaissance, Reformation, and Revolution: Early Modern Political Thought. (3 cr; Stdnt Opt) Thinks, theories, 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; Stdnt Opt. [S] POL 4253, Prereq-[S]: 3253) Theoretical responses to and critical 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, Toqueville, Mill, Nietzsche, Weber, Freud.

POL 5275. Contemporary Political Thought. (3 cr; Stdnt Opt. Prereq-[S]: 4275; grad student; 1201 recommended) 20th-century crisis of Western humanism in major works of contemporary political thought from World War II to present. 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 5280. Topics in Political Theory. (3-4 cr; Stdnt Opt. Prereq-[S]: 4280; grad student) Topics in historical, analytical, or normative political theory. Topics vary, see Class Schedule.

POL 5306. Presidential Leadership and American Democracy. (3 cr; Stdnt Opt. [S]POL 3306. Prereq-grad student or #) Examines whether president’s political and constitutional powers are sufficient to satisfy citizens’ high expectations and whether president should be expected to dominate American politics.


POL 5309. Justice in America. (3 cr; Stdnt Opt. Prereq-[S]: 4309; [1001 or 1002], [non-pol sci grad major or equiv or #]) American judiciary, selection of judges, how/why these individuals/institutions behave the way they do. What influences judicial decisions. What impact decisions have. Why people comply with them.

POL 5310. Topics in American Politics. (3 cr; Stdnt Opt. Prereq-grad student or #) See Class Schedule for description.
Courses

POL 5315. State Governments: Laboratories of Democracy. (4 cr; Stdnt Opt. [S]) POL 4315W. Prereq—grad student or #)
Political behavior, governmental institutions, and public policies in American states. Comparison among states, between state and national government. Emphasizes Minnesota.

POL 5322. Rethinking the Welfare State. (3-4 cr; Stdnt Opt. Prereq—[S]: 4322; grad student)
Competing arguments about welfare states in advanced industrial countries. Whether welfare states result from sectional interests, class relations, or citizenship rights. Compares American policy with policies in other western countries.

POL 5327. Politics of American Cities and Suburbs. (3 cr; Stdnt Opt. Prereq—[S]: 4327; [1001 or 1002, non-pol sci grad major or equiv] or #)

POL 5331. Thinking Strategically in Domestic Politics. (3-4 cr; Stdnt Opt. Prereq—[S]: 4331; grad student)
Applications of rational-choice and game theories to important features of domestic politics in the United States and elsewhere.

POL 5403. Comparative Constitutionalism. (3 cr; Stdnt Opt)

POL 5410. Topics in Comparative Politics. (3 cr; Stdnt Opt. Prereq—grad student)
Topics of current analytical or policy importance. Topics vary, see Class Schedule.

POL 5461W. European Government and Politics. (4 cr; Stdnt Opt. [S]) POL 4461W. Prereq—grad student or #)

POL 5465. Southeast Asian Politics. (3 cr; Stdnt Opt)
U.S. involvement in region. Progress toward and resistance to democratic political systems and economic development.

POL 5473. Chinese Politics. (3 cr; Stdnt Opt. Prereq—[S]: 4473; EAS 4473; grad student)
Fundamental conflicts in Chinese society. Democracy movement, human rights, class divisions, gender struggles, environmental issues, capitalist vs socialist development strategies. Secondary topics include Chinese foreign relations and domestic/foreign political issues in Taiwan.

POL 5477. Struggles and Issues in the Middle East. (4 cr; Stdnt Opt. Prereq—[S]: 4477; 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 Persian/Arabian Gulf, human rights.

POL 5478. Contemporary Politics in Africa and the Colonial Legacy. (4 cr; Stdnt Opt. [S]) AFRO 4478, POL 4478W, AFRO 4478, Prereq—grad student or #)
How current politics in mainly, though not exclusively, sub-Saharan Africa have been shaped by pre-colonial/colonial processes. Reality of independence, recurrent political/economic crises. Global context and prospects for effective democracy.

POL 5479. Latin American Politics. (3-4 cr; Stdnt Opt. [S]) POL 4479, LAS 4479. Prereq—grad student or #)

POL 5481. Governments and Markets. (3-4 cr; Stdnt Opt. Prereq—[S]: 4481. Prereq—1054 or 3051 or non-pol sci grad student or #)
Connection between democracy and markets. Focuses on countries in North America, Europe.

POL 5485. Human Rights and Democracy in the World. (3 cr; Stdnt Opt. [S]) POL 4485. Prereq—grad student or #)
History of ideas about human rights and democracy. Economic, political, psychological, and ideological explanations for repression.

POL 5487. Struggle for Democratization and Citizenship. (4 cr; Stdnt Opt. [S]) POL 4501W. Prereq—grad student)
History of democratic movement from its earliest moments in history to present. Attempts to draw balance sheet. Examines how disenfranchised fought to become included.

POL 5501. Supreme Court and Constitutional Interpretation. (3 cr; Stdnt Opt. Prereq—grad student or #)
Historical/methodological approaches to Court’s landmark decisions. Theory/techniques of judicial review. Court’s authority related to wider political/social context of American government.

POL 5502. Supreme Court, Civil Liberties, and Civil Rights. (3 cr; Stdnt Opt. Prereq—[S]: 4502; 1001 or 1002 or equiv or non-pol sci grad student or #)

POL 5525. Federal Indian Policy. (3 cr; A-F or Aud. Prereq—[S]: 4525; Amin 4525; grad student)
Formulation, implementation, evaluation, comparison of Indian policy from pre-colonial times to self-governance of new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature on policies.

POL 5561. Comparative Legal Systems. (3 cr; Stdnt Opt. [S]) POL 4561. Prereq—grad student or #)
Survey of principal legal systems of Western world. Role of legal system in relation to various political/economic systems. Contrast between common law and civil law traditions.

POL 5737. American Political Parties. (3 cr; Stdnt Opt. [S]) POL 4737W. Prereq—grad student or #)

POL 5766. American Political Culture and Values. (3-4 cr; Stdnt Opt. Prereq—[S]: 4766; 1001 or equiv or non-pol sci grad student or #)
Individualism, freedom, equality. Dominant beliefs about democratic principles, materialism, capitalism, citizenship, patriotism/heroism.

POL 5767. Public Opinion and Voting Behavior. (3 cr; Stdnt Opt. [S]) POL 3769. Prereq—grad student or #)
Major factors influencing electoral decisions. Political attitude formation/change. Data analysis lab required.

POL 5810. Topics in International Politics and Foreign Policy. (3 cr; max 6 cr; Stdnt Opt. Prereq—Grad student or advanced undergrad)
Selected topics in international studies. Topical courses may vary, see Class Schedule.

POL 5833. The United States in the Global EconomyUS For Econ Policy. (3-4 cr; Stdnt Opt. Prereq—[S]: 4833; grad student; 3835 recommended)
Domestic/international politics of the United States. Foreign economic policy (trade, aid, investment, monetary, migration policies). Effects of policies and international economic relations on U.S. economy.

POL 5883. Global Governance. (3 cr; Stdnt Opt. Prereq—[S]: 4883; 3835 or non-pol sci grad student or #)
Rise/role of inter-governmental organizations such as United Nations, non-governmental organizations. Peacekeeping, trade, development, human rights, security and arms control, self-determination, refugees, health, environment. Seminar discussions, class simulations.

POL 5885. International Conflict and Security. (3 cr; Stdnt Opt. [S]) POL 4885W. Prereq—grad student)
Alternative theories of sources of militarized international conflict. Theories applied to past conflicts. Theories’ relevance to present.

POL 5887. Thinking Strategically in International Politics. (3 cr; A-F or Aud. Prereq—[S]: 4878; grad student)
Applications of game theory to international politics. Conflict/cooperation, global environmental commons, deterrence/reputation.

POL 5889. Governments and Global Trade and Money. (3 cr; Stdnt Opt. [S]) POL 4889. Prereq—3835 or grad student or #)
Politics of international trade and monetary affairs, including north-south and east-west relations.

POL 5970. Individual Reading and Research. (1-4 cr [max 6 cr]; Stdnt Opt. Prereq—#; [B]) Guided individual reading or study.

POL 8060. Research Preseminar in Political Science. (2 cr [max 8 cr]; S-N only. Prereq—Pol sci grad student)
Readings, discussion, guest speakers. Topics vary by semester.

POL 8070. Advanced Research and Writing in Political Science. (2 cr [max 4 cr]; S-N only)
Commentary/guidance at all stages of dissertation research process, from conceptualization of topic/project to editing of nearly final drafts.

POL 8101. Introduction to Political Science. (3 cr [max 4 cr]; A-F or Aud. Prereq—Grad pol sci major or #)
History, scope, and methods of political science as a discipline; current subfields; major research programs (including statist, pluralism, institutionalism, realism, behavioralism, rational choice, and critical theory); problems of theory, interpretation, concept-formation, comparison, measurement and experimentation; designs for research.

POL 8104. Professional Development I. (1 cr [max 2 cr]; S-N or Aud. Prereq—Pol sci grad student, ABD status)
Research ethics. Completion of dissertation prospectus or early dissertation chapters.

POL 8105. Professional Development II. (1 cr [max 2 cr]; S-N or Aud. Prereq—Pol sci grad student, ABD, %)
Research ethics. Skills for teaching undergraduate courses in political science. Completion of dissertation prospectus or early chapters.
POL 8106. Quantitative Political Science I. (3 cr; Sdnt Opt. Prereq-political science grad major or #) This course provides a thorough grounding in the quantitative analysis of political science data. The emphasis is on how to analyze such data, interpret statistical research results, and summarize/report the findings. By the end of the term you will (1) know how to describe variables; (2) test hypotheses; (3) use measures of association to quantify the relationship between two variables while holding a third variable constant; (4) understand bivariate regression and the basics of multiple regression; (5) understand reliability and validity and how to assess these properties empirically; and (6) know how to use the STATA statistical software program.

POL 8107. Quantitative Political Science II. (3 cr; A-F only. Prereq-political science grad major or #) Multiple linear regression model applied to political science data. How to use regression techniques to analyze data, interpret statistical results, and summarize/report the findings. Estimation of model. Underlying assumptions. Inference. Model diagnostics. Extensions of multiple regression.

POL 8120. Core Course in Political Methodology: Modeling Political Processes. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Methods used and potential for creating models of political processes. Designing political institutions, discerning forecasting election outcomes, producing early warnings of international conflicts, increasing turnout in elections. Using mathematics to study political strategy and collective decision making in committees/legislatures. Using statistics to measure political variables, design experiments with human subjects, and test micro/macro political theories.

POL 8122. Positive Theory. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Survey of positive political theory and rational-choice models. Information and transaction costs; institutions; models of elections, voting, coalitions.

POL 8124. Game Theory. (3 cr; Sdnt Opt. Prereq-[8122, grad pol sci major or #) Application of noncooperative game theory in political science. Equilibrium concepts, bargaining, repeated games, game theoretical information, signaling games, reputation, learning in games.

POL 8125. Dynamic Analysis. (3 cr; Sdnt Opt. Prereq-Pol sci grad student or #) Time series method, its application in political science.


POL 8127. Survey Research Methods: Measuring Public Opinion. (3 cr; Sdnt Opt. Prereq-Pol sci grad major) Theoretical/empirical issues in survey research methodology aimed at assessing political attitudes/behavior (including questionnaire design, scientific sampling). Skill areas necessary to analyze, design, or conduct surveys to examine political phenomena.

POL 8131. Advanced Methods and Models. (3 cr; Sdnt Opt. Prereq-Grad pol sci major, 6 cr 81xx seminars or #) Intersection of statistical methodology and deductive modeling; issues in merging inductive and deductive research; causality, theory and models, probabilistic voting, strategic modeling of international relations.

POL 8160. Topics in Models and Methods. (1-3 cr [max 12 cr]; Sdnt Opt. Prereq-Grad pol sci major or #) Seminars on selected topics.

POL 8201. Understanding Political Theory. (3 cr [max 4 cr]; Sdnt Opt. Prereq-Grad pol sci major or #) Key concepts and major approaches.

POL 8215. Philosophy of Political Inquiry. (3 cr; Sdnt Opt. Prereq-Grad pol sci major or #) Major schools in philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political issues raised by philosophy of science: liberalism, democracy, control, multiculturalism.

POL 8225. American Political Thought. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Colonial era to present: Puritans, American Revolution, Constitution, rise of individualism, pro- and anti-slavery arguments, civil war and reconstruction, industrialism, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Great Depression; growth of American power at home and abroad.

POL 8235. Democratic Theory. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Competing models of democracy: classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of “democracy”; social science models of and findings on democracy.

POL 8251. Ancient and Medieval Political Thought. (3 cr; Sdnt Opt. Prereq-Pol sci major or #) Political and ethics in Greece, Rome, Christendom: Thucydides, Socrates, Plato, Aristotle, Cicero, Augustine, Aquinas, Marsilis.


POL 8253. Late Modern Political Thought. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Theoretical responses to and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; the end of metaphysics and the death of God; technology and bureaucracy; psychology of culture, in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Freud.

POL 8260. Topics in Political Theory. (3 cr [max 6 cr]; Sdnt Opt. Prereq-Grad pol sci major or #) Readings and research in special topics or problems.

POL 8275. Contemporary Political Thought. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) From approximately World War II to the present. Survey of range of texts or intensive focus on such authors as Adorno, Arendt, Derrida, Foucault, Habermas, Horkheimer, Rawls, Said. Sample topics: feminism, postmodernism, communitarianism, Frankfurt School, postcolonialism.

POL 8301. American Politics. (3 cr [max 4 cr]; Sdnt Opt. Prereq-Pol sci grad major or #) Seminar on major topics and research in American politics, institutions, law, and policy. Major works on individual, mass, elite, and institutional behavior and their relationship to one another. Foundation for advanced seminars in American politics.

POL 8302. Public Opinion and Political Participation. (3 cr; Sdnt Opt. Prereq-Grad pol sci major or #) Major theoretical perspectives and research on political participation, voting behavior, and public opinion. Voter turnout, importance of party identification, effects of campaigns, long-term change in public opinion, and designing and conducting research.

POL 8303. Political Parties. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Party systems and subsystems; party organizational characteristics, goals, and incentives; distribution of power and authority within the party; chief party functions; party as an organizer of governmental power; determinants of party structure and role.

POL 8305. Interest Groups and Social Movements. (3 cr; Sdnt Opt. Prereq-Pol sci major or #) Theoretical and empirical work on role of interest groups and social/political movements in American politics and policy-making processes. Theories of interest group and social/political movement formation, maintenance, and decline. How interest groups and social/political movements attempt to influence public policy. Impact/effectiveness groups/movements as agents of democratic representation, particularly for marginalized groups.

POL 8307. Proseminar in Political Psychology I. (2 cr; S-N or Aud. [S]PSY 8211. Prereq-Pol sci major or pol psych minor or #) Readings, discussion, and guest speakers. Topics vary by semester.

POL 8308. Proseminar in Political Psychology II. (2 cr; S-N or Aud. [S]PSY 8212. Prereq-Pol sci major or pol psych minor or #) Readings, discussion, and guest speakers. Topics vary by semester.

POL 8311. Political Psychology and Socialization. (3 cr; A-F or Aud. Prereq-Pol sci major or pol psych minor or #) Introduction to political psychology. Personality and politics; political cognition, emotion, and political behavior; political expertise; media and politics; aggression, authoritarianism, and political behavior; altruism and politics.

POL 8373. Legislative Process. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Introduction to study of legislative politics; theories of legislative institutions and individual behavior; congressional elections; congressional committees, parties, and leaders.

POL 8375. Executive Process. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Tension between leadership and democracy in context of American presidency in terms of President’s relationship with federal bureaucracy, Congress, and making of diplomatic and military policy.

POL 8376. Judicial Process. (3 cr; Sdnt Opt. Prereq-Pol sci grad major or #) Judicial systems and roles; selection of judges; organizing and supporting litigation; influences on judicial decisions; impact and enforcement of judicial decisions; courts and other institutions of government.

POL 8380. Social Psychology of Prejudice and Intergroup Relations. (3 cr; A-F or Aud) Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.

POL 8381. Urban Politics. (3 cr; A-F or Aud. Prereq-Pol sci grad major or #) Selection of local leadership; relationship of political system to governmental forms and social institutions; role and impact of political institutions; policymaking at local level; studies in policy problems; the emerging metropolis.
POL 8325. State Politics and Intergovernmental Relations. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Theoretical approaches to comparative study of state politics; study of political culture and behavior, governmental institutions, and public policy at state level; federalism.

POL 8331. Constitutional Law. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Overview of substantive and theoretical debates in American constitutional law; role of law and constitutional interpretation in shaping American political institutions and American politics.

POL 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) Theoretical approaches: incrementalism, innovation and policy learning, comparative policy outputs, policy process models, interest groups, and selected areas of public policy.

POL 8337. Welfare State Theories and American Social Policy. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Rival theoretical explanations for cause and nature of welfare state development in context of four American social policies: social security, welfare, education, and healthcare.

POL 8360. Topics in American Politics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad pol sci major or #) Readings/research in special topics or problems.

POL 8401. International Relations. (3 cr [max 4 cr]; Stdnt Opt. Prereq-Grad pol sci major or #) Basic theories/approaches to study of international politics. Surveys representative work/central issues of scholarship.


POL 8403. International Norms and Institutions. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Origins, roles, and effectiveness of international norms and institutions; theoretical explanations and debates. Institution of sovereignty; rational choice versus constructivist perspectives; role of international law, international organizations, and non-governmental organizations; and international society and transnational cultural norms.

POL 8404. International Hierarchy. (3 cr; Stdnt Opt. [SCSDS 8404: Prereq-Grad pol sci major or #]) Asymmetric structures and processes of international relations; systemic conditions and implications of informal empire and structures of hegemony; cultural productions of difference and inequality.

POL 8405. International Political Economy. (3 cr; A-F or Aud. Prereq-Grad pol sci major or #) Theoretical and policy issues in international economic relations. Different approaches for understanding outcomes in international economy. Trade, finance, labor markets, creation and maintenance of international regimes, and “globalization” of economic liberalism.

POL 8406. Politics of International Finance. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Relationship between workings of the international political system and that of international markets for currency and capital.

POL 8407. Morality in World Politics. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Approaches to theorizing and empirical research on moral norms in world politics. Theoretical topics: realism, communalitarianism, consequentialism, constructivism, postmodernism, cultural relativism. Substantive issue areas: famine and foreign aid, just war theory, nuclear weapons, moral implications of technology, case study on war (Gulf War).

POL 8408. International Relations of the Environment. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Theorizing and practice of international environmental politics. Emergence of environment as major issue of international relations. Diversities of agendas and politics. Imperatives, templates, resistance in global efforts to forge an applied politics of environmental sustainability. Selected cases.

POL 8411. Political Psychology and Foreign Policy. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Foreign policy theories about decision makers and audiences. Impact of human nature, formal institutions, cultural and cross-cultural settings, and kinds of issues on foreign policy choice, control, and justification.

POL 8412. American Foreign Policy. (3 cr; Stdnt Opt. Prereq-8410 or #) U.S. policy toward foreign states and peoples: heritage, motivations, policies, state, public generally knows and wants, specific policies. Rise of internestic issues and decline of enemy-focused internationalism; implications for process and content of U.S. foreign policy.

POL 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) Readings/research in advanced topics or problems. Recent topics: global environmental issues, morality in world politics, and norms and institutions in world politics.

POL 8601. Introduction to Comparative Politics. (3 cr; Stdnt Opt. Prereq-Grad pol sci major) Main theoretical approaches and issues: comparative method, the state and class; political culture; development, democratization, rational choice, social movements.


POL 8603. European Government and Politics. (3 cr; A-F or Aud. Prereq-Grad pol sci major or #) Main theories and approaches used to interpret European politics. Many of these theories have broad relevance for comparative politics, for example, theories about the state, cleavages and coalitional bases, parties and social movements, and constitutional structures and institutions have broad relevance for the field of comparative politics.

POL 8605. Government and Politics in Africa. (3 cr; A-F or Aud. Prereq-Grad pol sci major or #) Theoretical and methodological approaches to study of African politics, focusing on pre-colonial and colonial legacies for post-colonial reality. Local politics, social construction of identities, political economy of peasants and working class, political development and decay, social movements, and prospects for democracy.

POL 8608. Government and Politics of Russia and the Commonwealth of Independent States. (3 cr; A-F or Aud. Prereq-Grad pol sci major or #) Framework for understanding politics of change underway in the former Soviet Union. Roots of current transformation, including causes and legacy of the Russian revolution and creation of the Soviet Union; Issues in current transformation, including nationalism, economic reform, and democratization. Prior knowledge of basic Soviet politics is assumed.


POL 8615. The Political Economy of Contemporary Japan. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Major political and economic issues confronting the Japanese system; situation of Japanese case within comparative politics literature concerning role of the state in formulating economic and social policy making. Review of literature. Deregulation in key industries, welfare reform, tax reforms, and status of labor movements.

POL 8619. Latin American Politics. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Major bodies of theory on development, democracy and democratization, social movements, civil society, the state, and transnational linkages.

POL 8633. Comparative Sociopolitical Change. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Critical evaluation of literature and theoretical perspectives; comparative examination of social and political change and interrelationship between both processes; structure/agency nexus.

POL 8637. Comparative Political Economy. (3 cr; Stdnt Opt. Prereq-Grad pol sci major or #) Connections between democracy and markets, emphasizing experiences of countries in North America and Europe.

POL 8641. Comparative Mass Political Behavior. (3 cr; A-F or Aud. Prereq-Grad pol sci major or #) Examined from a cross-national perspective. Development of political participation, mobilization and its effects, development of political cleavages and political parties as vehicles of conflict, modes of political behavior under varied systems of representation and varied party systems.

POL 8643. Comparative Political Institutions. (3 cr; A-F or Aud. Prereq-Pol sci grad student or #) Structure/operation of various political institutions in different settings. Theoretical approaches, comparative frameworks. Introduction to literature on political institutions. Preparation for comparative research on political institutions.

POL 8660. Topics in Comparative Politics. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad pol sci major or #) Readings in advanced topics or problems; supervised research and research training.

POL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

POL 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])
Portuguese (PORT)

Department of Spanish and Portuguese

PORT 5520. Portuguese Literary and Cultural Studies. (3 cr [max 9 cr]; Stdt Opt. Prereq-Grad student or #)(1 cr; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

PORT 5530. Brazilian Literary and Cultural Studies. (3 cr [max 9 cr]; Stdt Opt. Prereq-Grad student or #) Origin/development of modern Portuguese nation (late 15th to 20th century) using literature, cultural and literary criticism, history, sociology, and various media (film, art, music, Internet). Main cultural problematics pertaining to Portugal as well as fundamental literary texts.

PORT 5540. Literatures of the Portuguese-Speaking World. (3 cr [max 9 cr]; Stdt Opt. Prereq-Grad student or #) Use of model-centered, guided inquiry method of teaching introductory science. Making better use of resources for science education. Strengthening local institutional support for participants as learning community of leaders in disseminating standards-based reform.

PORT 5501. Modeling Instructors: Introductory Science Courses. (3 cr; Stdt Opt. Prereq-Grad student or #) Use of model-centered, guided inquiry method of teaching introductory science. Making better use of resources for science education. Strengthening local institutional support for participants as learning community of leaders in disseminating standards-based reform.


PORT 5530. Directed Study: Reflecting on Professional Development Through Facilitating Peer Learning Groups. (1 cr; S-N or Aud. Prereq-90 cr) Personal/professional development that occurs through facilitating peer learning groups. Power of peer learning environments on students and on those who serve as facilitators. Direct instruction, directed learning tasks, intense reflective activities.

PORT 5105. Increasing Access and Success in Undergraduate Classrooms. (3 cr; A-F or Aud) Fundamentals and best practices for promoting student access, persistence, and retention within classroom. Focuses on traditionally under-represented/served populations.

PORT 5106. Multicultural Teaching and Learning in Diverse College Contexts. (3 cr; A-F only. Prereq-Grad student) Theory/pedagogy for culturally responsive teaching from perspectives of teachers/learners in postsecondary settings. Critical multicultural education, universal instructional design, integrated multicultural instructional design.

PORT 5196. Supervised Practicum in Multicultural Postsecondary Teaching and Learning. (3 cr; A-F only. Prereq-Grad student enrolled in PortL MA program or DGS approval) Directed study in multicultural postsecondary teaching and learning. (3 cr; S-N only. Prereq-Grad student in PortL MA program or DGS approval)

PORT 5206. Action Research Methods to Improve College Teaching and Learning. (3 cr; A-F only. Prereq-Grad student enrolled in PortL MA program or DGS approval) Directed study in multicultural postsecondary teaching and learning. (3 cr; S-N only. Prereq-Grad student in PortL MA program or DGS approval)

Preventive Science Minor (PREV)

Institute of Child Development

College of Education and Human Development


PREV 8005. Prevention Science Capstone Course. (1 cr Prereq-8001) Topics for preservation research project. Students discuss possible projects with faculty/peers. Students present final proposal for research project.

Product Design (PDES)

Department of Design, Housing, and Apparel

College of Design

PDES 5170. Topics in Product Design. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Jr or sr or grad student) In-depth investigation of specific topic, announced in advance.

PDES 5193. Directed Study in Product Design. (1 cr [max 8 cr]; A-F or Aud. Prereq-Grad, #) Independent study in product design under tutorial guidance.

PDES 5701. Creativity, Idea Generation, and Innovation. (2 cr; A-F only) Half semester course. Introduction to a variety of creativity and idea generation tools with an emphasis on innovative product concept development. Students apply different tools to an ongoing project. Starting with a general theme, students explore problems and concepts, practice using a variety of idea generation tools, and learn methods of evaluating/selecting concepts. Customer needs, benchmarking, and intellectual property.

PDES 5702. Concept Sketching and Rendering. (2 cr; A-F only) Sketching and marker rendering for communication of conceptual product plan design. Free-hand 2-point perspective. Weekly drawing assignments/presentations. Students keep a sketchbook to develop ideas/drawings.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

PDES 5703. Product Form and Model Making. (4 cr; A-F only)

PDES 5711. Toy Product Design. (4 cr; A-F only)
Product design process with a focus on creativity and designing for play. Project-centric. Students work in small teams of 5-6 members to design and prototype new toys with the help of local industry and children.

PDES 8193. Readings in Product Design. (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Grad, #)
Independent study; review of books and periodicals under tutorial guidance.

PDES 8193. Directed Study in Product Design. (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad, #)
Independent study in product design under tutorial guidance.

Psychology (PSY)

Department of Psychology

College of Liberal Arts

PSY 5012. Learning and Cognition in Animals. (4 cr; Stdnt Opt. Prereq-3011 or 4011 or honors or grad student or #)
Review/evaluation of key questions, methods, theories, and data about forms of learning and elementary cognitive processes. Emphasizes animal models. Implications for human learning/behavior.

PSY 5014. Psychology of Human Learning and Memory. (3 cr; Stdnt Opt. Prereq-3011 or 3051 or honors or grad student)

PSY 5015. Cognition, Computation, and Brain. (3 cr; Stdnt Opt. Prereq-[Honors or grad] or [[Jr or sr], [3011 or 3051 or 3061] or #])
Human cognitive abilities (perception, memory, attention) from different perspectives (e.g., cognitive psychological approach, cognitive neuroscience approach).

PSY 5018H. Mathematical Models of Human Behavior. (3 cr; A-F only. Prereq-Math 1271 or #)
Mathematical models of complex human behavior, including individual/group decision making, information processing, perception, and overt action. Specific computational techniques drawn from decision theory, information theory, probability theory, machine learning, and elements of data analysis.

PSY 5031W. Perception. (3 cr; Stdnt Opt. Prereq-3051 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 5036W. Computational Vision. (3 cr; Stdnt Opt. Prereq-[3051 or 3051], [Math 1272 or equiv])
Applications of psychology, neuroscience, computer science to design principles underlying visual perception, visual cognition, action. Compares biological processing of images with respect to image formation, perceptual organization, object perception, recognition, navigation, motor control.

PSY 5037. Psychology of Hearing. (3 cr; Stdnt Opt. Prereq-[MATH 1271, 3051 or 3051 or 3061])
Biological and physical aspects of hearing, auditory psychophysics, theories and models of hearing, perception of complex sounds including music and speech. Clinical/other applications.

PSY 5038W. Introduction to Neural Networks. (3 cr; Stdnt Opt. Prereq-[[3061 or NCS 3102], [MATH 1282 or 2243]]) or #)
Parallel distributed processing models in neural/ cognitive science. Linear models, Hebbian rules, self-organization, non-linear networks, optimization, representation of information. Applications to sensory processing, perception, learning, memory.

PSY 5054. Psychology of Language. (3 cr; Stdnt Opt. Prereq-Grad or [[Jr or sr], [3011 or 3051 or 3061] or #])
Theories/experimental evidence in past/present conceptions of psychology of language.

PSY 5063. Cognitive Neuropsychology. (3 cr; Stdnt Opt. Prereq-Grad or [[Jr or sr], [3011 or 3051 or 3061] or #])

PSY 5062. Introduction to Functional MRI. (3 cr; A-F only. Prereq-Jr or sr or grad or #)
How to understand and perform a brain imaging experiment. Theory and practice of functional MRI experimental design, execution, and data analysis. Students develop materials/analyze and analyze their own functional MRI data. Lectures/lab exercises.

PSY 5064. Brain and Emotion. (3 cr; A-F or Aud. Prereq-3061 or 5061 or #)
Introduction to affective neuroscience. How brain promotes emotional/motivated behavior in animals/humans. Biological theories of emotion in historical/current theoretical contexts. Fundamental brain motivational systems, including fear, pleasure, attachment, stress, and regulation of motivated behavior. Implications for emotional development, vulnerability to psychiatric disorders.

PSY 5065. Functional Imaging: Hands-on Training. (3 cr; Stdnt Opt. Prereq-[[3801 or equiv], [3061 or NCS 3101]])
Basic neuroimaging techniques/function/magnetic resonance imaging (MRI). First half of semester covers basic physical principles. Second half students design/execute fMRI experiment on Siemens 3 Tesla scanner.

PSY 5010. Personality Psychology. (3 cr; Stdnt Opt. [S]PSY 5011. Prereq-[[3001W or equiv], [honors undergrad or grad student])
Current theory and research on personality functioning and personality structure. Descriptive, biological, evolutionary, cognitive, developmental, cultural, and narrative perspectives on personality.

PSY 5135. Psychology of Individual Differences. (3 cr; Stdnt Opt. [S]PSY 5135. Prereq-[[300W or equiv], [5862 or equiv] or #])
Differential methods in study of human behavior. Psychological traits. Influence of age, sex, heredity, and environment in individual/group differences in ability, personality, interests, and social attitudes.

PSY 5136. Human Abilities. (3 cr; Stdnt Opt. Prereq-[[300W or 300IV], [3155 or 3155], [5862 or equiv] or #])
Theory, methods, and applications of research in human abilities. 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; Stdnt Opt. Prereq-3001W or equiv or #)

PSY 5138. Psychology of Aging. (3 cr; Stdnt Opt. Prereq-3001W or equiv)
Theories/findings concerning age-related changes in mental health, personality, cognitive functioning, productivity are reviewed/interpreted within context of multiple biological, social, and psychological changes that accompany age.

PSY 5202. Attitudes and Social Behavior. (3 cr; Stdnt Opt. Prereq-3201 or #)
Theory/research on social psychology of beliefs/attitudes. Persuasion principles.

PSY 5204. Psychology of Interpersonal Relationships. (3 cr; A-F only. Prereq-Honors or grad student or #)
Introduction to interpersonal relationship theory/research findings.

PSY 5205. Applied Social Psychology. (3 cr; Stdnt Opt. Prereq-3201 or grad student or #)
Applications of social psychology research/theory to domains such as physical/mental health, education, the media, desegregation, the legal system, energy conservation, public policy.

PSY 5206. Social Psychology and Health Behavior. (3 cr; A-F only. Prereq-3201 or grad student or #)
Survey of social psychological theory/research pertaining to processes by which people develop beliefs about health/illness. Relationship between these beliefs, adoption of health-relevant behavior. Effect of psychological factors on physical health.

PSY 5207. Personality and Social Behavior. (3 cr; A-F or Aud. Prereq-5301 or 3201 or honors or grad student or #)
Conceptual/methodological strategies for scientific study of individuals and their social worlds. Applications of theory/research to issues of self, identity, and social interaction.

PSY 5501. Vocational and Occupational Health Psychology. (3 cr; Stdnt Opt. Prereq-3001W or equiv or #)
Survey of history, concepts, theories, methods, and findings of vocational/occupational health psychology. Burnout, personality, violence, stress/strain-relations, counter productive behaviors, coping in workplace. Vocational development/assessment, career decision-making/counseling, person-environment fit.

PSY 5707. Personnel Psychology. (4 cr; Stdnt Opt. [S]PSY 5701. Prereq-[[300W or equiv], 3711]) or #)
Application of psychological research/theory regarding individual differences, psychological measurement, decision making, and learning to personnel selection, performance assessment, and occupational training. Job analysis, recruitment, selection decisions, performance appraisals, and training design, evaluation, and practice.

PSY 5708. Organizational Psychology. (3 cr; Stdnt Opt. [S]PSY 5702. PSY 5705. Prereq-[[300W, 3711] or psy grad or #])
Psychological causes of behavior in work organizations. Consequences for individual fulfillment and organizational effectiveness. Individual differences, social perception, motivation, stress, job design, leadership, job satisfaction, teamwork, organizational culture.

PSY 5862. Psychological Measurement: Theory and Methods. (3 cr; Stdnt Opt. Prereq-3501H or MATH 1271 or grad student)
Types of measurements (tests, scales, inventories) and their construction. Theory/measurement of reliability/validity.

University of Minnesota Fall 2012 Graduate Education Catalog

PSY 5960. Topics in Psychology. (1-4 cr; max 8 cr; S-N or Aud. Prereq: PSY 5001, [1 or 5 cr or grad student]) Special course or seminar. Topics listed in Class Schedule.

PSY 5993. Research Laboratory in Psychology. (3 cr; max 16 cr; Stdnt Opt. Prereq: #) Laboratory instruction and seminars in faculty research areas.

PSY 8004. Philosophical Psychology. (3 cr; S-N or Aud. Prereq-Grad student or #) Selected philosophical/methodological problems.

PSY 8010. Advanced Topics in Learning. (3 cr; max 12 cr; S-N or Aud. Prereq: 5012 or #) Contemporary topics in learning and behavior theory.


PSY 8036. Topics in Computational Vision. (3 cr; max 12 cr; Stdnt Opt. Prereq: 5031 or 5036 or equiv or #) Recent research in visual psychophysics, visual neuroscience, and computer vision.


PSY 8041. Proseminar in Perception. (3 cr; A-F or Aud. Prereq-Psy grad student or #) Seminar. Advanced topics in auditory and visual perception. Lecture, discussion, and student-led presentations of research papers on core topics of the peripheral visual and auditory systems, cortical representations, behavioral and brain-imaging methods, and computational approaches to understanding/simulating perception.

PSY 8042. Proseminar in Cognition, Brain, and Behavior. (3 cr; A-F or Aud. Prereq-Psy grad student or #) Advanced topics in cognition, brain, and behavior. Lecture, discussion, and student-led presentations of research papers on core topics of attention, memory, emotion, categorization, thinking, and language, and intersections between these areas.

PSY 8055. Seminar: Cognitive Neuroscience. (3 cr; Stdnt Opt. Prereq: 5015 or #) Recent advances in analysis of neural bases of cognitive functions.

PSY 8056. Seminar: Psychology of Language. (3 cr; A-F or Aud. Prereq-Grad psych major or #) Selected topics in psycholinguistics.

PSY 8061. Neuropsychopharmacology. (3 cr; A-F or Aud. [S]CMB 8208, Prereq: 5xxx coursework in biological psych or neuroscience or pharmacology or #) Relationships between biochemical, neurophysiological, psychological, and behavioral effects of drugs. Research in neuropharmacology, behavioral pharmacology, and pharmacology of addiction.


PSY 8203. Impression Management. (3 cr; Stdnt Opt. Prereq: Grad psych major; 8208 recommended; #) Classic and contemporary theory and research concerning interpersonal strategies of impression management and interplay between private and public self.

PSY 8204. Social Psychology of Prejudice and Intergroup Relations. (3 cr; A-F or Aud) Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.


PSY 8206. Proseminar in Social Psychology. (1 cr; max 5 cr; S-N only. Prereq-[PSY 8205, Social Psych PhD student] or #) Current research topics in social psychology.

PSY 8208. Social Psychology: The Self. (3 cr; A-F or Aud. Prereq-Psy background especially in personality and soc psych) Social psychological theory and research concerning the self and social behavior.


PSY 8210. Law, Race, and Social Psychology. (3 cr; A-F only. Prereq: 2nd or 3rd yr law student or PhD student in social science doctoral program) Interdisciplinary seminar. Scientific foundations for and legal implications of implicit (vs explicit) racial or gender bias in four socio-legal domains: criminal law, affirmative action, employment discrimination, and legislative redistricting.

PSY 8211. Proseminar in Political Psychology I. (1 cr; S-N or Aud. [S]POL 8307. Prereq-Political Psychology grad minor) Readings, discussion, and guest speakers. Topics vary each semester.

PSY 8212. Proseminar in Political Psychology II. (3 cr; S-N or Aud. [S]POL 8308. Prereq-Political Psychology grad minor) Readings, discussion, and guest speakers. Topics vary each semester.

PSY 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PSY 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

PSY 8505. Counseling Psychology: History and Theories. (3 cr; Stdnt Opt. Prereq-Counseling psych grad student or #) Introduction to history of counseling psychology and to primary theoretical orientations used by counseling psychologists. For each theory: basic principles, application to counseling practice, and research support.


PSY 8503. Interviewing and Intervention. (3 cr; Stdnt Opt. Prereq-Counseling Psy grad student or #) Skills-based course: conceptualization of counseling process, stages of counseling, development of counseling skills, and strategies for behavior change.

PSY 8510. Counseling Psychology Beginning Practicum: General. (1-6 cr [max 6 cr]; S-N only. Prereq-Counseling Psy grad student) Beginning applied experiences in counseling psychology settings.

PSY 8511. Counseling Psychology Beginning Practicum: General. (1-6 cr [max 18 cr]; S-N only. Prereq-Counseling Psy grad student) Beginning applied experiences in counseling psychology settings.

PSY 8512. Counseling Psychology Beginning Practicum: General. (1-6 cr [max 18 cr]; S-N only. Prereq-Counseling Psy grad student) Beginning applied experiences in counseling psychology settings.

PSY 8514. University Counseling Practicum I. (4-6 cr [max 6 cr]; S-N only. Prereq-Counseling Psy grad student, instr consent) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

PSY 8515. University Counseling Practicum II. (4-6 cr [max 6 cr]; S-N only. Prereq-Counseling Psy grad student) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

PSY 8541. Multicultural Psychology. (3 cr; Stdnt Opt. Prereq-#) Approaches, findings, and controversies in research on psychology of ethnic/racial minorities and other cultural populations. Emphasizes counseling/community applications of theory/research. Lecture, discussion, lab.

PSY 8542. Ethics in Psychology. (3 cr; S-N or Aud. Prereq-Counseling or clinical psych grad student or #) Ethical principles and codes of conduct for psychologists. Ethical dilemmas faced by researchers, practitioners, and teachers.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

PSY 8544. Vocational and Occupational Health Psychology Research. (3 cr; Stdnt Opt. Prereq-8501, 8502, 8503 or equiv) counseling psy grad student, #) Research problems specific to special populations, vocational research, assessment/testing, findings in these areas useful to counseling psychology practice.

PSY 8545. Counseling Psychology Process and Outcomes Research. (3 cr; Stdnt Opt. Prereq-[8501, 8502, 8503] or equiv) counseling psy grad student, #) Research methods, empirically-supported interventions, assessing treatment outcomes in practice, research on the counseling process, applying counseling research in counseling practice and in non-counseling contexts in the “real world.” Ethics and standards of research, history of counseling process and outcome research.

PSY 8560. Counseling Psychology Advanced Practicum I: General. (1-6 cr [max 6 cr]; S-N only. Prereq- Counseling psy grad student, #) Applied practice experience in counseling psychology settings and seminars. May include guest speakers, readings, and student presentations.

PSY 8561. Counseling Psychology Advanced Practicum II: General. (1-6 cr [max 6 cr]; S-N only. Prereq- Counseling psy grad student, #) Applied practice experience in counseling psychology settings and seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.


PSY 8566. Counseling Psychology Advanced Practicum II: Career Counseling and Assessment Clinic. (1-6 cr [max 6 cr]; S-N only. Prereq- Counseling psy grad student, #) Applied practice experience in vocational assessment clinic of Department of Psychology. Career/vocational testing, assessment, decision making.

PSY 8570. Counseling Psychology Internship I. (1-12 cr [max 36 cr]; S-N only. Prereq- Counseling psy PhD candidate, #) First part of counseling psychology internship.

PSY 8571. Counseling Psychology Internship II. (1-12 cr [max 36 cr]; S-N only. Prereq- Counseling psy PhD candidate, #) Second part of counseling psychology internship.

PSY 8572. Counseling Psychology Internship III. (1-12 cr [max 36 cr]; S-N only. Prereq- Counseling psy PhD candidate, #) Third part of counseling psychology internship.


PSY 8612. Assessment II. (5 cr; A-F or Aud. Prereq-8611, clinical psych grad student) Theory and practice in clinical application of assessment techniques and interviewing. Lab: observations, administration, scoring, interpretation.

PSY 8620. Clinical Psychology Practicum. (1-6 cr [max 36 cr]; S-N or Aud. Prereq-#) Field experience in professional work in clinical settings.


PSY 8622. Treatment I. (3 cr; A-F or Aud. Prereq-8111, CSPR grad student) Methodological issues in treatment research, theories of change/motivation. Empirically supported therapies for anxiety, mood, and personality disorders, psychosis, and addiction. Simulating therapeutic interactions to prepare students to provide therapy.

PSY 8644. Personality Assessment. (3 cr; Stdnt Opt. Prereq-Psy grad student or #) Concepts/Issues concerning individual differences in personality and their assessment: content, reality, and significance of personality traits; classification of personality traits; major approaches to measurement of personality.

PSY 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade) No grade. Doctoral student who has not passed prelim oral; no required consent for Ist/2nd registrations, up to 2 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before Summer 2007 may register up to four times, up to 60 combined cr)

PSY 8701. Seminar in Industrial and Organizational Psychology I. (3 cr; A-F or Aud. Prereq-#) Application of research and theory in psychological measurement and individual differences to problems in work behavior, job satisfaction, and individual training.

PSY 8702. Seminar in Industrial and Organizational Psychology II. (3 cr; A-F or Aud. Prereq-#) Determinants of behavior, performance, job satisfaction that can be influenced after an individual enters an organization. Application of research/theory in attitudes, motivation, leadership, group/team dynamics, and job design to enhancement of job performance/satisfaction.

PSY 8703. Seminar in Industrial and Organizational Psychology III. (3 cr; A-F or Aud. Prereq-#) Developing issues/trends in current research, research methodological advances, and implementation practices. Recent important/controversial developments.

PSY 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

PSY 8935. Readings in Behavioral Genetics and Individual Differences Psychology. (1 cr [max 10 cr]; S-N or Aud. Prereq-5135, 5137 or #) Each week participants read and discuss one or two primary research articles.


PSY 8960. Graduate Seminar in Psychology. (1-3 cr [max 36 cr]; Stdnt Opt. Prereq-Psychology grad student or #) Graduate seminar in subject of current interest in psychology.

PSY 8993. Directed Studies: Special Areas of Psychology and Related Sciences. (1-6 cr [max 36 cr]; Stdnt Opt. Prereq-#) Special area of psychology or a related science.

Public Affairs (PA)

Hubert H. Humphrey Institute of Public Affairs


PA 5002. Introduction to Policy Analysis. (1.5 cr; A-F or Aud. Prereq-Major in [public policy or science/technology/environmental policy] or #) Process of public policy analysis from problem structuring to communication of findings. Commonly used analytical methods. Alternative models of analytical problem resolution.

PA 5004. Introduction to Planning. (3 cr; A-F or Aud. Prereq-Major in urban/regional planning or #) History, institutional development of urban planning as a profession. Intellectual foundations, planning theory. Roles of urban planners in U.S./international settings. Scope, legitimacy, limitations of planning and of planning process. Issues in planning ethics and in planning in settings of diverse populations/stakeholders.

PA 5011. Management of Organizations. (3 cr; A-F or Aud. Prereq-Major in public policy or #) Challenges facing higher-level managers in public/nonprofit organizations in a mixed economy and democratic republic. Distinctive features of public/nonprofit management, skills necessary for effective management, manager’s role as creator of public value. Lectures, case discussions.

PA 5012. The Politics of Public Affairs. (3 cr; A-F or Aud. Prereq-Major in public policy or [sci, tech, and environ policy] or #) Stages of policy making from agenda setting to implementation. Role/behavior of political institutions (courts, legislatures, executives, bureaucracies) and citizens, social movements, and interest groups. Concepts of political philosophy. Theories of the state. Team taught, interdisciplinary course. Small discussion sections.

PA 5013. Law and Urban Land Use. (1.5 cr; A-F or Aud. Prereq-Major in urban/regional planning or #) Role of law in regulating/shaping urban development, land use, environmental quality, and local/regional governmental services. Interface between public/private sector.

PA 5021. Economics For Policy Analysis and Planning I. (3 cr; A-F or Aud. Prereq-[Econ 1101 or equiv.], Major in public policy or [sci, tech, and environ policy] or #) Introduction to tools useful for public policy: intermediate microeconomics, macroeconomics, concepts of international trade.

PA 5022. Economics For Policy Analysis and Planning II. (1.5-3 cr [max 4.5 cr]; A-F or Aud. Prereq-[5021 or equiv.], public policy major or #) Application of economic reasoning to various public policy issues. Cost-benefit analysis, nonmarket valuation, and tax analysis.


PA 5032. Intermediate Regression Analysis. (2 cr; A-F or Aud. Prereq-[[5031 or equiv.], major in [public policy or [sci, tech, and environ policy]]] or #) Bivariate/multivariate models of regression analysis, assumptions behind them. Problems using these models when such assumptions are not met.

PA 5033. Multivariate Techniques. (2 cr; A-F or Aud. Prereq-[[5031 or equiv.], major in [public policy or [sci, tech, and environ policy]]] or #; [5032 or equiv] recommended) Public affairs topics using maximum-likelihood estimation approaches.

PA 5035. Survey Research and Data Collection. (1.5 cr; A-F or Aud. Prereq-[[5031 or equiv.], major in [publ policy or [sci, tech, and environ policy] or urban/regional planning]] or #) Introduction to survey research methods. Emphasizes applications to policy and applied research. Research design choices (in qualitative, experimental, case studies), sampling, variable specification, measurement. Conducting interviews, mailed questionnaires. Qualitative techniques.

PA 5036. Regional Economic Analysis. (2 cr; A-F only. Prereq-Major in public policy or [science, tech, env policy] or urban/regional planning or #) Economic data analysis techniques for practitioners in planning and economic development working at local/regional levels. Shift-share analysis, economic base model, base multipliers, location quotient analysis, minimum requirements method, economic impact analysis. Individual/group projects.

PA 5037. Regional Demographic Analysis. (2 cr; A-F only. Prereq-Major in public policy or [science, tech, env policy] or urban and regional planning or instructor consent) Demographic data analysis, population projection techniques for practitioners in planning, social service delivery, and community development at local/regional levels. Population curve fitting methods, demographic indicators, cohort-component method of population projection, estimation of fertility/migration rates, life tables. Individual/group projects.

PA 5038. Analytics for Leaders I. (2 cr; A-F only. Prereq-Major in public affairs or public affairs leadership certificate or #) Skills to do basic quantitative analyses, evaluate research, develop evidence-based policy, and lead data-driven organizations. Descriptive statistics, research design. Ethical issues in interpretation, analysis, and use.

PA 5039. Analytics for Leaders II. (2 cr; A-F only. Prereq-5038) Builds on 5038. Skills to do basic quantitative analyses, evaluate research, develop evidence-based policy, and lead data-driven organizations. Descriptive statistics, research design. Ethical issues in interpretation, analysis, and use.

PA 5041. Qualitative Methods for Policy Analysts. (4 cr; A-F only. Prereq-Grad or #) Qualitative analysis techniques, examples of their application, meeting with a researcher who has employed the technique, and student practice applying the technique. Hands-on experience in designing, gathering, and analyzing data.

PA 5051. Cohort Leadership I. (2 cr; A-F only. Prereq-Major in public affairs or public affairs certificate (cohort); 5051-5052 must be taken in same academic yr) Leadership theories, tools, and strategies in global context for the mid-career student.

PA 5052. Cohort Leadership II. (2 cr; A-F only. Prereq-Major in public affairs or public affairs certificate (cohort); 5051-5052 must be taken in same academic yr) Continues 5051. Leadership theories, tools, and strategies in global context for the mid-career student.

PA 5053. Cohort Policy Analysis I. (2 cr; A-F only. Prereq-Major in public affairs (cohort) or public affairs certificate (cohort); 5053-5054 must be taken in same academic yr) Process of public policy analysis, including problem formulation, problem-solving, and communication of findings. Commonly used analytical methods. Use of multimedia mini-cases, including readings, cases, and simulation exercises.

PA 5054. Cohort Policy Analysis II. (2 cr; A-F only. Prereq-Major in public affairs (cohort) or public affairs certificate (cohort); 5053-5054 must be taken in same academic yr) Continues 5053. Process of public policy analysis, including problem formulation, problem-solving, and communication of findings. Commonly used analytical methods. Use of multimedia mini-cases, including readings, cases, and simulation exercises.

PA 5055. Cohort Quantitative Analytics I. (2 cr; A-F only. Prereq-Major in public affairs (cohort) or public affairs certificate (cohort); 5055-5056 must be taken in same academic yr) A problem-based learning approach to quantitative analysis. Frequency distributions, descriptive statistics, elementary probability and statistical inference. Hypothesis testing. Cross-tabulation, analysis of variance, correlation. Simple/multiple regression analysis. Data set development. Relevance to policy and leadership decision making.

PA 5056. Cohort Quantitative Analytics II. (2 cr; A-F only. Prereq-Major in public affairs (cohort) or public affairs certificate (cohort); 5055-5056 must be taken in same academic yr) Continues 5055. A problem-based learning approach to quantitative analysis. Frequency distributions, descriptive statistics, elementary probability and statistical inference. Hypothesis testing. Cross-tabulation, analysis of variance, correlation. Simple/multiple regression analysis. Data set development. Relevance to policy and leadership decision making.

PA 5080. Capstone Preparation Workshop. (1 cr; N-M only. Prereq-[PAPD83]) Project management, qualitative research, and critical framework to complete Capstone course. Students write draft of client project group norms and client contract.


PA 5103. Leadership and Change in an Innovation Society. (3 cr; Stdnt Opt. Prereq-Grad student or #) Models of change/leadership. How leaders can promote personal, organizational, and societal change. Case studies, action research. Framework for leadership/change in an innovation society.

PA 5104. Strategic Human Resource Management. (3 cr; A-F or Aud. Prereq-Grad student or #) Theory/practice of developing, utilizing, and aligning human resources to improve culture/outcomes of nonprofit/public organizations. HR strategy, individual diversity, leadership, selection, training, compensation, classification, performance appraisal, future HR practices.

PA 5105. Integrative Leadership Seminar. (3 cr) [SMGMT 6402, PA 5150, OLDP 6402, Prereq-Grad student or #] Basic concepts, practices, people, and organizations associated with integrative leadership. Case materials, related readings, presentations, and interactive discussion.
PA 5106. Foundations of Ethical Practice in Public Affairs. (1 cr; Prereq-Grad student or #) Links between each student’s core ethical values and formation documents that have shaped democracy in the United States or in the student’s homeland. Topics: ethics and agency; ethics in context of leadership development. Students compose a narrative of ethical practice.

PA 5107. Leadership, Reflective Practice, and Critical Theory: A Practicum. (2 cr; Stdt Opt. Prereq-Grad student or #) For students immersed in a cultural shift, organization, or leadership form who wish to learn how to negotiate international, cross-cultural/political contradictions. Critical approach to understanding adult learning. How to perceive and challenge dominant ideology, unmask power, contest hegemony, overcome alienation, and practice democracy.


PA 5113. State and Local Public Finance. (3 cr; Stdt Opt. Prereq-Grad or #) Overview of evolution of American legal system. Role of courts, legislatures, and political actors in changing law. How law is used to change public policy.


PA 5132. Mediation Training. (3 cr; Stdt Opt. Prereq-Grad or #) Creating an arena for mediation. Skills/expectations needed to mediate disputes between individuals, among groups: balanced (peer or colleague), needed to mediate disputes between individuals, creating an arena for mediation. Skills/expectations needed to mediate disputes between individuals, among groups: balanced (peer or colleague), needed to mediate disputes between individuals, among groups: balanced (peer or colleague), needed to mediate disputes between individuals, among groups: balanced (peer or colleague).

PA 5130. Urban Spatial and Social Dynamics. (3 cr; Stdt Opt. Prereq-Major in urban/regional planning or #) Behavioral theories of internal spatial arrangement, functioning, and characteristics of cities at macro level and how they produce a system of cities. Factors influencing urban spatial structure over time. Urban form, land use/rent. Spatial expression of economic, social, and political forces.

PA 5211. Land Use Planning. (3 cr; Stdt Opt. Prereq-Grad student or #) Physical/spatial basis for land use planning at community/regional level. Role of public sector in guiding private development. Land use regulations, comprehensive planning, growth management, innovative land use planning/policies.


PA 5213. Introduction to Site Planning. (3 cr; Stdt Opt. Prereq-Grad student or #) Analyzing/Preparing graphic plans for development or redevelopment of sites. Site planning issues, process, opportunities, details, and techniques. Hands-on preparation of a site plan. Site visits, lectures, research, presentations, exam, in-class exercises.

PA 5215. Computer Applications in Land Use Planning. (3 cr; Stdt Opt. Prereq-Grad or #) Geographical information system software, simulation modeling of land use/development, 3D software, the Internet. Project applications in citizen participation/decision-making. Meets weekly in mostly lab setting.

PA 5212. Private Sector Development. (3 cr; Stdt Opt. Prereq-Grad or #) Roles of various participants in land development. Investment objectives, effects of regulation. Overview of development process from private/public perspective.


PA 5222. Environmental Planning, Policy, and Decision Making. (3 cr; A-F only. Prereq-Grad or #) Theory and practice. Ethical, legal, and institutional frameworks relative to a range of environmental issues. Innovative environmental decision making informed by collaboration, conflict resolution, adaptive management, and resilience thinking.

PA 5251. Strategic Planning and Management. (3 cr; A-F or Aud. Prereq-Grad student or #) Theory/practice of strategic planning/management for public/nonprofit organizations/networks. Strategic planning process, management systems; stakeholder analyses. Tools/techniques such as purpose expansions, SWOT analyses, oval mapping, portfolio analyses, and logic models.


PA 5281. Immigrants and Cities. (3 cr; A-F or Aud. Prereq-Grad student or #) Impact of contemporary immigration in the United States on urban planning and public affairs. Social, political, and economic experiences of immigrants once they arrive in the United States. Immigrant assimilation theory by drawing on literature from demography, sociology, economics, political science, and public affairs.

PA 5290. Topics in Planning. (1-3 cr [max 9 cr]; Stdt Opt. Prereq-Grad student or #) Selected topics.


PA 5311. Program Evaluation. (3 cr; Stdt Opt. Prereq-Grad student or #) Principal methods, primary applications of evaluation research as applied to policies/programs in health/mental services, education, or other public affairs. Conducting evaluations. Becoming a critical consumer of studies.

PA 5390. Topics in Advanced Policy Analysis Methods. (1-4 cr [max 9 cr]; Stdt Opt. Prereq-Grad student or #) Topics in advanced policy analysis methods.

PA 5401. Poverty, Inequality, and Public Policy. (3 cr; Stdt Opt. Prereq-Grad or #) Nature/extent of poverty/inequality in the United States, causes/consequences, impact of government programs/policies. Extent/causes of poverty/inequality in other developed/developing countries.

PA 5405. Public Policy Implementation. (3 cr; A-F or Aud) Theory, tools, and practice of the implementation of public policy, particularly in areas involving public, private, and nonprofit organizations. Analytical approaches focus on multiple levels in policy fields to pinpoint and assess implementation challenges and levers for improvement.

PA 5412. Aging and Disability Policy. (3 cr; Stdt Opt. Prereq-Grad or #) Policy debates concerning populations that are aging or disabled. Students learn/practice analyses in context of important health, social, and economic policy debates. Readings on current theory/evidence.
PA 5414. Child Human Rights: Work and Education. (3 cr; Stdnt Opt. Prereq-Grad student or #) International child labor issues. Options for improving child well-being, including policies/programs that have potential to affect the lives of millions of children.

PA 5421. Racial Inequality and Public Policy. (3 cr; Stdnt Opt. Prereq-Grad or #) Historical roots of racial inequality in American society. Contemporary economic consequences. Public policy responses to racial inequality. Emphasizes thinking/analysis that is critical of strategies offered for reducing racism and racial economic inequality.


PA 5431. Public Policies on Work and Pay. (3 cr; Stdnt Opt. [S]HRIR 5061. Prereq-[PA 5031 or equiv], grad student or #) Public policies affecting employment, hours of work, and institutions in labor markets. Public programs impacting wages, unemployment, training, collective bargaining, job security, and workplace governance. Policy implications of the changing nature of work.


PA 5442. Policy Design for Education and Human Development. (3 cr; Stdnt Opt. Prereq-Grad or #) Designing effective educational policies. Using interdisciplinary approaches to identify/understand core variables (economic, psychological, etc.). Work on policy design.

PA 5451. Immigrant Health Issues. (3 cr; max 4 cr; A-F only. [S]PUBH 6281. Prereq-Grad student or #) How to access demographic, health, background information on U.S. immigrants. Characteristics and health needs of immigrants. Designing culturally competent health programs. How to advocate for change to promote immigrant health. Community visits are required. Online course.

PA 5453. Immigration and Public Policy. (3 cr; Stdnt Opt. Prereq-Grad student or #) How to employ an analytical framework to analyze a current immigration policy proposal. Topics vary (e.g., president’s guest worker proposal, demographic alternative proposals).

PA 5460. Topics in Race, Ethnicity, and Public Policy. (1-3 cr; max 9 cr; Stdnt Opt. Prereq-Jr or sr or grad student or #) Link between race/ethnicity and public policy. How to identify/measure racial/ethnic disparities and their historical/cultural origins and policy impacts and to craft politically feasible remedies. Topics may include criminal justice, housing, child welfare, and education.

PA 5490. Topics in Social Policy. (1-4 cr; max 9 cr). Stdnt Opt. Prereq-Grad student or #) Selected topics.

PA 5501. Theories and Policies of Development. (3 cr; Stdnt Opt. Prereq-Grad student or #) What makes some countries wealthier than others, one group of people healthier and more educated than another? How does the behavior of rich nations affect poor nations? Origins of development thought, contemporary frameworks and policy debates. Economic, human, and sustainable development.


PA 5521. Development Planning and Policy Analysis. (4 cr; Stdnt Opt. Prereq-5031 or equiv recommended or #) Techniques of development planning/policy analysis at national, regional, and project levels. Effects of external shocks and government interventions on national/regional economies. Macroeconomic modeling, input-output analysis, social accounting matrices/multipliers, project evaluation.


PA 5561. Gender and International Development. (3 cr; Stdnt Opt. Prereq-Grad or #) Women and men are affected differently by development and participate differently in policy formulation and implementation. Gender-sensitive perspective. Historical, political context. Global South. Policy, practice, and experience (theory and measurement; international, national, local stakeholders; effects of policy and practice on development).

PA 5580. Topics in Economic and Community Development. (1-3 cr; max 9 cr; Stdnt Opt. Prereq-Grad student or #) Selected topics.


PA 5621. Board Service in Women and Public Policy. (1 cr; S-N only. Prereq-#) Students serve as full members of a board of directors for a women’s movement organization. Organizational leadership. How to be an effective board member. Twin Cities feminist nonprofit organizations.

PA 5690. Topics in Women and Public Policy. (1-3 cr; max 9 cr; Stdnt Opt. Prereq-Grad student or #) Selected topics.


PA 5715. Survey of Current Issues in Science, Technology, and Environmental Policy. (1.5 cr; A-F only. Prereq-Grad or #) Current topics in science, technology, and environmental policy.

PA 5721. Energy and Environmental Policy. (3 cr; Stdnt Opt. Prereq-Grad or #) Impact of energy production/consumption choices on environmental quality, sustainable development, and other economic/social goals. Emphasizes public policy choices for energy/environment, linkages between them.


PA 5731. Emerging Technologies and Society. (3 cr; A-F only. Prereq-Grad student or #) Legal, public policy, social, economic, and ethical implications of emerging technologies (such as nanotechnology). Perspective of stakeholders (federal agencies, public, industry, environment, international organizations) on the future. Objectives/regulatory. Diversity of policy problems. Research methodologies.

PA 5741. Risk Analysis and Policy. (3 cr; Stdnt Opt. Prereq-Grad student or #) Interplay between risk analysis, decision making, and risk policy. Role of S&T Assessment methods; risk management processes, issues and methods; role/treatment of uncertainty; factors in decision making; risk-based rule making; public values; risk communication and perception. Scientific, technical, social, political, and ethical issues.

PA 5790. Topics in Science, Technology, and Environmental Policy. (1-3 cr; max 9 cr; Stdnt Opt. Prereq-Grad or #) Selected topics.

PA 5801. Global Public Policy. (3 cr; Stdnt Opt. Prereq-Major in public affairs or public policy or #) Creation of rules, norms, and institutions to regulate global activities. Policy making, from exclusive domain of state to including various nonstate actors. How global policy making regulates interstate, national, and transnational activities. Creation/ enforcement of global rules. Applications to international security, political economy, and other topics.

PA 5802. Global Economic Policy. (3 cr; Stdnt Opt. Prereq-Major in [public affairs or public policy] or #) Economic logic of globalization, national policy objectives, international finance/financial institutions, international trade and agreements including regional pacts and the WTO, global environmental and resource governance, immigration and emigration, and development challenges.
Courses

PA 5821. Humanitarianism. (3 cr; Stdtnt Opt. Prereq-Grad student or #) Foundations, logic, dynamics, dilemmas, and consequences of humanitarianism, a form of governance that operates in the name of--and for--the international community.


PA 5841. Women, Violence, and Armed Conflict. (5 cr; A-F only. Prereq-Grad student or #) Role of women in recent armed conflicts/how women are affected by wartime as combatants, civilians, victims, and perpetrators of war violence. Conflicts in Sierra Leone, Liberia and El Salvador, where women participated in fighting forces in large numbers, as well as women’s roles in the Abu Ghraib scandal, female suicide bombers, wartime sexual violence. Policy solutions offered by policymakers and NGOs to deal with problems of gender-based violence.

PA 5890. Topics in Foreign Policy and International Affairs. (1-5 cr [max 9 cr]; Stdtnt Opt. Prereq-Grad student or #) Selected topics.

PA 5910. Developing Your Public Service Career. (1 cr; S-N or Aud. Prereq-[Major in [public affairs or public policy or urban/regional planning] or [science, technology/environmental policy] or development practice] or #) Students investigate/analyze interests, skills, and abilities and combine them in a career plan. Develop tools to demonstrate abilities, document experiences/knowledge, and explore public service career options.

PA 5912. Politics of Public Affairs and Civic Engagement. (3 cr; A-F only. Prereq-Grad student or #) Potential for public affairs professionals to be agents/architects of democracy in a radically changing, diverse, global landscape of governance.

PA 5920. Skills Workshop. (1.5 cr; max 12 cr; Stdtnt Opt. Prereq-Grad student or #) Topics on public policy or planning skills. Topics specified in Class Schedule.

PA 5941. Leadership for the Common Good. (4 cr; A-F only. Prereq-[Major in development practice or public affairs] or public affairs leadership certificate or #) Personal, team, organizational, visionary, political, and ethical aspects of leadership. Building/experiencing a learning community.

PA 5952. Global Commons Seminar II. (2 cr; A-F only. Prereq-HH4 International fellow) Research/practicum related to professional development projects. Each week selected students assign readings, deliver a presentation on their professional development project, and distribute a summary of the talk. Presentations are developed in collaboration with at least one faculty specialist in the subject area.

PA 5981. American Institutions in Historical Perspective. (1.5 cr; Stdtnt Opt. Prereq-Grad student or #; basic US history course recommended) History of churches, fraternal organizations, charities, and institutions more directly related to government.

PA 5990. Topics: Public Affairs--General Topics. (0-3 cr [max 9 cr]; Stdtnt Opt. Prereq-Grad student or #) General topics in public policy.

PA 6001. Transforming Public Policy. (4 cr; A-F only. Prereq-5951 or #) Development of interdisciplinary understanding of one or more policy areas through explorations of theory, readings, cases, and model-building exercises. Articulating policy/system improvements and leadership implications for formulating/implementing them.

PA 6081. Capstone Workshop. (3 cr [max 6 cr]; A-F or Aud. Prereq-Grad major in public affairs or public policy or [urban and regional planning] or [science, technology, and environment policy] or development practice, completion of core courses or #) Project for external client on issue agreed upon by student, client, and instructor. Students apply interdisciplinary methods, approaches, and perspectives from core courses. Written report with analysis and policy recommendations. Oral presentation. Topics vary by term.

PA 6082. Working Group. (3 cr; A-F or Aud. Prereq-[Grad major in [public policy or [urban and regional planning] or [science, technology, and environment policy]]; completion of core courses or #) Facilitates completion of research paper on current issue in public policy and management. Students apply interdisciplinary methods, approaches, and perspectives studied in core courses. Written report includes analysis of issue, policy recommendations. Concentration/topic vary term-to-term.

PA 6190. Advanced Topics in Public and Nonprofit Leadership and Management. (1-3 cr [max 6 cr]; Stdtnt Opt) Selected topics.


PA 6202. Networks and Places: Transportation, Land Use, and Design. (4 cr; A-F or Aud. Prereq-[urban and regional planning] grad student or #) Relationship between land use and transportation. Developing synthetic design skills for linking land use transportation in urban/regional settings. Economic, political, legal, institutional frameworks for planning. Parallel practicum assignment.

PA 6203. Neighborhood Revitalization Strategies and Theories. (4 cr; A-F or Aud. Prereq-[Urban and regional planning] grad student or #) Policymaking/politics of planning in housing, community development, social policy. Connecting policy to local/regional policies. Role of institutional decision-making structures on policy outcomes. Importance of citizens, social movements, interest groups in policymaking process.

PA 6204. Creating Good Work: Economic and Workforce Development. (4 cr; A-F or Aud) Job-oriented economic development. Theories on how/why jobs are created. Tools used by communities and economic developers (e.g., tax abatement, infrastructure, job training, entrepreneurship). Strategies, politics, effectiveness.

PA 6290. Advanced Topics in Planning. (1-3 cr [max 6 cr]; Stdtnt Opt) Selected topics.


PA 6312. Analysis of Discrimination. (3 cr; Stdtnt Opt) Introduces students of policy analysis and other applied social sciences to tools for measuring and detecting discrimination in market and nonmarket contexts. Application of modern tools of labor econometrics and race relations research to specific problems of market and nonmarket discrimination.

PA 6333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PA 6390. Advanced Topics in Advanced Policy Analysis Methods. (1-3 cr [max 6 cr]; Stdt Opt) Selected topics.

PA 6490. Advanced Topics in Social Policy. (1-3 cr [max 6 cr]; Stdt Opt) Selected topics.

PA 6590. Advanced Topics in Economic and Community Development. (1-3 cr [max 6 cr]; Stdt Opt) Selected topics.

PA 6686. Feminist Organizations. (3 cr; A-F or Aud) Uses social movement literature and histories of U.S. second-wave feminism to study feminist organizations. Recurring issues and conflicts within organizations and movements examined through comparative studies of feminism in Latin America, Eastern Europe, Britain, and Italy. Methods and sources for studying feminism.

PA 6687. Women and Electoral Politics. (3 cr; A-F or Aud) Political science and women’s studies literature on American women and electoral politics.

PA 6690. Advanced Topics in Women and Public Policy. (1-3 cr [max 6 cr]; Stdt Opt) Selected topics.

PA 6777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PA 6790. Advanced Topics in Science, Technology, and Environmental Policy. (1-3 cr [max 6 cr]; Stdt Opt) Selected topics.

PA 6811. Strategic Issues in International Economic Policy. (3 cr; Stdt Opt) Compares/contrasts experiences of industrial/developing countries in trade, investment, exchange rates, and immigration.

PA 6821. National Security Policy. (3 cr; Stdt Opt) Politics and economies of national security policy. Defense policy, military strategy, and weapons procurement. While emphasis is on the United States, other countries also discussed.

PA 6890. Advanced Topics in Foreign Policy and International Affairs. (1-3 cr [max 6 cr]; Stdt Opt) Selected topics.

PA 8922. Master’s Paper: Plan B. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Masters of science in science, technology, and environmental policy majors work under guidance of paper adviser to complete their Plan B.

PA 8991. Independent Study. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-Limit of 3 credits applied toward a Humphrey School of Public Affairs degree or certificate program, #) Independent study.

Public Health (PUBH)

School of Public Health

PUBH 5230. Topics: Public Health Practice. (2 cr [max 4 cr])


New course offerings or topics of interest in environmental health.

PUBH 8110. Occupational Health and Safety Research Seminar. (1 cr [max 12 cr]; S-N or Aud. Prereq-[6120, 6330 or 6341, 6450], environmental health major, [OIPRTP specialty or equiv] or #) Facilities student research training in occupational injury prevention. Roundtable discussions, interdisciplinary involvement.

PUBH 8140. Validity Concepts in Epidemiologic Research. (2 cr; S-N only)

Conceptual basis for validity in observational epidemiologic research. Recognizing, evaluating, preventing, and correcting for confounding specification error, measurement-error bias, and selection/follow-up bias.


PUBH 8142. Epidemiologic Uncertainty Analysis. (2 cr; S-N only. Prereq-8140) Scientific interpretation of statistical analysis as dependent on both data and assumptions. Techniques that enable an investigator to incorporate uncertainty about assumptions into a quantitative analysis.

PUBH 8160. Advanced Toxicology. (2 cr; Stdnt Opt. Prereq-6160, one course in biochem, one course in molecular biological, #) Cellular/molecular mechanisms by which xenobiotics cause toxicity. Investigative approaches to current research problems in toxicology/carcinogenesis. Apoptosis, cell cycle regulation, genetic toxicity, molecular mechanisms of chemical carcinogenesis, genetic basis for susceptibility to environmental toxicants.

PUBH 8161. Current Literature in Toxicology. (1 cr [max 3 cr]; S-N or Aud. Prereq-8160) Modern methods in toxicology, critical thinking skills. Topics vary each semester. Students read/discuss toxicological literature.

PUBH 8162. Chemical Carcinogenesis and Chemoprevention. (3 cr; A-F or Aud. [S]NUTR 8617, Prereq-[BIOC 3001, BIOC 3021, BIOC 4331] or equiv). (Chem 2302 or equiv) Fundamental background in chemical carcinogenesis, carcinogen activation/detoxification, carcinogen-DNA adduct formation, cellular oncogenesis, cancer chemoprevention, nutrition/cancer. Topics integrated/interrelated.

PUBH 8163. Toxicology. (5 cr; A-F only. Prereq-Enrolled in toxicology concentration of environmental health PhD program) Biological/physiological principles that govern toxicological methods.

PUBH 8165. Current Topics in Toxicology. (1 cr [max 2 cr]; S-N only. Prereq-[Environmental health PhD, toxicology concentration] student or #) Seminars presented by students/faculty in toxicology grad program.

PUBH 8166. Experiences in Toxicology Research. (3 cr; A-F only. Prereq-Environmental health PhD student in toxicology concentration) Students complete research projects in labs of toxicology program graduate faculty members.

PUBH 8170. Advanced Industrial Hygiene Applications. (2 cr; A-F or Aud. Prereq-5170, eh grad major) Recognition, evaluation, and control of occupational health safety hazards. Application of concepts to specific industrial hygiene problems related to gases/vapors, aerosols, and physical agents.

PUBH 8194. Directed Research: Environmental Health. (1-6 cr [max 6 cr]; Stdnt Opt. Prereq-#) Research, with direction from faculty member, in environmental/occupational stresses on human health.

PUBH 8300. Topics: Epidemiology. (1-4 cr [max 20 cr]; Stdnt Opt) New course offerings or topics of interest in epidemiology.

PUBH 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

PUBH 8341. Advanced Epidemiologic Methods: Concepts. (3 cr; Stdnt Opt)

Conceptual foundations of fundamental issues in epidemiologic methodology. How/why a given method, design, or approach might help explain population health. Strengths, limits, and potential alternatives for a given approach.

PUBH 8342. Advanced Epidemiologic Methods: Applications. (3 cr; Stdnt Opt. Prereq-8341 or equiv or #) Applied methodology course designed for students in the Epi PhD program. Examples/readings are aimed at clinical/epidemiological and social/behavioral track students.

PUBH 8352. Readings in Clinical Research. (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-Clinical research major, #) Current readings in clinical research.

PUBH 8393. Directed Study: Clinical Research. (1-4 cr [max 20 cr]; Stdnt Opt. Prereq-Clinical research major, #) Directed research or field practice in clinical research.

PUBH 8400. Topics: Biostatistics. (5-4 cr [max 20 cr]; Stdnt Opt)

Topics of interest.


PUBH 8432. Probability Models for Biostatistics. (3 cr; Stdnt Opt. Prereq-[7450, 7407, STAT 5102, [advanced biostatistics or statistics] major or #]) Three basic models used for stochastic processes in the biomedical sciences: point processes (emphasizes Poisson processes), Markov processes (emphasizes Markov chains), and Brownian motion. Probability structure and statistical inference studied for each process.

PUBH 8435. Latent Variable Measurement Models and Path Analysis. (3 cr; Stdnt Opt. [S])

PUBH 7435. Prereq-Biostatistics PhD student or #) Introduction to use of statistical techniques known collectively as latent variable models. Exploratory/confirmatory factor analysis, path analysis, structural equation modeling, latent trait models, latent class models. SAS/AMOS software are used.

PUBH 8442. Bayesian Decision Theory and Data Analysis. (3 cr; Stdnt Opt. Prereq-[[7460 or experience with FORTRAN or with [C, S]], Stat 5101, Stat 5102, Stat 8311, grad student in [biostatistics or statistics] or #) Theory/application of Bayesian methods. Bayesian methods compared with traditional, frequentist methods.

PUBH 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)


Introduction to statistical problems arising in molecular biology. Problems in physical mapping (radiation hybrid mapping, DDP), genetic mapping (pedigree analysis, lod scores, TDT), biopolymer sequence analysis (alignment, motif recognition), and micro array analysis.

PUBH 8446. Advanced Statistical Genetics and Genomics. (3 cr; Stdnt Opt. Prereq-[[7445, statistical theory at level of STAT 5101-2; college-level molecular genetics course is recommended] or #) Genetic mapping of complex traits in humans, modern population genetics with an emphasis on inference based observed molecular genetics data, association studies; statistical methods for low/high level analysis of genomic/proteomic data. Multiple comparison and gene network modeling.

PUBH 8452. Advanced Longitudinal Data Analysis. (3 cr; Stdnt Opt. Prereq-[[Stat 5102, Stat 8311, experience with [SAS or S], advanced [biostats or stat] student]] or #) Methods of inference for outcome variables measured repeatedly in time or space. Linear/nonlinear models with either normal or non-normal error structures. Random effects. Transitional/marginal models with biomedical applications.


For definitions of course numbers, abbreviations, and symbols, see page 3. 167
PUBH 8472. Spatial Biostatistics. (3 cr; Stdtnt Opt. Prereq-[[STAT 8101, STAT 8102] or [STAT 8101, STAT 8102]], some experience with S-plus; STAT 8311 recommended) Spatial data, spatial statistical models, and spatial inference on unknown parameters or unobserved spatial data. Nature of spatial data. Special analysis tools that help to analyze such data. Theory/ applications.

PUBH 8475. Statistical Learning and Data Mining. (3 cr; Stdtnt Opt. Prereq-[[6450, 6451, 6452] or STAT 5303 or equiv], [biostatistics or statistics PhD student]) or #) Statistical techniques for extracting useful information from data. Linear discriminant analysis, tree-structured classifiers, feed-forward neural networks, support vector machines, other nonparametric methods, classifier ensembles (such as bagging/boosting), unsupervised learning.


PUBH 8492. Theories of Hierarchical and Other Richly Parametrized Linear Models. (3 cr; A-F only. Prereq-[[8201 or STAT 8311] or (STAT 8101, STAT 8102] or equiv],[biostatistics or statistics PhD student] or #) Linear richly-parameterized models. Hierarchical/dynamic/linear/linear mixed models. Random effects, shrinkage estimators, longitudinal models. Schemes for specifying/fitting models. Theory/computing for mixed-linear models. Richly parameterized models and the odd/surprising/undesirable results in applying them to data sets. Lectures, class project.

PUBH 8494. Directed Research: Biostatistics. (1-4 cr [max 4 cr]; S-N only. Prereq-#) Research, with direction from a faculty member, in biostatistics.

PUBH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PUBH 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PUBH 8800. Topics in Health Services Research and Policy. (1-4 cr [max 20 cr]; Stdtnt Opt) Topics and credit vary by instructor.


PUBH 8802. Health Services Policy Analysis: Applications. (2 cr; A-F or Aud. Prereq-Prerq-Grad or professional school or grad student or #) Emphasis on relationships between health services research and policy, and uses case studies to examine how research influences policy and vice versa.

PUBH 8803. Long-Term Care Principles, Programs, and Policies. (2 cr; Stdtnt Opt. Prereq-Grad-level health services research, policy course or #) Long-term care policy for functionally impaired persons, particularly the elderly. Team taught from healthcare and social services perspective; grounded in research literature on evidence of program effects. Innovative programs addressing current fragmentation of services.

PUBH 8805. Sociological Theory in Health Services Research. (3 cr; Stdtnt Opt) Overview of sociological theories in medical sociology, occupations/professions. Emphasizes teaching students how to apply theories to health/social phenomena of their own interest/choice.

PUBH 8806. Sociology of Health Occupations and Organizations. (3 cr; Stdtnt Opt. Prereq-HsP) grad major or #) Sociological theories of occupations/organizations as applied to health care. Functional, conflict, evolutionary theories applied to health care reorganization such as managed care, technology on organization of work/occupations. Emphasizes application of theories to develop hypotheses.

PUBH 8810. Research Studies in Health Care. (3 cr [max 6 cr]; Stdtnt Opt. Prereq-[Grad or professional school] student or #) Introduction to philosophy of science, conceptual modeling, experimental design, survey/sample design, issues relevant to health services research.


PUBH 8813. Measurement of Health-Related Social Factors. (3 cr; A-F or Aud. Prereq Intro stat course, understanding of simple correlations or #) How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data.

PUBH 8820. Health Economics I. (3 cr; A-F or Aud. Prereq-One course each in intermediate microeconomics, calculus, intro to linear algebra) Application of microeconomic theory to health care; decisions of consumers and producers under different assumptions about market structure and behavior.

PUBH 8821. Health Economics II. (3 cr; A-F or Aud. Prereq-8820 or #) Examines application of microeconomic theory to health services research through selected reading from published and unpublished health economics literature.

PUBH 8830. Writing for Research. (2 cr Prereq- HsP grad student or #) Two-course sequence. Writing research grants/papers. Writing skills appropriate to research proposals and scholarly papers. How to review, synthesize, and critique research proposals and published articles.

PUBH 8831. Writing for Research. (2 cr Prereq-8830) Second of two course sequence. Writing research proposals and scholarly papers. How to review, synthesize, and critique papers and research proposals.

PUBH 8836. Integration of Public Health Research Methods in Health Services Research and Policy. (2 cr, Stdtnt Opt. Prereq-Grad school or grad student or #) Integration of concepts/designs of public health research methods, how they can be integrated into health services research and policy analysis. Experimental learning opportunities in clinical settings that illustrate need for integration.

PUBH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required; For Environmental Health Students ONLY; Contact Director of Graduate Studies and the Graduate Student Coordinator)

PUBH 8893. Directed Study: Health Services Research, Policy, and Administration. (1-3 cr [max 3 cr]; Stdtnt Opt. Prereq-HSRA grad student, #)

PUBH 8894. Directed Research: Health Services Research, Policy, and Administration. (1-8 cr [max 8 cr]; Stdtnt Opt. Prereq-HSRA grad student, #)

Radiology (RAD)

Department of Radiology

Medical School

RAD 8200. Nuclear Medicine. (1-15 cr [max 15 cr]; Stdtnt Opt)

RAD 8210. Fundamentals of Nuclear Medicine. (1 cr; Stdtnt Opt. Prereq-tst-yr resident)

RAD 8250. Research: Nuclear Medicine. (1-15 cr [max 15 cr]; Stdtnt Opt)

RAD 8450. Research: Radiation Biology. (1-15 cr [max 15 cr]; Stdtnt Opt)

RAD 8550. Research: Radiological Physics. (1-15 cr [max 15 cr]; Stdtnt Opt)

Recreation Resource Management (RRM)

Department of Forest Resources

College of Food, Agricultural and Natural Resource Sciences

RRM 5001. Park and Protected Area Tourism. (3 cr; A-F or Aud. [S]RRM 3101. Prereq-Grad student or #) Interaction of resource based tourism with cultural/natural environments. Impacts of tourism on environment.

RRM 5201. Introduction to Travel and Tourism. (3 cr; A-F only. [S]RRM 3101. Prereq-Grad student or #) Nature, structure and complexity of tourism industry. Overview of travel/tourism: definition, evolution, magnitude globally. Types/functions of various sectors, tourism distribution system, role of various stakeholders in creation/delivery of tourism. Motivations for travel as means of understanding demand for tourism.

Rehabilitation Science (RSC)

School of Kinesiology

College of Education and Human Development

REC 5111. Sports Facilities. (3 cr; A-F or Aud. Prereq-Kin or REC major or #) Steps in planning and building facilities for athletics, physical education, and sport for college, professional, and public use.

REC 5115. Event Management in Sport. (3 cr; A-F or Aud. Prereq-Q2; Kin 5115; Grad student, #) Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events/benefits, professional events.

REC 5161. Recreation Land Policy. (3 cr; A-F or Aud) Historical development of recreational land policy in the United States and related contemporary issues in policy, management, interpretation, and research.

REC 5191. Adventure Recreation, Tourism, and Eco-Tourism. (3 cr; A-F or Aud) Development of adventure recreation programs, including an emphasis on the tourism industry.

REC 5211. Community Leisure Services for Persons with Disabilities. (3 cr; A-F or Aud) 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 5301. Wilderness and Adventure Education. (4 cr; A-F or Aud) Rationale for, methods in applying wilderness/adventure education programs in education, recreation, corporate, human service settings. Emphasizes adventure/wilderness program management.

REC 5311. Programming Outdoor and Environmental Education. (3 cr; A-F or Aud) Methods, materials, and settings for developing and conducting environmental and outdoor education programs.

REC 5317. Sport and Society. (3 cr; A-F or Aud. Prereq-[3126W, grad student] or #) Sport, sporting processes, social influences, systems, and structures that have affected and exist within/among societies, nations, and cultures. Issues concerning social differentiation. Social concerns such as violence and honesty.

REC 5421. Sport Finance. (3 cr; A-F or Aud. Prereq-Grad student or #) Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market.

REC 5461. Foundations of Sport Management. (3 cr; A-F or Aud. Prereq-Kin or rec or postbac or grad student or #) Theories/techniques in administering/managing sport enterprises. Organizational theory/policy. Practical examples of sport management skills/strategies.

REC 5511. Sport and Gender. (3 cr; A-F or Aud. Only) Critically examines women's involvement in/contributions to sport, physical activity, and leisure.

REC 5601. Sport Management Ethics and Policy. (3 cr; A-F or Aud. Prereq-Grad student or #) Ethical concepts that underpin or inform sport policies. Evaluating sport policies from a normative point of view. Selected sport policy issues are used to illustrate relevance of ethical considerations in policy development, ethical implications of sport policy.

REC 5631. Programming and Promotion in Sport. (3 cr; A-F or Aud. Prereq-Kin or REC grad student or #) Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing concepts. Discussion, practical application.

REC 5701. Positive Youth Development Programming. (3 cr; A-F only. Prereq-UPPER div undergrad or grad student or #) Youth development programming for out-of-school time. Philosophy/purpose of youth development programs. Principles/protocols for developing out-of-school time programs.

REC 5801. Legal Aspects of Sport and Recreation. (4 cr; A-F or Aud. Prereq-5551 or 5461 or #) Legal issues related to recreation, park, and sport programs/facilities with public/private sectors.

REC 5900. Special Topics: Contemporary Issues in Leisure Services. (1-12 cr [max 12 cr]; Stdnt Opt) 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, Recreation, and Sport. (3 cr; A-F or Aud. Only) Major theoretical paradigms and empirical findings, where appropriate, from leisure studies in particular and social sciences in general.

REC 8428. Doctoral Sport Management Seminar. (3 cr; A-F only. [S]KIN 8128. Prereq-PhD student, #) Analysis of current literature, theoretical constructs, research methodology, and design relative to sport management. Focuses on student-selected topics, research projects.

REC 8510. Seminar: Leisure Services. (3 cr; A-F or Aud. Prereq-REC Med or grad student or #) Critical study and special problems in recreation, park, and leisure services and in therapeutic recreation.

REC 8520. Seminar: Theoretical Perspectives in Leisure Behavior. (3 cr; A-F or Aud. Prereq-5101 or #) Major theoretical paradigms and empirical findings, where appropriate, from leisure studies in particular and social sciences in general.

REC 8533. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

REC 8590. Seminar: Administrative Problems in Leisure Services and Therapeutic Recreation. (3 cr; A-F or Aud. Prereq-REC Med or grad student or #) Administrative and management issues and problems in leisure services and therapeutic recreation.

REC 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

REC 8980. Graduate Research Seminar in Recreation, Park, and Leisure Studies. (1-3 cr [max 3 cr]; S-N or Aud. Prereq-5981, EPSy 5261 or #) Analyzing, designing, and reporting on research problems in leisure studies.

REC 8993. Research Problems in Recreation, Park, and Leisure Studies. (1-4 cr [max 9 cr]; S-N only. Prereq-REC PhD student, #) Individual scholarly research.

Rehabilitation Science (RSC)

Department of Physical Medicine and Rehabilitation

Medical School

RSC 5100. Hot Topics in the Biology of Aging. (1 cr; Stdnt Opt. Prereq-#) Biological research in aging. Student/faculty-led discussions on select research topics that are highly relevant to the field of biogerontology research, along with seminars on scientific integrity. Students lead discussions focused on their area of research expertise, using review/research articles and case studies of scientific misconduct. Tour of laboratory/discussion of literature published by lab dealing with aging and/or proteomics.

RSC 5101. Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences. (1 cr; A-F or Aud. Prereq-Basic algebra, trigonometry, and geometry. Pre-calculus or calculus is helpful but not required) Quantitative research approaches in health, rehabilitation, human movement sciences. Application examples/practice problems focus of the course. Basic algebra/geometry, solving equations for unknowns, logarithmic transforms, derivatives/integrals, matrix methods, use of macros in research applications.

RSC 5135. Advanced Biomechanics I: Kinematics. (3 cr; A-F or Aud. Prereq-#) How to describe/measure movement. Basic/applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion. Meets with RSC 8135.
Courses

RSC 5200. Introduction to Transcranial Magnetic Stimulation. (3 cr; A-F or Aud) Theory/application of transcranial magnetic stimulation (TMS) to measure corticospinal excitability. Must sign consent form. Resting/active motor thresholds, single hemisphere paired-pulse testing, bilateral interhemispheric inhibition paired-pulse testing, input-output recruitment curves, cortical silent periods, H reflex testing.


RSC 5235. Advanced Biomechanics II: Kinetics. (5 cr; A-F or Aud. Prereq-5155 or equiv or #) Forces that create human motion and are produced within body as a result. Measuring human motion. Clinical movement assessment. Exercise, sport, and activities of daily living. Two-dimensional rigid body dynamics models. Forward/inverse dynamics solutions, hypotheses to describe whole body/joint kinetics. Lab, lecture, discussion.

RSC 5294. Independent Study in Rehabilitation Science. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-Rehabilitation science student or program approval) Independent exploration into topics related to rehabilitation science.

RSC 5814. Age, Exercise, and Rehabilitation. (2 cr; Stdnt Opt. Prereq-Rehabilitation science student or program permission) Overview of normal physiological responses to exercise in the elderly. Comparison of exercise-induced responses of physiological systems throughout aging process. Focuses on importance of exercise from rehabilitation perspective. Offered Fall semesters of even-numbered years.

RSC 5841. Rehabilitation Science Instrumentation and Methodology. (4 cr; A-F or Aud. Prereq-( PHYS 1031, Phys 1032) or equiv). [All rehabilitation science student or program permission] Theory/application of kinesiological EMG and other common instruments used to measure human motion.


RSC 8100. Rehabilitation Science Seminar. (1 cr [max 6 cr]; A-F or Aud. Prereq-Rehabilitation science student or program permission) Critically reading/discussing rehabilitation science literature. Identifying important researchable questions, methods to answer them. Speaking/writing persuasively on scientific topics.

RSC 8150. Current Literature Seminar. (1 cr; A-F or Aud. Prereq-Grad student in PT or rehabilitation science major or #) Critical review of literature to evaluate efficacy of selected physical therapy interventions.

RSC 8155. Advanced Kinesiology. (3 cr; A-F or Aud. Prereq-Rehabilitation science student or program permission) How to describe/make measurement. Basic/applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion.

RSC 8170. Special Topics in Rehabilitation Science. (1 cr [max 3 cr]; A-F or Aud. Prereq-[Rehabilitation science student or program permission]. #) Topics vary by semester. Papers required.

RSC 8185. Problems in Rehabilitation Science. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-[Rehabilitation science student or program permission], #) Research project on selected topic. Use of systematic literature search. Critical analysis of scientific literature. Specific measurement systems. Data collection/reduction methods of on-going or new research projects. Preparing/defending research reports.

RSC 8188. Teaching Practicum. (1-3 cr [max 5 cr]; A-F or Aud. Prereq-[Rehabilitation science student or program permission], #) Supervised experience in teaching/evaluation. Effective use of instructional materials in lecture/lab courses. Students create learning objectives for teaching unit(s), conduct a review of current literature on topic, prepare/deliver presentations, compose test questions. Offered by individual arrangement with faculty.

RSC 8192. Research Design in Rehabilitation Science. (4 cr; A-F or Aud. Prereq-#) Critical appraisal of current medical literature. Fundamentals of research design, data analysis, and medical writing.

RSC 8235. Human Kinetics. (3 cr; A-F or Aud. Prereq-[5155 or equiv) or #) Forces that create human motion or are produced within body as a result of motion. Measuring kinetics of motion. Clinical movement assessment. Measuring/analyzing exercise, sport, and activities for transfer of forces within body. Two-dimensional rigid body dynamics. Forward/inverse dynamics. Hypotheses for whole-body/joint kinetics. Lectures, lab experiments, discussion.

RSC 8282. Problems in Human Movement. (4 cr; A-F or Aud. Prereq-[Rehabilitation science student or program permission], #) Fundamental principles of neuropsychology, neurology, motor control, and motor learning as a basis for therapeutic intervention in motor dysfunction.

RSC 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent) FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

RSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

RSC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer, 10 cr total required [Plan A only]) RSC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer, 24 cr required; RSC doctoral student who has successfully passed the prelim written exam, %) Thesis credit: doctoral.

Religious Studies (RELS)

Department of Classical and Near Eastern Studies

College of Liberal Arts


RELS 5070. Topics in Religious Studies. (3 cr [max 18 cr]; Stdnt Opt) Topics specified in Class Schedule and Course Guide.


RELS 5076. Apostle Paul: Life, Letters, and Legacy. (3 cr; Stdnt Opt) How what we can know about Paul. What his message was. What he was fighting. How he was later understood by friends/foes.


RELS 5111. Problems in Historiography and Representation of the Holocaust. (3 cr; Stdnt Opt. Prereq-3521 or 3541 or JWST 3521 or #) Issues connected with Holocaust. Inclusiveness of other groups, Holocaust versus “Shoa,” historiographical conflicts about perpetrators. Problems of representation in literature/art. Problems of narrative theology after Auschwitz.

RELS 5115. Midrash: Jewish Biblical Interpretation. (3 cr; Stdnt Opt. [S]RELS 3115, JWST 3115, CNES 3115, CNES 3115, JWST 3115) Jewish law studies as mirror of society and as way to actualize its value. Original sociocongregational contexts, current applications. Selections include biblical interpretations addressing moral, theological, legal, and literary problems.

REL 5255. Archaeology of Religion. (3 cr; Stdnt Opt.) Evidence for origins of religion, its diverse roles in human societies over millennia. What constitutes religion, why it is constantly present in human history. How archaeologists reconstruct beliefs/practices of past peoples.

REL 5503. History and Development of Israelite Religion I. (3 cr; Stdnt Opt.) Survey of the evolution of Israelite religion. Cultiic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

REL 5504. Development of Israelite Religion II. (3 cr; Stdnt Opt.) 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.

REL 5535. Death and the Afterlife in the Ancient World. (3 cr; A-F only) Beliefs, attitudes, and behaviors related to death and afterlife found in cultures of ancient Mediterranean and Near East. Literature, funerary art/epitaphs. Archaeological evidence for burial practices and care of dead.


REL 5614. Medieval Church. (3 cr; Stdnt Opt.) Introduction to history of western church in Middle Ages. Emphasizes church teachings and institutional structures, beliefs/practices of lay people, medieval/Christian encounter with non-Christian world.

REL 5621. The Christian Right and Left in America: Protestant Liberals, Evangelicals, and Fundamentalists. (3 cr; Stdnt Opt. [S]) RELS 5621) Religious, historical, social, and scientific thought/practice across three main U.S. Protestant groups since 1820. Historical processes that brought about diverse understandings of Christianity, theologies, and worship. Theological left/right views of views of society, history, and science that influence public debates.


REL 8190. Comparative Seminar in Religions in Antiquity. (3 cr [max 6 cr]; A-F or Aud. Prereq-Grad student in relevant field) Topics vary, see Class Schedule. Major cultural movement as it developed over several centuries. Drawn on evidence in literature, archival records, inscriptions, documentary papyri, and archaeological remains. Artistic media such as wall painting, architectural ornament, funerary sculpture, or manuscript illumination.

Retail Merchandising (RM)
Department of Design, Housing, and Apparel: Retail Merchandising
College of Design
RM 5170. Topics in Retail Merchandising. (1-4 cr [max 32 cr]; A-F or Aud. Prereq-Jr or sr or grad student) In-depth investigation of single specific topic, announced in advance.

Russian (RUSS)
Department of Slavic Languages/Literatures
College of Liberal Arts
RUSS 5404. Tolstoy in Translation. (3 cr; Stdnt Opt. [S]) RUSS 3404) Novels, stories, and philosophical writings of Leo Tolstoy.

RUSS 5407. Stories and Plays of Anton Chekhov in Translation. (3 cr; Stdnt Opt. [S]) RUSS 3407) Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

RUSS 5411. Dostoevsky in Translation. (3 cr; Stdnt Opt. [S]) RUSS 3411) Novels, stories, and other writings of Fyodor Dostoevsky.

RUSS 5421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr; Stdnt Opt. [S]) RUSS 5421) 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; Stdnt Opt. [S]) RUSS 5422) Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

RUSS 5900. Topics in Russian Language, Literature, and Culture. (1-4 cr [max 3 cr]; Stdnt Opt. Prereq-1102 for language topics) Variable topics in Russian language, literature, and culture.


Russian Area Studies (RAS)
Institute for Global Studies
College of Liberal Arts
RAS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

RAS 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Scandinavian (SCAN)
Department of German, Scandinavian, and Dutch
College of Liberal Arts
SCAN 5501. Scandinavian Mythology. (3 cr; Stdnt Opt.) 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; Stdnt Opt.) 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; Stdnt Opt.) 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; Stdnt Opt.) 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 society, and dramatic structure and staging conventions in the context of modern theater. Readings in English for nonmajors.

SCAN 5634. Scandinavian Women Writers. (3 cr; Stdnt Opt. [S]) SCAN 3634) Issues important to women as articulated by Scandinavian women writers. Historical overview of women’s writing in Scandinavia. In-depth investigation of texts by contemporary women writers. All readings in translation.

SCAN 5670. Topics in Scandinavian Studies. (3 cr [max 9 cr]; Stdnt Opt.) 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; Stdnt Opt.) Acquisition of a reading knowledge of Old Norse; linguistic, philological and literary study of Old Norse language and literature.

SCAN 5710. Topics in Old Norse Literature. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5701 or equiv) Topic may focus on Old Norse prose or poetry. Primary texts read in Old Norse. Critical literature about texts, medieval Icelandic culture in English. Topics specified in Class Schedule.

SCAN 5993. Directed Studies. (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-#, [B]) Guided individual reading and study.

SCAN 8500. Seminar in Medieval Scandinavian Languages and Literature. (3 cr [max 9 cr]; Stdnt Opt.) Sample topics: [Volsunga Saga], studies in Snorri Sturluson’s [Edda], dialogue analysis in the Icelandic saga.

SCAN 8994. Directed Research. (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-#, may be taken as tutorial with #, [B])

Scientific Computation (SCIC)
College of Science and Engineering
SCIC 8001. Parallel High-Performance Computing. (3 cr; Stdnt Opt. Prereq-Undergrad degree in field using sci comp or #) Interdisciplinary overview of computer science aspects of scientific computation, both hardware and techniques. Parallel computing, architectures, programming, and algorithms; restructuring compilers and data structures.
Courses

SCIC 8011. Scientific Visualization. (3 cr; Sdtnt Opt. Prereq-Undergrad degree in field using sci comp or #) Basic issues in scientific visualization, visualization software, graphics, representation of scientific data, modeling, hardware for visualization, user interface techniques, output, commonly used algorithms and techniques for visualization, animation, information visualization, higher dimensional data, case studies, and examples of successful visualizations.


SCIC 8041. Computational Aspects of Finite Element Methods. (3 cr; Sdtnt Opt. Prereq-Undergrad degree in field using sci comp or IT grad student or #) Fundamental concepts and techniques of finite element analysis. Variational equations and Galerkin’s method; weak formulations for problems with nonsymmetric differentials operators; Petrov-Galerkin methods; examples from solid and fluid mechanics; properties of standard finite element families, implementation.

SCIC 8095. Problems in Scientific Computation. (1-3 cr [max 9 cr]; Sdtnt Opt. Prereq-Undergrad degree in field using sci comp or #) Selected topics in interdisciplinary aspects of scientific computing.

SCIC 8190. Supercomputer Research Seminar. (1 cr [max 3 cr]; Sdtnt Opt. Prereq-Undergrad degree in field using sci comp or #) Series of seminars by distinguished lecturers.

SCIC 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

SCIC 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

SCIC 8594. Scientific Computation Directed Research. (1-5 cr [max 9 cr]; Sdtnt Opt. Prereq-Undergrad degree in field using sci comp or #)

SCIC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 1% for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SCIC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SCIC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Second Language Studies (SLS)

Department of Second Language Studies

College of Liberal Arts

SLS 5101. Academic Writing in TESOL. (1 cr; S-N or Aud. Prereq-[5721, grad ESL student] or #) Research writing conventions in the profession. University rules on ethical use of human subjects, research paper rhetorical structure, literature searches, writing strategies.

SLS 5401. Language Analysis for Teachers of English as a Second Language. (4 cr; Sdtnt Opt. Prereq-Ling 3001 or Ling 5001 or #) Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English from the point of view of second-language speakers as well as native speakers. Phonetics, phonology, morphology, and some aspects of the syntax of the English language. Part of a two-course sequence.

SLS 5402. Language Analysis for Teachers of English as a Second Language. (4 cr; Sdtnt Opt. Prereq-[5402, Ling 5001 or #) Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English from the point of view of second-language speakers as well as native speakers. More complex structures of English syntax, as well as English semantics, pragmatics, and discourse structures. Part of a two-course sequence.


SLS 5721. Methods in Teaching English as a Second Language. (3 cr; Sdtnt Opt. Prereq-Ling 3001 or 5001 or #) Introduction to methods for teaching English as a second language to adults.

SLS 5722. Practicum in Teaching English as a Second Language. (6 cr [max 12 cr]; S-N or Aud. Prereq-[(5402 or [P]5401], [5402 or [P]5402], 5721, ESL major or ESL minor] or #) Observation of, and practice in, teaching English as a second language to adults at college or university level.

SLS 5724. Intro to Language Assessment. (3 cr; A-F or Aud) How to engage in meaningful, appropriate, and fair second-language assessment practices; interpret test results; and construct new forms of assessment.


SLS 5900. Topics in Second Language Learning and Teaching. (3 cr [max 12 cr], Sdtnt Opt) Topics vary. See Class Schedule.


SLS 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

SLS 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr required [Plan A only])

Security Technologies (ST)

Security Technologies Program

College of Science and Engineering

ST 8110. Security Science and Technology Foundations. (3 cr; A-F only. Prereq-Admitted student in security technologies program) Essential areas of emerging science and pivotal technology disciplines for homeland security. Nanotechnology, sensor networks (biobacking, critical infrastructure protection), food and biosafety, cyber and control systems security, and secure energy technologies. Current state-of-the-art status for each technology, together with barriers and opportunities for commercialization.


ST 8112. Technology for Homeland Security. (2 cr; A-F only) Technologies involved in homeland security issues from several perspectives, including science, engineering, business, policy, and society. Advanced tools for the analysis and forecasting of technology and developing strategies aligned with overall stakeholder and organizational goals. Micro- and nanotechnologies and biochemical/chemical, radiological agents. Readings/discussion. Select a technology topic and analyze its current status and potential future trajectories for application or relevance to key issues of importance to security, both threats and opportunities. Present this in the last class session.

ST 8113. Information and Cyber Security. (2 cr; A-F only. Prereq-MSTT grad program student) Existing and emerging IT, cyber, communication networks, and coordination activities during emergencies. Technological and policy issues for the need to share information through the use of interoperable technologies and to rapidly collect and synthesize data in real time in order to achieve critical national security.

ST 8200. Special Topics in Security Technologies. (5 cr; A-F only) Leaders in the field related to security technologies. Special speakers.

ST 8221. Communications of Risk and Security. (1 cr; A-F or Aud. Prereq-MSST grad student) Analyze public speeches, how to be an effective listener, how to prepare for effective public speaking, how to be an effective writer, communicate by email, write for emphasis, tone, and business writing.


ST 8331. Dynamic Systems Modeling and Simulation Tools. (2 cr; A-F only) Techniques for modeling complex systems and predicting and evaluating consequences, risks, and the potential utility of interventions and countermeasures in the context of intentional disruption or use of the system as an attack vehicle. Importance of inter/intra system modeling. Variety of modeling approaches. How systems can be characterized focusing on the parameters that are important for consequence assessment, risk assessment, capability benchmarking, and decision support. Develop a systems and simulation-based approach to risk assessment, preparedness, intervention assessment, and problem solving.

ST 8440. Security Practicum. (0.5-2 cr [max 2 cr]; A-F only. Prereq-Admitted to MSST grad program) Seminar-based and focused workshops on selected areas of security science and technology.

ST 8441. Internship (optional). (0.5 cr [max 1 cr]; A-F only) Summer internship opportunities at the university centers, companies, state, and federal agencies.

ST 8510. Psychology/Behavior Intelligence for Homeland Security. (2 cr; A-F only) Political, psychological, sociological, and economic foundations and dynamics of both terrorism and homeland security. Contemporary debates over terrorism, counterterrorism, and homeland security. Students develop their own (informed) perspectives.

ST 8511. Public Policy. (1 cr; A-F only) Key policies in the U.S. addressing safety and security of citizens, institutions, and systems. Complex network of actors/organizations involved in S&T and security-related areas and their multiple objectives and values. Legislative, policy, and organizational issues facing U.S. intelligence, business, academic, and S&T communities. Students reflect on how these issues relate to their own professional roles/experiences, as well as stakeholder communities with which they work. Consider a specific piece of security-related legislation/analyze associated policy problems and how they relate to security risks. Historical and contemporary examples used to illustrate related public policy questions.

ST 8512. Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics. (2 cr; A-F only. Prereq-MSST grad student) An exploration of challenges to American civil liberties and national security in times of terrorism.

ST 8660. Independent Study. (1-4 cr [max 4 cr]; A-F only) Self-directed study in security science, technology, business, policy or law, with a deliverable project report/presentation.

Social and Administrative Pharmacy (SAPH) Department of Pharmacy Practice College of Pharmacy SAPH 8100. Pro-Seminar. (1 cr; A-F or Aud) History, foundational frameworks, and key research domains for social and administrative pharmacy through examples, interviews, and panels. Students think critically, reflect on important works, and create a cognitive map of the discipline and their own focus for study.

SAPH 8610. Pharmacoeconomics. (3 cr; A-F only) Application of epidemiologic principles to study, benefit/useful/adverse outcomes of drugs in human populations.


SAPH 8100. Seminar. (1 cr [max 8 cr]; A-F only. Prereq-Grad SAPH major or #) Contemporary issues and research problems in sociobehavioral pharmacy, pharmacoeconomics, policy, and clinical research.

SAPH 8173. Principles and Methods of Implementing Research. (3 cr; Stdnt Opt. [S] NURS 8173, Prereq-Two grad stat courses) Integrates statistical, statistical, and practical aspects of research. Interrelationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences.

SAPH 8200. Research Problems. (1-8 cr [max 16 cr]; Stdnt Opt. Prereq-Grad SAPH major or #) Individually designed research experience directed at contemporary problems related to drug use process.

SAPH 8235. Pharmaceutical Economics and Policy. (3 cr; A-F or Aud. Prereq-Grad SAPH major or #) Economic analysis of pharmaceutical sector of health care systems. Problems of pricing production and distribution of pharmaceuticals. Domestic or international policy issues relevant to price and access of pharmaceuticals.

SAPH 8255. Pharmaceutical Marketing. (3 cr; A-F or Aud. Prereq-Grad SACP major or #) Historical development of distributive systems, marketing channels, professional policies, and practices as they relate to pharmaceutical industry. Contemporary issues/theory related to pharmaceutical marketing. Pharmaceutical proportion, especially directed to consumer advertising.

SAPH 8270. Clinical Conferences. (2 cr; Stdnt Opt. Prereq-Grad SAPH major or #) SAPH 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

SAPH 8420. Social and Behavioral Aspects of Pharmacy Practice. (3 cr; A-F or Aud. Prereq-Grad SAPH major or #) Historical development of the profession, its growth and development, emphasizing forces of education, professionalization, attitude modification, and changes occurring as a product of legal and organizational forces in society.

SAPH 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

SAPH 8500. Pharmacy and Its Environment. (3 cr; A-F or Aud. Prereq-Grad SAPH major or #) Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to other health practitioners. Identification of factors (health policy, regulation, economics, research and development, promotion) that affect individual responses to drug therapy.

SAPH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 6 cr for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Doctoral pre-thesis credit.

SAPH 8700. Hospital Pharmacy Administration. (3 cr; A-F or Aud. Prereq-Grad SAPH major or #) History, classification, organization, and functions of hospital departments in relation to the pharmacy service.

SAPH 8702. Hospital Pharmacy Survey. (1 cr [max 3 cr]; Stdnt Opt. Prereq-Grad SAPH major or #) Readings for self-directed students to explore contemporary issues in hospital pharmacy practices.

SAPH 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SAPH 8810. Social Psychology of Health Care. (3 cr; Stdnt Opt. Prereq-Grad SAPH major or #) Behavioral and social aspects of recovery, responses to drugs and other therapies patients' compliance with prescribed therapies, relationships between healthcare professional and patient.

SAPH 8840. Social Measurement. (3 cr; A-F or Aud. Prereq-Intro stat course, understanding of simple correlations or #) How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data.

SAPH 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Social Work (SW) School of Social Work College of Education and Human Development SW 5051. Human Behavior and the Social Environment. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad student or 8 cr social sciences or #) Social, psychological, biological, and cultural factors of individual and group development as related 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.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

SW 5101. Historical Origins and Contemporary Policies and Programs in Social Welfare. (3 cr; A-F or Aud. Prereq-Grad or 8 sem cr of social sciences) Contemporary policies and programs in social welfare are examined in light of their historical origins and evolution. A framework is then developed for analysis of concepts and principles in contemporary social policy for social welfare programs and services. The emergence of the profession of social work is also examined.

SW 5105. Women and Public Policy. (3 cr; Stdnt Opt) Study of feminist organizations; issues and conflicts within organizations and movements; methods and sources for studying feminism.

SW 5309. Case Management with Special Populations. (3 cr; Stdnt Opt. Prereq-Grad or non-degree seeking student or #) Examine concepts and principles of case management practice with special populations such as older adults, persons with developmental disabilities, and persons with serious 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; Stdnt Opt. Prereq-Grad or non-degree seeking student or #) The practice components of social work with older adults including assessment, intervention, and case management. Thought from the perspective of bio-psycho-social strengths and challenges and within the context of current social policy and delivery systems.

SW 5316. Brief Treatment and the Task-Centered Approach. (2 cr; Stdnt Opt. Prereq-Grad student or non-degree seeking student or #) Advent/prominence of brief-treatment models in work with individuals, families, and groups. Theoretical/empirical bases. Practice with diverse populations in managed care. Skill training, supervised practice.

SW 5318. Family Centered Home Based Services for Engagement. (3 cr; Prereq.- 8314; grad or non-degree seeking student or #) Ecological, multisystems approach focusing on the family system. Triadic theory, meta-neutrality, strengths-focus, case management and team treatment. Family-based services evaluated for high-risk, multi-problem families and as an alternative to foster placement.

SW 5319. Adolescents: Norms, Culture, and Health. (2 cr; Stdnt Opt) Relationships among peers, social, societal, political, economic, environmental, psychosocial, and cultural determinants of adolescent behavior that affect health; major public health issues and problems of adolescents.

SW 5482. Child Abuse Prevention II: Program Development, Evaluation, and Advocacy. (3 cr; Stdnt Opt. Prereq-5481) Design and evaluation of policies and programs of interventions to prevent child abuse. This is the second course in the Level I Child Abuse Certificate program.

SW 5483. Child Abuse Prevention III: Skill Building I: Cultural and Legal Issues. (5 cr; Stdnt Opt. Prereq-Bachelor's degree or #) Risk factors, protective factors, resilience in cultural settings. Identifying/designing strategies appropriate to cultural characteristics. First course for level II child abuse prevention certification.


SW 5512. Developing and Managing an Agency Budget. (1 cr; Stdnt Opt. Prereq-MSW student or #) Preparing/monitoring agency budgets, interpreting/utilizing financial reports. Information systems. Fiduciary responsibilities geared to ethics, organizational mission, and positive client outcomes.

SW 5513. Grant Writing and Fund-raising. (1 cr; Stdnt Opt. Prereq-MSW student or #) Procuring/managing financial resources ethically in human services settings. Designing a strategic fund-raising plan. Researching sources of support, developing relationships with grant makers, preparing/submitting grant requests.

SW 5514. Strategic Risk Management in Agencies. (1 cr; Stdnt Opt. Prereq-MSW student or #) Strategies to minimize risk to agency, its assets, and its resources. Relationship between mission, risk management, and board role. Agency internal systems, controls, and prevention strategies. Liability/insurance. Agency exposure to risk, including volunteer program management.

SW 5801. Policies and Programs in American Social Welfare. (2 cr; A-F or Aud) Major policies and programs of social welfare, distinguishing between programs of social insurance and public assistance. Develops skills for analyzing social problems/policies that respond to those problems. Concepts for defining and measuring poverty and social disparity.

SW 5802. Social Welfare History. (1 cr; A-F or Aud) Policies/programs in social welfare. Historical evolution, along with themes that have shaped development over time. Contributions of population subgroups to the development of the welfare state, and the impact of policies and programs on such groups. History of social work profession.

SW 5810. Seminar: Special Topics. (1-4 cr; max 10 cr; Stdnt Opt) Topics specified in Class Schedule.


SW 5903. Substance Abuse and Social Work. (2 cr; Stdnt Opt. Prereq-Grad student or #) Students gain skills in eliminating the detrimental impact of substance use disorders at multiple levels (families, groups, organizations, and communities) through an ability to identify, assess, intervene, and evaluate those struggling with substance abuse and dependency throughout the life span.


SW 5906. Advanced Ethical Decision Making. (1 cr; Stdnt Opt. Prereq-Grad student or #) Identify ethical issues, resolve ethical dilemmas, make ethical decisions when confronted with conflicting duties/choices that occur within the context of professional social work at all levels of practice.

SW 5907. School Social Work. (1 cr; Stdnt Opt. Prereq-Grad student or #) Apply social work knowledge/skills in school settings through prevention, assessment, intervention, and evaluation from an ecological multilevel approach focused on students, families, and the school community.

SW 5908. Technology and Communication in Social Work. (1 cr; Stdnt Opt. Prereq-Grad student or #) Online course explores the influence of technology in social work practice/society. Appropriate community or direct interventions using new technologies. Introduction to effective communication and public relations.

SW 5909. Social Work With Involuntary Clients. (2 cr; Stdnt Opt. Prereq-Grad or non-degree seeking student or #) Includes theory, ethics, effectiveness, and intervention methods for working 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 5911. Global Social Work and Social Development. (2 cr; Stdnt Opt) Theories estratégicas de trabajo social and social development in industrial/developing countries. Applying international perspective and comparative framework to analyze basic human needs, social problems, and social work and social development strategies in different countries.


SW 5991. Independent Study in Social Work. (1-4 cr; max 4 cr; Stdnt Opt) Independent study in areas of special interest to students and faculty.

SW 8010. Seminar: Field Practice I. (1-8 cr; max 6 cr; S-N or Aud. Prereq-8201) Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups focus on student-and facilitator-identified issues. Students discuss professional/personal biases, ethical dilemmas, and supervisory issues. Cross-cultural understanding, implications of cross-cultural practice.

SW 8020. Field Practicum II. (1-6 cr; max 6 cr; S-N or Aud. Prereq-8010) Integrates classroom learning with direct experience of a social work field internship. Students expand competency in cross-cultural practice.
SW 8030. Advanced Standing Social Work Practicum. (1-8 cr [max 8 cr]: S-N or Aud. Prereq: MSW Adv Standing or #). Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups discuss issues raised in field placement. Groups focus on professional/personal biases, ethical dilemmas, supervisory issues, cross-cultural sharing, and implications of students’ privilege/power in relation to client systems.

SW 8041. Specialized Field Placement. (1-4 cr: max 4 cr: S-N only. Prereq: [8020 or 8030, #]. Field placement added to required foundation/concentration field placements (or to concentration placement for advanced standing students).

SW 8051. Psychopathology and Social Work Practice. (3 cr: A-F only. Prereq: All foundation courses for full program or advanced standing or #). Psychopathology from ecosystemic perspective. Biopsychosocial influences on incidence, course, treatment of common mental disorders diagnosed from infancy through adulthood. Differential effects on populations at risk. Diagnostic skills, alternative intervention strategies, social work roles.

SW 8052. Resilience and Risk. (3 cr: A-F only. Prereq: [Foundation coursework, adv standing] or #). Applying theories of human development to issues confronting children, families, and social workers. Identifying strengths-based resources within ecologies of families. Mobilizing resources to empower clients to cope with, adapt to, and overcome adversities.

SW 8105. Economic Security of Disadvantaged Populations. (3 cr: A-F only, Prereq: [SW 8211, advanced standing] or #). Impact of social policy and macro economic trends on economic security of disadvantaged populations. Focuses on antipoverty/welfare programs in the United States, although international perspective is used as well.

SW 8150. Special Topics in Social Policy. (1-9 cr [max 9 cr]: Stdt Opt).

SW 8151. Social Work Methods: Practice With Individuals and Systems. (2 cr: A-F or Aud. Prereq: MSW student or #). Develops foundational knowledge and skills for social workers to work with individuals and systems.

SW 8152. Social Work Practice Methods: Families and Groups. (2 cr: A-F or Aud. Prereq: MSW student or #). Develop foundational knowledge and skills in relationship building, engagement, interviewing, and assessment with families and groups using the ecological-systems theoretical framework and resiliency-based approach.

SW 8153. Models of Community Intervention. (1 cr: A-F or Aud. Prereq: MSW student or #). Models of community intervention as integral to social work professional’s role in community/practice policy. Multi-modes of community intervention. How they are practiced at neighborhood, community, and legislative levels.

SW 8154. Organizations and Policy Advocacy. (1 cr: A-F or Aud. Prereq: MSW student or #). Community practice as it relates to human service agencies and organizations. Builds upon theoretical approaches to human service organizations/agencies and their distinct attributes. Key practice knowledge, skills, and values that promote, develop, and maintain human service organizations that effectively meet community/client needs.


SW 8312. Advanced Social Work Practice With Groups. (3 cr: Stdt Opt. Prereq: [8201, 8202, adv standing] or #). Advanced clinical social work practice with groups. How to differentiate among available models of group work and select an appropriate model based on needs of client population and on context in which they are served.

SW 8313. Professional Practice in Interdisciplinary Teams and Collaboratives. (3 cr: Stdt Opt. Prereq: [Foundation curriculum, advanced standing or grad student in health and human service or in educational professional program] or #). Principles of interdisciplinary/interorganizational collaboration in human services, health, and educational settings. Team building, decision-making models, engaging value differences, managing conflict on team, role/status disparities, relational communications. Emerging approaches to interorganizational collaboration.


SW 8333. FTE: Master’s. (1 cr: No grade. Prereq: Master’s student, adviser and DGS consent)


SW 8444. FTE: Doctoral. (1 cr: No grade. Prereq: Doctoral student, adviser and DGS consent)


SW 8463. Social Work Practice With Severe and Persistent Mental Illness and Severe Emotional Disturbance, (3 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Intensive social work approach to assessing/working with individuals with SPMI, SED. Trends/modalities/evidence-supported approaches. Recovery/wellness approaches. Macro systems that impact lives of individuals/families.

SW 8501. Planning, Marketing, and Program Development, (3 cr; A-F only. Prereq-[Foundation curriculum, advanced standing] or #) Principles, applied practice of management concepts in human service settings. Management theories, organizational planning, program development, marketing/communications. Management practice that is client/community-focused, results-oriented, and seeks to achieve positive social change.


SW 8505. Advanced Community Organization and Advocacy, (3 cr; A-F only. Prereq-[Foundation curriculum, advanced standing] or #) Methods for stimulating/supporting joint action for constructive change to fulfill community needs. Principles of working with local organizations. Social action to accomplish specific changes.

SW 8507. Community Practice Seminar, (1 cr; Stdnt Opt. Prereq-[Foundation curriculum, advanced standing] or #) Links content from human services management and from community organization and advocacy. Integrating framework that draws upon knowledge/skills used in agency/organizational management and in community organization/change.

SW 8519. Mediation and Conflict Resolution for Social Workers, (3 cr; Stdnt Opt. Prereq-[5519]; MSW student or grad conflict mgmt minor or #) Advanced mediator skills for social workers; appropriateness of mediation for conflicts that frequently confront social work practitioners, such as divorce, neighborhood disputes, and conflicts between parents and adolescents, between spouses, and between crime victims and offenders.

SW 8525. Global Perspectives on Social Welfare, Peace, and Justice, (3 cr; A-F only. Prereq-[8211, advanced standing] or #) Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and strategies of social welfare in different economic/political systems. Emphasizes Third World nations. Skills for social workers and other professionals in the helping professions.

SW 8551. Advanced Community Practice: Assessment, Organizing, and Advocacy, (4 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Community practice, including community organizing, policy advocacy, social service/change leadership.

SW 8552. Advanced Community Practice: Leadership, Planning, and Program Development, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Advanced community practice knowledge/skills. Strategic planning, program design, organizational leadership, management, work groups.


SW 8563. Advanced Policy Advocacy, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Students paired with social service, social policy, social justice agencies, coalitions. Agenda setting, legislative research, legislative advocacy in relation to specific legislation proposed in Minnesota state legislature. Tie policy theory to real-world practice.

SW 8602. Direct Practice Evaluation, (2 cr; A-F only. Prereq-[8601] or equiv or #) Students design evaluations that incorporate current evaluation methods and principles derived from research, theory, practice wisdom, their own experience. Evaluation methods include single-system designs, client-focused evaluations, practitioner-focused evaluations, and use of event analyses, standardized instruments, self-constructed instruments.

SW 8603. Program Evaluation, (2 cr; A-F only. Prereq-[8601] or equiv or #) Conceptual, methodological, political, psychological, and administrative facets related to conduct and consequences of social work program evaluation. Social programs as cause and effect; models, types, and strategies of evaluation; appraisal of selected research literature.

SW 8666. Doctoral Pre-Thesis Credits, (1-6 cr; max 12 cr) No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 6 combined cr; % for 5th/6th registrations, up to 3 combined cr. Only one student admitted before summer 2007 may register up to four times, up to 60 combined cr.

SW 8693. Directed Study, (1-6 cr; max 6 cr; Stdnt Opt. Prereq-#) Independent study under tutorial guidance.

SW 8694. Directed Research, (1-6 cr; max 6 cr; Stdnt Opt. Prereq-#) Individual or small group research inquiry translating introductory course content into research design and study. Projects may be conducted in conjunction with field learning experiences or other coursework.

SW 8801. Social Work Ethics and Legal Issues, (3 cr; Stdnt Opt. Prereq-[5519]; MSW student or grad research methods courses, or MSW Adv Standing or #) Develops knowledge base and skills required to identify and understand legal and ethical issues, resolve ethical dilemmas, and make ethical decisions within social work. Values base, ethical standards, ethical decision-making models, and laws and legal procedures related to social work. Legal aspects of child welfare practice.

SW 8804. Child Welfare Policy, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Critically engage in health/mental health policy debate, analysis, development, implementation.

SW 8805. Aging and Disability Policy, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Social policy related to disability/aging. Major policy areas of income support, health, education, caregiving, employment, housing, retirement.

SW 8806. Health and Mental Health Policy, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Critically engage in health/mental health policy debate, analysis, development, implementation.

SW 8807. International and Comparative Social Welfare Policy, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Cross-national comparisons of social welfare policies, major international conventions, treaties. Social welfare, social development theories/policies. In-depth analyses of selected countries’ policies, international agencies, social development strategies.

SW 8821. Social Work and Difference, Diversity and Privilege, (2 cr; A-F only. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Essential knowledge/awareness/skills to support culturally competent social work practice.

SW 8841. Social Work Research Methods, (2 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Develops foundational research methods knowledge/skills fundamental to evidence-based social work practice.

SW 8842. Advanced Social Work Evaluation, (1-3 cr; max 6 cr; A-F or Aud. Prereq-[5051, 5801, 8151, 8152, 8153, 8841] or MSW Adv Standing or #) Students design/carry out evaluation of program or own direct practice. Purposes/types of evaluations. Instrument design, data analysis, ethical issues. Organizational, political, social, cultural factors affecting evaluation in diverse human contexts.

SW 8851. Social Welfare History and Historical Research Methods, (3 cr; A-F only. Prereq-Completed research courses for soc work PhD student or (equiv research methods courses, grad student) Methods of historical research in, and survey of, history/evolution of social welfare/work, using primary/secondary source materials.

SW 8855. Social Policy Formulation and Analysis, (3 cr; A-F only. Prereq-Soc wk PhD student or #) Application of theoretical perspectives, conceptual frameworks, and research methodologies to analysis of social issues and analysis/formulation of social welfare policy.
For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

SOC 8490. Advanced Topics in Social Organization. (3 cr [max 12 cr]; Stdnt Opt. Prereq-
Content varies with instructor. Sample topics: gender and organizations, interorganizational relations, comparative study of organizations, nonprofit organizations, consumer behavior, industry and technology, social networks, conflict, coercion, and social change. Topics specified in [Class Schedule].

SOC 8501. Sociology of the Family. (3 cr; Stdnt Opt)
Theoretical and empirical works from contemporary family sociology. Content varies with instructor. Sample topics: definitions of the family, family roles, family interactions, marriage and divorce, childbearing, parenthood, and cultural variations in families.

SOC 8540. Topics in Family Sociology. (3 cr [max 12 cr]; Stdnt Opt)
Families and mental health; families, work, and the labor market; historical/comparative research on the family. Topics specified in [Class Schedule].

SOC 8551. Social Structure and the Life Course. (3 cr; Stdnt Opt. Prereq-Soc grad major or #)
Central concepts/premises of life cycle analysis as applied to intercultural (comparative); intrasocial (socioeconomic status, race, gender); and historical/viability. Institutional patterning of life course (family, education, work, policy). Deviance and criminal careers. Changes in the self: methodological strategies.

SOC 8590. Topics in Life Course Sociology. (3 cr [max 12 cr]; Stdnt Opt)
Sociology of aging, sociology of youth, and mental health and adjustment in early life course. Topics specified in [Class Schedule].

SOC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SOC 8701. Sociological Theory. (4 cr; A-F or Aud. Prereq-Grad soc major or #)
Traditions of social theory basic to sociological knowledge, their reflection and expansion in contemporary theory, their applications in selected areas of empirical research. Sample topics: social inequality, social organization and politics, family organization and social reproduction, social order and change, sociology of knowledge and religion.

SOC 8721. Theories of Social Psychology. (3 cr; Stdnt Opt)
Prominent contemporary theories of sociological psychology, including structural (social structure and personality) perspectives, social relationships and small group processes (exchange, equity, expectation states theories), and symbolic interactionism. Classical writings, theoretical statements, and empirical studies.

SOC 8731. Sociology of Knowledge. (3 cr; Stdnt Opt. Prereq-Soc grad student or #)
Knowledge and related terms (ideology, stereotype, prejudice, belief, truth). Variation of knowledge across social groups/categories (e.g., gender, race, class, generation, nationality); institutions (e.g., politics, law, science); and societies across time and space. Power, rituals, institution, networks, and knowledge. Genealogy of theories.

SOC 8735. Sociology of Culture. (3 cr; Stdnt Opt)

SOC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 per semester or summer; 10 cr total required [Plan A only])

SOC 8790. Advanced Topics in Sociological Theory. (3 cr [max 12 cr]; Stdnt Opt)
Sample topics: theories of conflict, theories of purposive action, Marxist theory, and structure-agency debate.

SOC 8801. Sociological Research Methods. (4 cr; A-F or Aud. Prereq-Grad soc major or #)
Multiple objectives of social research and how they inform research design. Conceptualization and measurement of complex concepts. Broad issues in research design and quantitative and qualitative approaches to data collection and management.

SOC 8811. Advanced Social Statistics. (4 cr; A-F or Aud. Prereq-S581 or equiv, grad soc major or #)
Statistical methods for analyzing social data. Sample topics: advanced multiple regression, logistic regression, limited dependent variable analysis, variance of covariance, log-linear models, structural equations, and event history analysis. Applications to datasets using computers.

SOC 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 per semester or summer; 24 cr required)

SOC 8890. Advanced Topics in Research Methods. (1-4 cr [max 12 cr]; Stdnt Opt. Prereq-Grad soc major, 8801, 8811 or #)
Advanced quantitative methods (e.g., multilevel models) and historical/comparative, field, and survey research. Topics specified in [Class Schedule].

Software Engineering (SENG)

Department of Computer Science

College of Science and Engineering

SENG 5115. Graphical User Interface Design, Evaluation, and Implementation. (3 cr; A-F or Aud. Prereq-Grad SEng major)
Design and evaluation of interactive application interfaces, user- and task-centered approaches to design, guidelines for graphical design, interface evaluation techniques, current interface trends, including web interfaces and information visualization. Group projects that include designing, prototyping, and implementing an application interface.

SENG 516. Graphical User Interface Toolkits. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad SEng major)
Toolkit-centered introduction to GUI implementation technology. Students learn to use a GUI toolkit to implement a graphical application. Introduction to advanced techniques, including constraint-based data management, 3D visualization tools, and toolkit structure and design.

SENG 5131. Distributed Application Design and Development. (3 cr; A-F or Aud. Prereq-Grad SEng major)
Java programming, concurrent programming, workflow, distributed database, security, collaborative computing, object-oriented architectural design, network publishing, messaging architecture, distributed object computing, and intranet.

SENG 5199. Topics in Software Engineering. (2-3 cr [max 6 cr]; A-F or Aud. Prereq-Grad student)
Topics specified in Class Schedule.

SENG 5511. Artificial Intelligence. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad SEng major)

SENG 5551. Introduction to Intelligent Robotic Systems. (3 cr; A-F or Aud. Prereq-Grad SEng major)
Transformations, kinematics and inverse kinematics, dynamics, and control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and micro-robotics.

SENG 5707. The Principles of Database Systems. (3 cr; A-F or Aud. Prereq-Grad SEng major)
Fundamental concepts; representing instances; prototypic model shapes; model evolution; interviewing user skills, reverse engineering; mapping to DBMS schema; database querying.

SENG 5708. Data Analytics. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad SEng major)

SENG 5801. Software Engineering I: Overview, Requirements, and Modeling. (5 cr; A-F or Aud. Prereq-Grad SEng major)
Software engineering as a discipline. Preview of topics to be covered in subsequent courses in master of science in software engineering program; in-depth study of requirements engineering; modeling techniques applicable to requirements and specification, including UML and formal modeling.

SENG 5802. Software Engineering II: Software Design. (5 cr; A-F or Aud. Prereq-Grad SEng major)
Software design quality, processes that produce quality design, graphical and textual representations, including UML, common problems and patterns that solve them, refactoring. Students develop and advocate design ideas. Students work in teams to complete a multiphase project.

SENG 5811. Software Testing and Verification. (2 cr; A-F or Aud. Prereq-S5001, grad SEng major)
Theoretical/practical aspects of testing software. Analyzing a requirements document for test conditions. Writing a test plan. Designing, creating, and executing test cases. Recording defects. Writing a test report.

SENG 5831. Software Development for Real-Time Systems. (2-3 cr [max 3 cr]; A-F or Aud. Prereq-Grad SEng major)
Analysis, design, verification, and validation of real-time systems. Periodic, aperiodic, and sporadic processes, scheduling theory. Pragmatic issues.

SENG 5841. Model-based Development. (3 cr; A-F or Aud. Prereq-Grad SEng major)
Formal specification of software artifacts. Applicability of formal specifications. Methods such as Z, SCR, and Satecharts. Formal analysis. Theorem proving. Reachability analysis, Model checking. Tools such as PVS, Statemate, SPIN, and SMV.
**Spanish (SPAN)**

**SOIL 5005. Lab and Field Techniques in Soil Science.** (2 cr; A-F only. [S]SOIL 4005. Prereq-2125) Field/lab experiences for analysis of soils/landscapes. Students describe soils along a hillslope sequence, take soil samples, and perform a suite of chemical, physical, and biological soil analyses. Lab analytical techniques, safety, quality control issues.

**SOIL 5111. Practicum Internship in Precision Agriculture.** (2-5 cr [max 5 cr]; S-N or Aud) Practical experience in precision agriculture in agriculture/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; Stdnt Opt. [S]SOIL 1125, SOIL 2125) Basic physical, chemical, and biological properties of soil. Soil genesis classification and principles of soil fertility. WWU used for lab. Soil survey information used to make a land-use plan. Similar to 2125 with less emphasis on chemistry.

**SOIL 5232. Vadose Zone Hydrology.** (3 cr; Stdnt Opt. Prereq-[Math 1271 or equiv.], [Phys 1042 or equiv:]) Basic soil physical properties/processes governing transport of mass/energy in soils. Emphasizes water/solute transport through unsaturated root/vadose zones, their impact on subsurface hydrology, and on water quality. Lectures, hands-on laboratory exercises, discussion of real world problems, problem solving.

**SOIL 5480. Special Topics in Land and Atmospheric Science.** (1-4 cr [max 6 cr]; Stdnt Opt. Prereq-Sr or grad student) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

**SOIL 5555. Wetland Soils.** (3 cr; A-F or Aud. [S] ESPM 5555. Prereq-1125 or 2125 or equiv #; [P]5111 recommended) Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project.


**SOIL 6005. Supervised Classroom or Extension Teaching Experience.** (2 cr; S-N or Aud. [S]IBBE 6005, PLPA 6005, AGRO 6005, LAAS 6005, Hort 6005. Prereq-#) Teaching experience in one of five departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Participation in discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

**SOIL 8101. Colloquium in Soil Science.** (1-3 cr [max 6 cr]; S-N or Aud) Research or intellectual areas in soil science or climatology not covered in regular courses. Topics vary; contact department for current offerings.


Courses


SPAN 5528. Latin American Cultural Integration in the Neocolonial Order. (5 cr; Stdnt Opt. Prereq-Grad student or #) Modernismo, historical vanguard, impact of populist politics in patterns of culture/literature. 1900-50.


SPAN 5531. Hispanic Literature of the United States. (3 cr; Stdnt Opt. Prereq-Grad student 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 5701. History of Ibero-Romance. (5 cr; Stdnt Opt. Prereq-Grad student or #) Origins and developments of Ibero-Romance languages; evolution of Spanish, Portuguese, and Catalan.

SPAN 5711. The Structure of Modern Spanish: Phonology. (3 cr; Stdnt Opt. Prereq-Grad student 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: Syntax. (3 cr; Stdnt Opt. Prereq-Grad student or #) Study and analysis of the principal constructions found in the syntax of Spanish.

SPAN 5714. Theoretical Foundations of Spanish Syntax. (3 cr; Stdnt Opt. Prereq-Grad student or #) Linguistic types/processes that appear across languages. Grammatical relations, word order, transitivity, subordination, information structure, grammaticalization. How these are present in syntax of Spanish.

SPAN 5715. The Structure of Modern Spanish: Semantics. (3 cr; Stdnt Opt. Prereq-Grad student or #) Applying semantic theory to Spanish: conceptual organization and the structuring of experience; meaning and cultural values; semantic fields; categorization and prototypes; cognitive mental model; metaphor, metonymy, and mental imagery as source and change of meaning.


SPAN 5717. Spanish Sociolinguistics. (3 cr; Stdnt Opt. Prereq-Grad student or #) Sociolinguistic variation, cross-dialectal diversity in different varieties of Spanish in Latin America and Spain. Impact of recent cultural, political, and socioeconomic transformations on language.

SPAN 5718. Spanish Language Contact. (3 cr; Stdnt Opt. Prereq-Grad student or #) Analysis of different types/results of Spanish language contact globally, taking into account varying social conditions under which contact occurs.

SPAN 5721. Spanish Laboratory Phonology. (3 cr; A-F or Aud. Prereq. Grad student or #) Core literature on Spanish laboratory phonology. Phonology from a laboratory perspective. Students evaluate laboratory research methodologies, perform basic acoustic analyses, and design laboratory phonology studies.

SPAN 5790. Topics in Spanish Peninsular Studies. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) Crucial moment or characters, works, or events marking beginning of new phase in literary/cultural landscape.

SPAN 5910. Theories in Spanish American Studies. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) 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]; Stdnt Opt. Prereq-Grad student or #) Problems in Hispanic linguistics; a variety of approaches and methods.

SPAN 5970. Directed Readings. (1-4 cr [max 9 cr]; Stdnt Opt. Prereq-Grad student or #) 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; Stdnt Opt. Prereq-Grad student 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]; Stdnt Opt. Prereq-Grad student or #) Directed research.

SPAN 5991. The Acquisition of Spanish as a First and Second Language. (3 cr; Stdnt Opt. Prereq-Grad student 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.

SPAN 8100. Research in Sociohistorical Approaches to Spanish Literature. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5xxx courses in Spanish literature and culture) Sociohistorical functions of Spanish literary works and major theories concerning literary production of texts. Testing modern theories in terms of representative fictional discourses from specific historical periods.

SPAN 8200. Spanish Literary Texts: Theories of Formal Structures. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5xxx courses in Spanish literature and culture) Advanced research in methods of literary analysis of discourse. Emphasizes theoretical and practical frameworks within which representative texts are analyzed and interpreted from differing perspectives.


SPAN 8300. The Construction of Spanish Literary History. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Two 5xxx courses in Spanish literature and culture) Origins and development of Hispanic literary canon: sociocultural theories of Spanish literary histories as academic and historiographic disciplines. Critiques of modern literary theories through analysis of literary works by major writers.

SPAN 8312. Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina]. (3 cr; Stdnt Opt. Prereq-5106, 5107 or 5xxx course in Portuguese) Cultural reappraisal of the late Middle Ages by reference to two Spanish masterpieces: the Archpriest's [Book of True Love] and Rojas' [La Celestina] (1499-1502). Emphasizes historical function of varied genres, motifs, and sources adapted by the authors.

SPAN 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

SPAN 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

SPAN 8466. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 12 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SPAN 8710. Seminar in Spanish and Portuguese Phonology. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5711, Ling 5302 or #) Critical examination of readings and research on specific topic.

SPAN 8730. Seminar in Spanish and Portuguese Syntax. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5714 or #) Critical examination of readings and research on specific topic.
Spanish and Portuguese (SPPT)

Department of Spanish and Portuguese Studies

College of Liberal Arts

SPPT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SPPT 8887. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

SPPT 8900. Spanish Seminar. (3 cr [max 9 cr]; Sdtnd Opt. Prereq-Span 5xxx series required for MA or #)

Projects relying heavily on advanced research in Spanish problems. Investigation of assigned fields, analysis of problems, appraisal of principles. Limited to small group of students. For list of sample seminars, consult department and director of graduate studies.

SPPT 8940. Advanced Research in Spanish-American Literary Historiography. (5 cr [max 9 cr]; Sdtnd Opt.)

Sources and procedures that have given rise to institutionalizations of Spanish-American literary history. Evaluation and review of epistemological principles and assumptions in theory of literary criticism and histories of literature.

SPPT 8960. Workshop: Research in Hispanic Cultural Issues. (5 cr [max 9 cr]; A-F or Aud. Prereq-Reading knowledge of Spanish and Portuguese)

Individualized support and advice in framing, theorizing, problematizing, and interpreting areas of cultural research. Taught in Spanish, Portuguese, and English.

SPPT 8990. Advanced Comparative Research of Caribbean Genres. (3 cr [max 9 cr]; Sdtnd Opt. Prereq-5525 or #)

Major literary works and genres of Caribbean literature studied against the background of sociohistorical vicissitudes of the process leading to the formation and consolidation of the national states.

For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

SLHS 5820. Clinical Research and Practice: Grand Rounds. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-[4801 or CDIS 4801 or equiv]. SLHS grad or #) Group discussions of current professional issues in audiology. Case presentations, guest presentations on current technology, clinical/research ethics. Group meets for an hour weekly with faculty coordinator who leads discussion. Integrates academic/clinical education.


SLHS 5993. Directed Study. (1-12 cr [max 18 cr]; Stdnt Opt. Prereq-SLHS grad or #) Directed readings and preparation of reports on selected topics.

SLHS 8333. FTE: Masters. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

SLHS 8410. Seminar: Research. (3 cr; Stdnt Opt) Advanced study exploring application of experimental and quasi-experimental research designs used in single-subject and group research.

SLHS 8420. Seminar: Teaching. (3 cr [max 9 cr]; Stdnt Opt. Prereq-Grad comp dis major) Advanced study to prepare doctoral students for careers in undergraduate and graduate teaching.

SLHS 8430. Proseminar in Speech-Language-Hearing Sciences. (1 cr [max 10 cr]; S-N only. Prereq-SLHS grad student) Presentations/discussions led by faculty and PhD students in the department, based on research or issues in the discipline.

SLHS 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

SLHS 8501. Interdisciplinary Management in Cleft Palate and Craniofacial Disorders. (3 cr; Stdnt Opt. Prereq-5305 or CDIS 3305 or #) Communication problems associated with cleft palate and craniofacial disorders within interdisciplinary context; structural bases for speech problems and physical and behavioral approaches to speech treatment; interdisciplinary medical and dental concerns and management.

SLHS 8530. Seminar: Speech. (3 cr [max 12 cr]; Stdnt Opt) Advanced study and analysis of research in speech science and speech pathology.


SLHS 8630. Seminar: Language. (3 cr [max 12 cr]; Stdnt Opt) Research in language acquisition, language science, and language disorders.

SLHS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SLHS 8720. Clinical Education in Speech-Language Pathology. (1-8 cr [max 2a cr]; S-N or Aud. Prereq-Grad CDIs major, adviser, DGS consent) Clinical experience.

SLHS 8777. Thesis Credits: Master’s. (1-18 cr; max 50 cr) No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only)

SLHS 8801. Audiologic Assessment I. (3 cr; Stdnt Opt. Prereq-5801 or CDIs 5801 or #) Auditory brainstem response and balance function in adults. Case studies and development of clinical protocols allowing for integration of topics from both courses in this sequence.

SLHS 8802. Hearing Aids II. (3 cr; Stdnt Opt. Prereq-5802 or CDIs 5802 or #) Instrumentation and methods for fitting and evaluating personal hearing aids; ear impression techniques and materials; repair and modification of hearing aids.

SLHS 8803. Signals and Systems in Audiology. (3 cr; Stdnt Opt. Prereq-[3305, 3306, 4801] or [CDIs 3305, CDIs 3306, CDIs 4801] or #) Introduction to electronics, digital signal processing, and calibration of instruments used to assess hearing. Lab sessions on such topics as sound-field calibration, earphone calibration, filters, spectra of transient signals, and use of an artificial mastoid.


SLHS 8806. Audiology Capstone. (1-6 cr [max 6 cr]; S-N or Aud. Prereq-8802, 8807) Students research a case history of patient with an auditory problem, write paper that summarizes the literature on the disorder, and recommend assessment tools and treatment plans.


SLHS 8830. Clinical Education in Audiology. (1-8 cr [max 24 cr]; S-N or Aud. Prereq-Grad CDIs major) Clinical experience.

SLHS 8830. Seminar: Hearing. (3 cr [max 12 cr]; Stdnt Opt) Advanced study/analysis of research in hearing science and audiology.

SLHS 8840. Audiology Externship. (1-7 cr [max 7 cr]; S-N or Aud. Prereq-[8802, 8807] or [CDIs 8802, CDIs 8807]) Students intern at external clinical setting under supervision of certified audiologist. Entry-level knowledge/skills required for professional practice as clinical audiologist. External internship settings may include hospitals, schools, private otolaryngology practices, hearing aid dispensing practices, industrial settings, and community clinics.

SLHS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

SLHS 8994. Directed Research. (1-12 cr [max 18 cr]; Stdnt Opt. Prereq-#) Directed research

Statistics (STAT)

School of Statistics

College of Liberal Arts

STAT 5011. Statistical Analysis. (4 cr; Stdnt Opt. [STAT 3011, ANSC 3011, EPSP 3012. Prereq: 3011; College algebra or #; Stat course recommended]) Intensive introduction to statistical methods for graduate students needing statistics as a research technique.

STAT 5051. Statistical Methods for Quality Improvement. (4 cr; Stdnt Opt. Prereq-[3021 or 3022 or 4102 or 5021 or 5022 or 8102], Math 1272) Random variability/sampling. Controlling statistical process. Shewhart/accumulative charting. Analyzing plant data, trend surface, and variance/design of experiments.


STAT 5051. Sampling Methodology in Finite Populations. (3 cr; Stdnt Opt. Prereq-3022 or 4102 or 5021 or 5102 or #) Simple random, systematic, stratified, unequal probability sampling. Ratio, model based estimation. Single stage, multistage, adaptive cluster sampling. Spatial sampling.

STAT 5302. Applied Regression Analysis. (4 cr; Stdnt Opt. Prereq-3022 or 4102 or 5021 or 5102 or #) Simple, multiple, and polynomial regression. Estimation, testing, prediction. Use of graphics in regression. Stepwise and other numerical methods. Weighted least squares, nonlinear models;response surfaces. Experimental research/applications.


STAT 5511. Time Series Analysis. (3 cr; Stdnt Opt. Prereq-5302 or 4102 or 5024 or 5025 or #) Order statistics. Classical ranked-based procedures (e.g., Wilcoxon, Kruskal-Wallis). Goodness of fit. Topics may include smoothing, bootstrap, and generalized linear models.

STAT 5931. Topics in Statistics. (3 cr; Stdnt Opt.) Topics vary according to student needs and available staff.

STAT 5932. Topics in Statistics. (3 cr; Stdnt Opt.) Topics vary according to students’ needs and available staff.

STAT 5993. Tutorial. (1-6 cr [max 12 cr]; Stdnt Opt. Prereq-#) Directed study in areas not covered by regular offerings.


STAT 8052. Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling. (4 cr; A-F or Aud. Prereq-8051 or #) Classical experimental designs, mixed effect models. How to recognize designs. How to design/analyze experiments. ANOVA for factorial designs, contrasts, multiple comparisons, complete/incomplete block designs, unbalanced data, confounding, fractional factorials, response surfaces, nested designs, split-plots, random effects, mixed effects, repeated measures, longitudinal data.


STAT 8055. Applied Project. (2 cr; S-N only. Prereq-8054, 8801 or #) Collaborative applied statistical practice with a member of University community, including consulting, problem solving, presentation, documentation of results.


STAT 8171. Sequential Analysis. (3 cr; Stdnt Opt. Prereq-8121) Wald’s sequential probability ratio test and modifications Sequential decision theory. Martingales. Sequential estimation, design, and hypothesis testing. Recent developments.

STAT 8201. Topics in Sampling. (3 cr; S-N or Aud. Prereq-8102 or #) Sampling theory; stratified sampling, ratio estimators, cluster sampling, double sampling, superpopulation theory, Bayesian methods, multiple imputation, nonresponse.


STAT 8312. Linear and Nonlinear Regression. (3 cr; Stdnt Opt. Prereq-8311) Nonlinear regression: asymptotic theory, Bates-Watts curves, super leverage, parameter plots, projected residuals, transform-both-sides methodology, Wald versus likelihood inference. Topics in linear and generalized linear models as they relate to nonlinearity issues, including diagnostics, semi-parametric models, and model assessment.

STAT 8313. Topics in Experimental Design. (3 cr; Stdnt Opt. Prereq-8311) Optimal, Bayes, and nonlinear designs; algorithms for computing designs; sample size; recent developments.


STAT 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) For definitions of course numbers, abbreviations, and symbols, see page 3. 183


STAT 8444. FTE: Doctoral. (0 cr; No grade. Prereq-Doctoral student, adviser and DGS consent) For definitions of course numbers, abbreviations, and symbols, see page 3.
Courses

**SCB 8181. Stem Cell Biology.** (3 cr; S-N only. Prereq-Grad student or #) Principles of effective consulting/problem-solving, meeting skills, reporting. Aspects of professional practice/behavior, ethics, continuing education.

**SCB 8833. Directed Readings and Research.** (2 cr; A-F only. Prereq-Grad student or #) Students write research paper based on primary literature on stem cell biology topic of interest, mentored by faculty member.

**SST 8400. Seminar: Science, Technology, and Society.** (3 cr; S-N only. Prereq-HSCI 8111 or [Phil 8601 or Phil 8602 or Phil 8603] or #) Students participate in ongoing research on interactions involving science, technology, and society from perspectives of history, philosophy, and social studies of science, and prepare and present research papers.

**Supply Chain and Operations (SCO)**

**Supply Chain and Operations Department**

Curtis L. Carlson School of Management

**SCO 8651. Experimental Design.** (3 cr; A-F or Aud. Prereq-MBA 6120 or equiv or business admin PhD student or #; offered alt yrs) Analysis of variance for one-way, two-way, and multi-way data. Basic concepts of statistical design and analysis of results. Randomized block, Latin square, cross-over, factorial designs, confounding, estimation and comparison of effects, response surfaces, and applications to management.

**SCO 8652. Regression Analysis.** (3 cr; A-F or Aud. Prereq-MBA 6120 or equiv. business admin PhD student or #; offered alt yrs) Regression and correlation models, inferences in simple and multiple regression, multicolinearity, indicator variables, variable selection techniques, treatment of assumption violations, applications to management problems, basic concepts of experimental design.

**SCO 8711. Research in Operations Strategy.** (3 cr; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs) Operations performance: competitive advantage; focused factory, product, and process innovation; and operations strategy implementation. Research results and methods.

**SCO 8721. Management of Technological Operations.** (3 cr; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs) Theories and models used to address problems of managing technological operations and operations in manufacturing and service firms. Technology strategy, economic/organizational perspectives on technology, productivity analysis, technology evaluation, project selection and evaluation, learning, etc.

**SCO 8735. Supply Chain Management.** (3 cr; A-F or Aud. Prereq-Business admin PhD student or #) Research on forecasting, inventory control, materials requirements planning, just-in-time manufacturing, aggregate planning, scheduling, routing, sequencing, and dispatching in manufacturing and service industries. Research papers and methods are discussed. (Phil 8601 or Phil 8602 or Phil 8603) or #)

**SCO 8745. Research on Quality Management.** (3 cr; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs) Research literature, methods, and results. Research on quality strategy, economics of quality, statistical process control, vendor management, off-line quality, and quality practice.

**SCO 8755. Behavioral Operations.** (3 cr; A-F only. Prereq-Business admin Ph.D. student or #) Research/review classic behavioral literature in economics and other business disciplines; identify behavioral problems within operations contexts; test/analyze operations phenomenon through experimental study, empirical methods, and analytical modeling. Supply chain problems.
Surgery (SURG)  

Department of Surgery  

Medical School  

SURG 8200. Clinical Surgical Problems in Management. (3 cr; A-F or Aud. Prereq-Grad surg major) Diagnostic and management instruction in all phases of clinical surgery, inpatient and outpatient.  

SURG 8201. Surgery Reorientgenological Pathology Conference. (1 cr; A-F or Aud. Prereq-Grad surg major) Weekly review of surgical patients presenting interesting pathogenetic and pathological findings. Staff from the Departments of Surgery, Radiology, and Laboratory Medicine and Pathology. Basic science and management principles of the surgical patient.  

SURG 8202. Surgical Research. (3 cr; A-F or Aud. Prereq-Grad surg major) Graduate students undertake original investigation of problems in either experimental or clinical surgery.  

SURG 8203. Surgery Complications and Research Conference. (1 cr; A-F or Aud. Prereq-Grad surg major) Evaluation of surgical patients, including postoperative course. Discussion and critical evaluation of current research problems.  

SURG 8207. Transplantation Conference. (1 cr; A-F or Aud. Prereq-Grad surg major) Interdepartmental discussion and evaluation of current clinical and research problems.  

SURG 8293. Applied Statistics. (1 cr; S-N or Aud. Prereq-Grad student in surgery or experimental surgery or health sciences) or Interactive computer course. Concepts of applied statistics. Examples, problem sets based on surgical research. How to independently set up appropriate experiments and perform basic descriptive/inferential analysis.  

SURG 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)  

SURG 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)  

SURG 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)  

SURG 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])  

Surgical Training (SURG)  

SURG 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)  

Sustainable Agricultural Systems (SAGR)  

Department of Agronomy and Plant Genetics  

College of Food, Agricultural and Natural Resource Sciences  

SAGR 8010. Colloquium in Sustainable Agriculture. (2 cr; A-F or Aud. Prereq-Coursework in biological or social sciences that provides intro to ag practices or issues) Forum for University faculty and students, and representatives of state agencies, to engage in discussions on topics related to sustainability of food production.  

SAGR 8020. Field Experience in Sustainable Agriculture. (1-4 cr [max 3 cr]; S-N or Aud. Prereq-Coursework in biological or social sciences that provides intro to ag practices or issues) 3- to 14-week internship with growers or organizations working with sustainable agriculture issues. Students analyze issues in final written project, oral seminar.  

Swahili (SWAH)  

Department of African American/African Studies  

College of Liberal Arts  

SWAH 5226. Advanced Swahili II. (3 cr; Stdnt Opt. Prereq-S225 or equiv) Continuation of skill development from 5225.  

Theatre Arts (TH)  

Department of Theatre Arts and Dance  

College of Liberal Arts  

TH 5100. Theatre Practicum. (1-4 cr [max 20 cr]; Stdnt Opt. Prereq-#; 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 5117. Performance and Social Change. (3 cr; A-F or Aud. Prereq-Jr or sr or grad student) Reading, writing, research, presentations and workshops explore activist performance projects. Themes of social change and performance.  

TH 5178. History and Theory of Performance Conventions. (3 cr; A-F or Aud. Prereq-[1322, 3171 or 3172] or grad student) Historical and theoretical study of performance conventions with the intent to develop understanding of the nature and development of performance conventions.  

TH 5278W. Text and Performance. (3 cr; A-F or Aud. Prereq-[1322, 3171 or 3172] or grad student) How to read texts toward performance in various dramatic/non-dramatic material. Method of unlocking metaphorical energy of texts. Vocabulary/techniques of analysis that transform text from page to stage.
Courses

TH 5540. Lighting Design for the Theatre. (3 cr [max 9 cr]; Stdnt Opt. Prereq-5515 or grad or #) Design aesthetics and exploration of design for various stage forms and venues. Development of the lighting plot and paperwork; use of the computer in lighting design.

TH 5545. Stage Lighting Technology. (3 cr; Stdnt Opt. Prereq-5515 or grad or #) The lighting technician’s skills and crafts: equipment, techniques, control operation, wiring, and maintenance.

TH 5550. Video Project. (3 cr [max 6 cr]; Stdnt Opt. Prereq-[4550 or 4560] [preferred], #) Students participate in a video-shoot project serving in various positions, including camera operator, gaffer, grip, audio engineer, cast, and possibly director and director of photography.

TH 5554. Multimedia Production for Live Performance. (3 cr; Stdnt Opt. Prereq-5553 or #) Use of multimedia production technologies in actual production. Students apply knowledge/skill in conjunction with an artistic team on a production and are an integral part of the development/realization of that production.

TH 5556. Audio Engineering. (3 cr; Stdnt Opt. Prereq-4555, #) Mikro/recording techniques specific to music/dramatic dialogue. Recording different styles of music. Hands-on recording of bands, doing final mixes to demo CD. Field trips to professional studios and club/concert recordings.

TH 5559. Sound Design for Performance. (3 cr; Stdnt Opt. Prereq-4555 or #) Audio technology/psychology, their impact on audience in a performance. Communication, design process, psychoacoustics, script analysis.


TH 5580. Costume Technology. (3 cr [max 15 cr]; Stdnt Opt. Prereq-3515 or grad or #) Fabric enhancement techniques, masks, wig-making, millinery, makeup prosthetics, pattern drafting, and draping. Topics specified in Class Schedule.

TH 5590. Theatre Technology Practicum. (1-3 cr [max 15 cr]; Stdnt Opt. Prereq-3515, #, %, 4 cr max for undergrads) Individual creative project in technology/craft area of theatre. Practical work in costume, lighting, makeup, props, scenery, sound, or theatre management.


TH 5720. Advanced Stage Management. (2-3 cr [max 3 cr]; Stdnt Opt. Prereq-5716 or [P]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 Arts Management. (2-4 cr [max 6 cr]; Stdnt Opt. Prereq-5718) Students apply non-profit arts management theories/techniques learned in 5718. Marketing/audience development, fundraising and grant writing strategies, and financial management of a nonprofit arts organization.


TH 5993. Directed Study. (1-5 cr [max 20 cr]; Stdnt Opt. Prereq-6 Th hr, #, %, [B]) Guided individual reading or study.

TH 8010. Theatre Practicum. (1-4 cr [max 20 cr]; Stdnt Opt. Prereq-#, %) Individual creative projects in production of approved plays as an actor, director, dramaturg, or playwright (see 8500 for design practicums).

TH 8012. Theatre Historiography. (3 cr; Stdnt Opt) Current trends in historiography; research strategies and methods.

TH 8111. History and Theory of Western Theatre: Ancient World and Early Medieval. (3 cr; Stdnt Opt) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8112. History and Theory of Western Theatre: Medieval Through Renaissance. (3 cr; Stdnt Opt) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8113. History and Theory of Western Theatre: National Theatres to the French Revolution. (3 cr; Stdnt Opt) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8114. Theatre: Performance and Political Modernity. (3 cr; Stdnt Opt) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8115. History and Theory of Western Theatre: 20th Century Through World War II. (3 cr; Stdnt Opt) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8116. History and Theory of Western Theatre: 20th Century From 1945 to the Present. (3 cr; Stdnt Opt) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8120. Seminar. (3 cr [max 12 cr]; Stdnt Opt) Selected research topics from various theatre fields and periods. Sample topics: Border Crossings--Theatre History and Representation; The Theatre and Drama of the Third Reich, 1927-1944.

TH 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master student, adviser and DGS consent)

TH 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

TH 8500. Theatre Design Practicum. (1-3 cr [max 20 cr]; Stdnt Opt. Prereq-#, %) Individual creative projects in production of approved plays as a designer for scenery/properties, costumes, lighting, or sound (see 8100 for other creative practicums).

TH 8590. Theatre Technology Practicum. (1-3 cr [max 20 cr]; Stdnt Opt. Prereq-#, %) Individual creative projects in the technology or craft of costume, lighting, makeup, props, scenery, sound, or theatre management.

TH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

TH 8711. Theory and Practice of the Modern Stage Director. (3 cr; Stdnt Opt) Survey of principal stage directors (e.g., Saxe-Meiningen, Meyerhold, Brecht, Strehl, Mnouchkine, Brook) and their theories and practices from 1871 to today using books, journals, firsthand accounts, and video.

TH 8750. MFA Directing Practicum. (2-3 cr [max 10 cr]; A,P or Aud, Prereq-MFA directing specialization) Rehearsed and performed production of published or original one-act (2 cr) or full-length play (3 cr) with built-in design and technical support.

TH 8777. Thesis Credits: Master’s. (0-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

TH 8888. Thesis Credit: Doctoral. (0-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

TH 8900. Topics in Theatre. (1-4 cr [max 6 cr]; Stdnt Opt) Topics specified in Class Schedule.

TH 8900. Internship. (1-5 cr [max 10 cr]; Stdnt Opt. Prereq-#, %)

TH 8990. MFA Creative Thesis. (3-4 cr [max 4 cr]; Stdnt Opt. Prereq-#, %)

TH 8994. Directed Research. (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#, %)

Therapeutic Radiology (TRAD)

Department of Therapeutic Radiology

Medical School

TRAD 8149. Advanced Topics in Radiation Therapy Physics. (2 cr; A-F only. Prereq-[7170, 7173] or [BPHY 5170, BPHY 5173]) Special procedures, including total body irradiation, intensity-modulated radiation therapy, stereotactic radiosurgery/radiotherapy, image-guided radiation therapy. Treatment planning algorithms and techniques. Advanced techniques in brachytherapy.

TRAD 8204. Tumor Clinic Conference. (0 cr; Stdnt Opt)

TRAD 8240. Radiation Therapy Conference. (0 cr; Stdnt Opt)

TRAD 8310. Fundamentals of Radiation Therapy. (1 cr; Stdnt Opt)

TRAD 8315. Radiation Therapy Pathology. (1 cr; Stdnt Opt)

TRAD 8320. Radiation Therapy Treatment Planning Problems. (1 cr; Stdnt Opt)
TMJ/Craniofacial Pain (TMJP)

School of Dentistry

TMJP 8440. Advanced Theory and Principles of TMJ and Craniofacial Pain. (0-5 cr [max 3 cr]; A-F or Aud)
Nature and pathophysiology of disorders causing chronic pain in TMJ and craniofacial regions; advanced principles and theory on assessment, diagnosis, and interdisciplinary management.

TMJP 8441. Seminar in TMJ and Craniofacial Pain. (1 cr; A-F or Aud)
Advanced topics on theories and application of recently developed techniques of data collection, diagnostic strategies, and management.

Toxicology (TXCL)

College of Veterinary Medicine

TXCL 5000. Directed Research in Toxicology. (1-5 cr [max 80 cr]; A-F or Aud. Prereq-#)
Special project that addresses specific issue in toxicology. Under guidance of faculty member.

TXCL 5011. Principles of Toxicology. (2 cr; A-F or Aud. Prereq-Grad txcl major or #)
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

TXCL 5012. Principles of Toxicology. (3 cr; A-F or Aud. Prereq-At least one semester [biochemistry, calculus, cell biology]; at least one semester of [human or animal] physiology recommended)

TXCL 5013. Chemical Toxicology. (3 cr; A-F or Aud. Prereq-5012, #)
Signs, symptoms, and mechanism of toxicity of different classes of chemicals spanning several organ systems, including chemical carcinogenesis.

TXCL 5011. Molecular and Cellular Basis of Nanoparticle Toxicology. (3 cr [max 6 cr]; A-F or Aud. Prereq-5010. Prereq-Introductory toxicology course)
Introduction to science of nanotoxicology. Nanotechnology in scientific research. Assessment of impact on biological systems.

TXCL 5193. Veterinary Toxicology. (3 cr; A-F or Aud. [S]CVM 6195. Prereq-Grad student or #)
Toxicology of minerals, pesticides, venoms, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisons.

TXCL 5545. Introduction to Regulatory Medicine. (2 cr; A-F or Aud. [S]CVM 6545. Prereq-Grad student or #)
Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market.

TXCL 8012. Advanced Toxicology I. (3 cr; A-F or Aud. Prereq-5011 or BioC 4331, PubH 5104 or #)
Absorption, distribution, metabolism, and excretion of xenobiotics; toxicokinetics; mechanisms of toxicity or specific classes of chemical agents.

TXCL 8013. Advanced Toxicology II. (3 cr; A-F or Aud. Prereq-5012, BioC 4331, PubH 5062 or PubH 6101 or #)
Kinetic and dynamic determinants of target organ toxicity; pathological alterations in structure/function relationships for major target organ systems; mechanisms of mutagenesis, carcinogenesis, and teratogenesis.

TXCL 8100. Investigative Toxicology. (1 cr [max 2 cr]; A-F or Aud. Prereq-5013 or #)
Evaluating toxicology research issues and literature.

TXCL 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

TXCL 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

TXCL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

TXCL 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

TXCL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Translation and Interpreting (TRIN)

College of Continuing Education

TRIN 5000. Topics in Translation and Interpreting. (1-4 cr [max 16 cr]; Stdnt Opt)
Topics specified in Class Schedule.

TRIN 5093. Directed Study. (1-3 cr [max 6 cr]; Stdnt Opt)
Directed study in translation/interpretation.

Turkish (TURK)

Department of Asian Languages and Literatures

College of Liberal Arts

TURK 5900. Topics in Turkish Language, Literature, and Culture. (3 cr [max 9 cr]; Stdnt Opt)
Topics in Turkish language, literature, and culture.

University College (UC)

College of Continuing Education

UC 5075. Directed Study. (1-8 cr [max 8 cr]; Stdnt Opt)
Directed study.

University of Veterinary Medicine (VME)

College of Veterinary Medicine

VME 5080. Problems in Veterinary Epidemiology and Public Health. (1-5 cr [max 3 cr]; A-F or Aud)
Individual study on problem of interest to epidemiology or public health student.

VME 5082. Diagnostic Epidemiology of Infectious Diseases. (2 cr; A-F; Only. Prereq-Statistics course or #)

VME 5090. Seminar: Veterinary Epidemiology. (1 cr [max 3 cr]; S-N or Aud. Prereq-Veterinary Medicine grad student) Each student leads at least one seminar. Reviews of current research, literature reviews, and technique development. Students and participating faculty participate in presentation, discussion, and administration of the seminars.

For definitions of course numbers, abbreviations, and symbols, see page 3.
VMED 5101. Molecular and Cellular Basis of Nanoparticle Toxicity. (3 cr [max 6 cr]; A-F or Aud. [S/NC for grad student]) Use of nanotechnology in scientific research. Impact of nanomaterials on biological systems.


VMED 5190. Seminar and Presentation Development. (2 cr; S-N only. Prereq-Grad student) Skills needed to research, organize, develop, and deliver an oral scientific presentation or to assist in finding, compiling, and organizing information for presentations, theses, or papers suitable for publication.


VMED 5210. Advanced Large Animal Physiology I. (1-3 cr [max 6 cr]; Shtd Opt) Review of large animal physiology at level needed for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

VMED 5211. Advanced Large Animal Physiology II. (1-3 cr [max 5 cr]; A-F or Aud. Prereq-#; S210 recommended) Large animal physiology for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

VMED 5232. Comparative Clinical Veterinary Dermatologic Pathology. (1 cr [max 2 cr]; S-N only. Prereq-DVM degree or foreign equiv) Microscopic pathology of basic dermatologic reactions and of variable disease states.

VMED 5240. Advanced Small Animal Pathobiology I. (1 cr; A-F only, Prereq-CVM grad student, [DVM or foreign equiv degree]) Biology, physiology, pathophysiology, and medicine of diseases relevant to companion animals. Pathogenesis/treatment of diseases. Developing hypotheses that can be translated into clinical research.

VMED 5241. Advanced Small Animal Pathobiology II. (1 cr; A-F only, Prereq-CVM grad student, [DVM or foreign equiv degree]) Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

VMED 5243. Advanced Small Animal Pathobiology IV. (1 cr; A-F only, Prereq-CVM grad student, [DVM or foreign equiv degree]) Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

VMED 5295. Problems in Large Animal Clinical Medicine/Surgery and Theriogenology. (1 cr [max 3 cr]; A-F or Aud. Prereq-VMED grad student, possess DVM) Hospital cases using standardized format, audiovisual aids. Review literature pertaining to case. One or two cases presented by enrolled participants each.

VMED 5310. Topics in Veterinary Clinical Pathology. (1 cr [max 2 cr]; S-N only. Prereq-Grad student in CVM) Modified rounds format. Cases from VMCC used to explore veterinary pathology with associated laboratory data. Attendees can request lab topics for discussion. Past topics have included lab measurement of chemical analytes, test sensitivity or specificity (e.g., enzyme linked immunosorbent assay, ELISA test), rabbit testing for infectious agents.

VMED 5319. Veterinary Gross Pathology. (1 cr [max 3 cr]; S-N only. Prereq-Grad student in CMH or [VMED, DVM degree or foreign equiv], [BI]) Diagnosing gross lesions of tissues. Evaluating images from wide variety of animals submitted to lab. Lab exercises. Students prepare three in-depth reviews on topics covered during course.

VMED 5320. Advanced Veterinary Systemic Pathology I. (3 cr; A-F only, Prereq-Grad student in VMED or [CVM, DVM degree or foreign equiv]) Students review/summarize topics in systemic pathology using textbook pathology and relevant updates from pathology and veterinary medical journals. Various topics presented to veterinary students: respiratory, urinary, cardiovascular, and hematopoietic system pathology. Students give 10-15 presentations with handouts for other students.

VMED 5330. Veterinary Descriptive Histopathology. (1 cr [max 2 cr]; Shtd Opt. Prereq-Grad student in VMED or [CVM, DVM degree or foreign equiv]) Weekly, one-hour microscopic slide presentations, reviews on wide variety of diseases in domestic/non-domestic animals. Students present microscopic slide cases and prepare discussions about disease entities, differential diagnoses, and ancillary tests.


VMED 5420. Molecular Epidemiology of Infectious Disease. (3 cr; A-F only. Prereq-Basic course in microbiology) Impact, application, and interpretation of molecular techniques in understanding etiology, transmission, and control of infectious diseases important to animal and public health. Theoretical/practical aspects of molecular biology methods in context of epidemiological studies of infectious diseases, including bacterial/viral infections of veterinary/zoonotic significance. Population and evolutionary genetics of pathogenic microorganisms. Data analysis/interpretation. Design of descriptive/hypothesis-driven epidemiological studies involving molecular techniques.

VMED 5430. HIV/AIDS: Pathogenesis, Treatment, and Prevention. (1 cr; Shtd Opt. Prereq-CVM grad student) Exposure to pathogenesis, treatment, and prevention of HIV/AIDS from clinical faculty who are dealing with AIDS patients. Developing new questions and design experiments that have greatest chance of translating to clinical setting.

VMED 5496. Training in Swine Production and Management. (4 cr; S-N only. Prereq-VMED grad student or #) Production module introduces techniques/protocols for swine production system operation. Research module covers applied research trials for viral/bacterial pathogens in pigs.

VMED 5594. Research in Veterinary Medicine. (1-4 cr [max 6 cr]; Shtd Opt. Prereq-Jr. #) Independent study as determined by instructor. Usual activities include conducting research in instructor’s lab.

VMED 5596. Swine Diseases and Diagnostics. (2-3 cr; Shtd Opt) Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.


VMED 5621. Principles of Veterinary Anesthesiology. (2 cr; A-F only. Prereq-VMED grad student, [DVM degree or foreign equiv], inst consent) In-depth training in principles of veterinary anesthesiology. Lectures, anesthesia labs, presentations by students.

VMED 5670. Bovine Surgery Practicum. (2 cr; S-N only. Prereq-[VMED grad student, [DVM or equiv foreign degree]] or #) Intensive training in bovine surgery. Evaluation of food animal surgery principles, hands-on laboratory components.

VMED 5910. Grant Writing; What Makes a Winning Proposal?. (1 cr; S-N or Aud. [S]CMH 5910) Components of a strong proposal. Grant submission process. What reviewers look for. How to locate grant announcements that match research interests.

VMED 5920. Food Defense: Prepare, Respond, Recover. (3 cr; A-F only. Prereq-Grad or professional student or #) Basic principles of preparedness/emergency response. Instructor may substitute topics if timely topic arises.


VMED 5992. Animal Health and Food System Policy and U.S. National Government. (0-1 cr [max 1 cr]; S-N only. Prereq-DVM or equiv degree or current DVM student or #) Evidence-based policy development. Relevant global animal health and food system issue. Role of scientific evidence in developing/implementing policy. Policy-making process as it pertains to trade, animal health, and food system at national level, as well as role of scientific evidence.
VMED 5993. Animal Health and Food System Policy and Intergovernmental Organizations. (1 cr; S-N only; Prereq-DVM or equiv degree or current DVM student or #) Evidence-based policy development. Relevant global animal health and food system issue. Role of scientific evidence in developing/implementing policy. Policy-making process as it pertains to trade, animal health, and food systems across intergovernmental organizations. Role of scientific evidence in intergovernmental organization’s policy development.

VMED 5994. Advanced Clinical Epidemiology. (1 cr; A-F only) In-depth focus on infectious disease epidemiology, with opportunities to apply epidemiologic principles to control infectious diseases in animal populations.

VMED 5995. Engaging Intergovernmental Organizations. (1 cr; S-N only) Relevant policy issues/roles of intergovernmental organizations. Discussions/debate about current issue, interact with key officials, perform group task assignments, develop/deliver presentation to relevant leaders.

VMED 5996. Professional Communications: Current Veterinary, Public Health and Food System Issues. (1 cr [max 2 cr]; S-N only. Prereq-Students must have a professional or graduate degree related to human, animal, or ecosystem health or be pursuing a graduate degree (MS/PhD) or professional masters (MPH/MPA) or #) Critical review of scientific/lay literature. Principles of risk communication. Presentation of scientific information. Prepare/critique executive summaries of current topics for CAHFS Daily News. Support media interactions of CAHFS faculty. Generate fact sheets for use on the CAHFS website.

VMED 6090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans. (3 cr; A-F or Aud. Prereq-Epidemiology and infectious disease course or #) Major human zoonotic diseases, methods of transmission, diagnosis, control, and prevention.

VMED 8134. Ethical Conduct of Animal Research. (3 cr; A-F or Aud. [S]ANSC 8134, CMB 8134. Prereq-[Grad or professional school] students) Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

VMED 8220. Advanced Nephrology/Urology Clinics. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Clinical investigation of naturally occurring urinary diseases in patients admitted to Veterinary Medical Center.

VMED 8230. Medical Conference. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Participation in a weekly conference about internal medical disorders.

VMED 8250. Problems in Acid-base, Electrolyte, and Fluid Metabolism. (2-4 cr [max 4 cr]; A-F or Aud. Prereq-#) Clinical problems and physiology of acid-base, electrolyte, and fluid disorders of dogs and cats.

VMED 8292. Journal Club: Large Animal Internal Medicine. (1 cr [max 3 cr]; A-F or Aud. Prereq-#) Students/faculty keep abreast of current literature in large animal internal medicine. Students critically evaluate the literature.


VMED 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent) Use of medicine literature in clinical problem solving.

VMED 8360. Evidence-based Medicine. (2 cr; A-F or Aud. Prereq-#) Use of medicine literature in clinical problem solving.

VMED 8394. Research in Veterinary Medicine. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-#) Research problems relating to any aspect of internal medicine or to the various systems in animals.

VMED 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

VMED 8492. Seminar: Infectious Diseases and Swine Medicine. (1 cr [max 2 cr]; Stdnt Opt) Students, faculty, and guest speakers present seminars on current research in diagnosis, control, and treatment of infectious diseases.

VMED 8520. Advanced Immunology. (2 cr; Stdnt Opt) Lectures and case presentations.

VMED 8550. Veterinary Medicine Seminar. (1 cr [max 2 cr]; S-N only. Prereq-Grad student) Seminar: Exposure to research activities of CMB and VMED students and faculty. Students prepare/present a 20 minute seminar on their original research.

VMED 8592. Infectious Disease Journals: Critical Thinking. (1 cr; Stdnt Opt) Reading and critical discussion of journal articles.

VMED 8593. Advanced Veterinary Virology and Serology. (1-3 cr [max 3 cr]; Stdnt Opt) Discussion and laboratory practice.

VMED 8666. Doctoral Pre-Defense Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; % for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

VMED 8682. Advanced Large Animal Surgery. (2 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #) Surgery of various systems in large animals, with preoperative and postoperative evaluation and management.

VMED 8684. Surgical Physiology. (1-3 cr [max 3 cr]; Stdnt Opt) Discussions on pathophysiology of surgical diseases in dogs and cats.

VMED 8685. Neurosurgery. (2-3 cr [max 3 cr]; A-F or Aud) Advanced neurosurgical diseases of small animals amenable to surgical treatment.

VMED 8686. Thoracic and Cardiovascular Surgery. (2-4 cr [max 4 cr]; A-F or Aud) Advanced thoracic and cardiovascular diseases of small animals amenable to surgical treatment.

VMED 8693. Seminar: Large Animal Surgery. (1 cr [max 6 cr]; A-F or Aud. Prereq-DVM or equiv degree, #) Discussion of current literature and surgery board preparation.

VMED 8696. Research in Critical Care/ Emergency Medicine. (1-3 cr [max 3 cr]; Stdnt Opt. Prereq-DVM or equiv degree) Special problems course. Controlled study; prospective and retrospective models of evaluation are defined, critiqued, and used for experimental design and data collection to validate research methods.

VMED 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

VMED 8780. Advanced Avian Critical Care: Principles and Procedures. (2 cr; A-F or Aud. Prereq-Course each in vet pathology, physiology, pharmacology, anatomy, small animal anesthesiology and critical care) Procedures and protocols for managing avian medical emergencies such as starvation, toxicities, respiratory failure, and massive trauma.

VMED 8781. Seminar: Advanced Veterinary Anesthesiology. (1-3 cr [max 3 cr]; A-F or Aud. Prereq-[CVM 6321, CVM 6332] or equiv., grad student) Active interaction around topics of advanced anesthesiology in veterinary species.

VMED 8788. Seminar: Veterinary Critical Care/Emergency Medicine. (1 cr; A-F or Aud. Prereq-DVM or equiv degree) Current topics.

VMED 8793. Seminar: Veterinary Anesthesiology. (1-2 cr [max 2 cr]; A-F or Aud. Prereq-[CVM 6321, CVM 6332] or equiv., DVM degree) Discussion and presentations; for veterinary anesthesiology and surgery residents and graduate students.


VMED 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Water Resources Science (WRS)

Department of Soil, Water, and Climate

College of Food, Agricultural and Natural Resource Sciences

WRS 5101. Water Policy. (3 cr; Stdnt Opt. [S]PA 5723. Prereq-Grad student or #) Socio-cultural, legal, and economic forces that affect use of water resources by individuals/institutions. Historical trends in water policy, resulting water laws in the United States. Institutional structures whereby water resources are managed at federal, state, and local levels.


WRS 6050. Special Topics in Water Resources Science. (1-3 cr [max 6 cr]; A-F or Aud) Special topics in water resources science.
WRIT 8050. Directed Research Writing Practice for Non-native Speakers of English. (3 cr; S-N only. Prereq-Grad student) Directed research writing practice in a community of technical communication professionals. Graduate-level writing techniques/formats for summaries, critiques, research, and abstracts. Persuasion, documentation, structure, grammar, vocabulary, field-specific requirements. Writing through several drafts, using mentor in specific field of study. Revising/editing to meet graduate standards. Discussions.

WRIT 5002. Graduate Research Presentations and Conference Writing for Non-Native Speakers of English. (3 cr; S-N only. Prereq-Grad student) [Grad student, non-native speaker of English] Practice in writing/presenting graduate-level research for conferences/presenting professional seminars. Delivery of professional academic presentations to U.S. audiences. Conference abstract, paper, and poster presentation. Communication in research process. Students select topics from their own research/studies. Format, style, transitions, topic narrowing, non-verbal presentation skills.

WRIT 5112. Information Design: Theory and Practice. (3 cr; A-F or Aud. Prereq-Grad student or #) Political, economic, social, and technical aspects of media selection and message design. Media analyses, scripts, budgets, treatments, project-design plans, interactive screens. Online design project.

WRIT 5196. Internship in Scientific and Technical Communication. (3-6 cr [max 6 cr]; S-N or Aud. Prereq-SCC grad or #) Internship sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor are required.

WRIT 5270. Special Topics. (3 cr [max 9 cr]; Sdn Opt. Prereq-Grad student or #) Topics specified in Class Schedule.

WRIT 5291. Independent Study, Reading, and Research. (1-3 cr [max 3 cr]; Sdn Opt. Prereq-#, %) Supervised reading/research on advanced projects not covered in regularly scheduled offerings.


WRIT 5531. Introduction to Writing Theory and Pedagogy. (3 cr; A-F or Aud. Prereq-Grad student) Pedagogical philosophy/methodology in composition, primarily year-long writing. Theories underlying teaching/tutoring with technology.

WRIT 5532. Writing Pedagogy Practicum. (1 cr; max 3 cr; S-N only. Prereq-Grad student) Discussion/activities that support development of sound pedagogical practices. Practical details of classroom. Professionalization, theory/research.

WRIT 5534. Designing Technical Training for Intercultural Audiences. (3 cr; A-F or Aud) 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.

WRIT 5561. Editing and Style for Technical Communicators. (3 cr; A-F only. Prereq-[Grad student, knowledge of grammar/punctuation rules] or #) Proofreading, copy-editing, comprehensive editing. Students primarily use electronic editing methods. Editor’s responsibilities, relationship to writers, roles within an organization, style guides, ethical choices. Editing in global setting. Editing/style for visual design and online documents.

WRIT 5570. Minnesota Writing Project Directed Studies. (1-3 cr [max 9 cr]; A-F or Aud) Guided individual research into current theories/practices of writing and writing pedagogy.

WRIT 5664. Science Writing for Popular Audiences. (3 cr; A-F or Aud. Prereq-Rhet 3562 or #) How science is “translated” for popular audiences. Rhetorical theory used to critique popularized articles. Developing a heuristic for writing articles. Controversial issues surrounding movement from science as “science” to science as “popular.”

WRIT 5671. Visual Rhetoric. (3 cr; A-F only. Prereq-Jr or sr or grad student) Range/development of visuals, especially those in science/technology. Vocabulary for commenting on, criticizing, and creating visuals.

WRIT 5775. The Rhetorical Tradition: Classical Period. (3 cr; A-F only) Rhetoric in the Classical world and recurring themes that constitute “the rhetorical tradition.” Epistemological/ethical status and sociopolitical importance of ancient rhetorical theory and discourse. Works by Isocrates, Plato, Aristotle, Cicero, Quintilian, and others. Prepares students for preliminary examinations/seminars in rhetoric.

WRIT 5876. The Rhetorical Tradition: Modern Era. (3 cr; A-F or Aud) Core works in modern/contemporary rhetorical theory. Twentieth-century revivals of and challenges to the Aristotelian rhetorical tradition. Units devoted to Enlightenment rhetorics; the New Rhetorics of I. A. Richards, Kenneth Burke, and Chaim Perelman; feminist rhetorical theory, historiography, and critique; deconstruction/post-structuralism. Prepares students for preliminary examinations/seminars in rhetoric.

WRIT 6011. Research Methods in Writing Studies and Technical Communication. (3 cr; A-F or Aud. Prereq-SCC grad or #) Survey of quantitative/qualitative research methods. Theoretical perspectives that demonstrate/test analytical approaches to scientific/technological rhetoric.

WRIT 6012. Applied Research Methods in Writing Studies and Technical Communication. (3 cr; A-F or Aud. Prereq-[8011, grad student] or #) Introduction to one or two quantitative or qualitative research methods in scientific/technical communication or rhetoric (e.g., ethnography, case studies, discourse analysis).

WRIT 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

WRIT 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

WRIT 8505. Professional Practice. (3 cr; S-N only. Prereq-Grad student) Extended problem-solving situation in business, government, or industry. Student acts as consultant to explore problem, identify possible solutions, introduce solution, apply it.
WRIT 8550. Seminar in Technology, Culture, and Communication. (3 cr [max 12 cr]; A-F or Aud.
Topics may include computer-mediated communication, democracy/technology, controversies over digital communication, privacy/ethical issues, feminist theory and interactions of gender with science and technology, communication in legal or medical settings. Topics vary. See the Class Schedule.

WRIT 8660. Topics in Writing Studies. (3 cr [max 12 cr]; A-F only. Prereq-Grad student) Topics may include literacy, genre, history of writing, narrative theory and practice, writing as textual practice. Topics vary. See the Class Schedule.

YOST 5291. Independent Study in Youth Studies. (1-8 cr [max 16 cr]; Stdnt Opt. Prereq-Independent reading and/or research under faculty supervision.

YOST 5301. Communicating With Adolescents About Sexuality. (3 cr; Stdnt Opt. Prereq-[Upper div AdPry course, exper working with youth] or #) How to communicate sensitively/effectively with adolescents and their concerned persons about sexuality in everyday life. Healthy sexual development (physical, emotional, ethical), sexual diversities. Gender/body image, disease, sexual violence, intimacy, sex in cyberspace.


YOST 5315. Youthwork in Schools. (4 cr; Stdnt Opt. [S]YOST 4315. Prereq-Introductory course in education or #) Craft of youthwork as a framework to understand life-worlds of young people and a practice to enhance healthy development. How young people often make artificially/harmfully divide their lives into in-school and out-school.

YOST 5316. Media & Youth. Learning, Teaching, and Doing. (2 cr; Stdnt Opt. [S]YOST 4316. Prereq-1001 or 2101 or #) Youth are targets, producers, and consumers of a variety of media. This course is about understanding and learning to use a variety of these sources with young people to enhance their development and civic engagement.

YOST 5319. Understanding Youth Subcultures. (3 cr; Stdnt Opt. [S]YOST 4319. Prereq-2001 or one course each in [Anth, Soc] or #) Young people's participation in and understanding of subcultures, life-styles, and event cultures. Place of these in young people's identity, friendship, and life chances.


YOST 5952. Everyday Lives of Youth. (3 cr; A-F or Aud) Youth as idea/lived-reality in scholarship, public discourse, and professional practice. Building practice of work with or on behalf of youth.


YOST 5956. Organizational Approaches to Youth Development. (3 cr; A-F or Aud) Historical contexts, theoretical frameworks, organizational practices, and public policies that shape nonformal educational experiences of youth in community-based or school-linked settings.

YOST 5958. Community: Context for Youth Development Leadership. (3 cr; A-F or Aud) Issues/policies in family, school, and community that drive the professional practice of community-based youth work. Practical projects explore what it means to be local, to build social capital for youth, and to involve youth in community change.

YOST 5960. Seminar in Youth Development Leadership. (1-4 cr [max 4 cr]; S-N or Aud. Prereq-YDL student or #) Group study of topics/issues. Course proposal, educational program development. Students participate in co-created learning experience with a group of peers. Four-course sequence.

YOST 5962. Leadership Field Experience: Youth Development. (4 cr; S-N only. Prereq-YDL student) Demonstration of leadership in practice. Project on youth, experiential pedagogy, and community/program settings. Focuses on public policy, advocacy, evaluation, pedagogical issues, program design, curriculum development, or applied research.

YOST 5972. Education in the Community. (3 cr; Stdnt Opt) Models of community/education, their intersections. Twentieth century practice of education in the community in the U.S. Examples from other cultures/times.

YOST 5974. The Democratic Learning Community. (3 cr; Stdnt Opt) Historical/ theoretical development of how leading thinkers have conceptualized education centered in the community. Colonial, Native American, transcendentalist, progressive, existential, critical, and feminist perspectives.
### Course Designators

Below is an alphabetical list of course designators and their referents under which courses are organized within the Coursed section of this catalog. The list is provided to help students find the full description of prerequisite courses and identify the programs to which the courses apply.

Directly following each designator and its referent is a “see” note in cases where the program name or names differ from the referent. For example, courses in physiology (PHSL) pertain to the cellular and integrative physiology program.

Courses in fields that do not offer graduate programs, but which may be taken for graduate credit if related to a student’s program, also appear in the course section; their designators and referents below are followed by “related courses.”

<table>
<thead>
<tr>
<th>Designator</th>
<th>Referent</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAS</td>
<td>Asian American Studies</td>
</tr>
<tr>
<td>ACCT</td>
<td>Accounting—see Accountancy, Business Administration; Business Taxation</td>
</tr>
<tr>
<td>ADDS</td>
<td>Addiction Studies</td>
</tr>
<tr>
<td>ADED</td>
<td>Adult Education—see Work and Human Resource Education</td>
</tr>
<tr>
<td>ADPY</td>
<td>Adult Psychiatry—related courses</td>
</tr>
<tr>
<td>AEM</td>
<td>Aerospace Engineering and Mechanics—see Aerospace Engineering; Mechanics</td>
</tr>
<tr>
<td>AFEE</td>
<td>Agricultural, Food, and Environmental Education—see Work and Human Resource Education</td>
</tr>
<tr>
<td>AFRO</td>
<td>Afro-American Studies—see Studies in Africa and the African Diaspora</td>
</tr>
<tr>
<td>AGRO</td>
<td>Agronomy and Plant Genetics—see Applied Plant Sciences</td>
</tr>
<tr>
<td>AKKA</td>
<td>Akkadian—see Classical and Near Eastern Studies</td>
</tr>
<tr>
<td>ALL</td>
<td>Asian Languages and Literatures—see Asian Literatures, Cultures, and Media</td>
</tr>
<tr>
<td>AMIN</td>
<td>American Indian Studies—related courses</td>
</tr>
<tr>
<td>AMST</td>
<td>American Studies</td>
</tr>
<tr>
<td>ANES</td>
<td>Anesthesiology</td>
</tr>
<tr>
<td>ANSC</td>
<td>Animal Science</td>
</tr>
<tr>
<td>ANTH</td>
<td>Anthropology</td>
</tr>
<tr>
<td>APEC</td>
<td>Applied Economics</td>
</tr>
<tr>
<td>APSC</td>
<td>Applied Plant Sciences</td>
</tr>
<tr>
<td>ARAB</td>
<td>Arabic</td>
</tr>
<tr>
<td>ARCH</td>
<td>Architecture</td>
</tr>
<tr>
<td>ARM</td>
<td>Aramaic—see Classical and Near Eastern Studies</td>
</tr>
<tr>
<td>ARTH</td>
<td>Art History</td>
</tr>
<tr>
<td>ARTS</td>
<td>Art</td>
</tr>
<tr>
<td>ASL</td>
<td>American Sign Language</td>
</tr>
<tr>
<td>AST</td>
<td>Astronomy—see Astrophysics</td>
</tr>
<tr>
<td>BA</td>
<td>Business Administration</td>
</tr>
<tr>
<td>BBE</td>
<td>Bioproducts and Biosystems Engineering—see Biosystems and Agricultural Engineering; Natural Resources Sciences and Management</td>
</tr>
<tr>
<td>BIE</td>
<td>Business and Industry Education—see Work and Human Resource Education</td>
</tr>
<tr>
<td>BINF</td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>BIOC</td>
<td>Biochemistry—see Biochemistry, Molecular Biology, and Biophysics</td>
</tr>
<tr>
<td>BIOLL</td>
<td>Biology</td>
</tr>
<tr>
<td>BMEN</td>
<td>Biomedical Engineering</td>
</tr>
<tr>
<td>BMSC</td>
<td>Biomedical Science</td>
</tr>
<tr>
<td>BPHY</td>
<td>Biophysical Sciences—see Biophysical Sciences and Medical Physics</td>
</tr>
<tr>
<td>BTHX</td>
<td>Bioethics, Center for</td>
</tr>
<tr>
<td>CAPY</td>
<td>Child and Adolescent Psychiatry—related courses</td>
</tr>
<tr>
<td>CAS</td>
<td>Central Asian Studies—see Russian Area Studies</td>
</tr>
<tr>
<td>CBIO</td>
<td>Conservation Biology</td>
</tr>
<tr>
<td>CE</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td>CGSC</td>
<td>Cognitive Science</td>
</tr>
<tr>
<td>CHEM</td>
<td>Chemistry</td>
</tr>
<tr>
<td>CHEN</td>
<td>Chemical Engineering—see also Materials Science and Engineering</td>
</tr>
<tr>
<td>CHIC</td>
<td>Chicano Studies—related courses</td>
</tr>
<tr>
<td>CHN</td>
<td>Chinese—see Asian Literatures, Cultures, and Media</td>
</tr>
<tr>
<td>CHPH</td>
<td>Chemical Physics</td>
</tr>
<tr>
<td>CI</td>
<td>Curriculum and Instruction—see Education—Curriculum and Instruction</td>
</tr>
<tr>
<td>CL</td>
<td>Comparative Literature</td>
</tr>
<tr>
<td>CLS</td>
<td>Clinical Laboratory Science</td>
</tr>
<tr>
<td>CMB</td>
<td>Comparative and Molecular Biosciences</td>
</tr>
<tr>
<td>CMPE</td>
<td>Computer Engineering</td>
</tr>
<tr>
<td>CNES</td>
<td>Classical and Near Eastern Studies</td>
</tr>
<tr>
<td>COMM</td>
<td>Communication Studies</td>
</tr>
<tr>
<td>COPT</td>
<td>Coptic—see Classical and Near Eastern Studies</td>
</tr>
<tr>
<td>CPSY</td>
<td>Child Psychology</td>
</tr>
<tr>
<td>CSCI</td>
<td>Computer Science—see Computer and Information Sciences; Computer Engineering</td>
</tr>
<tr>
<td>CSCL</td>
<td>Cultural Studies and Comparative Literature—related courses</td>
</tr>
<tr>
<td>CSDS</td>
<td>Comparative Studies in Discourse and Society</td>
</tr>
<tr>
<td>CSDY</td>
<td>Control Science and Dynamical Systems</td>
</tr>
<tr>
<td>CSPH</td>
<td>Center for Spirituality and Healing—See Complementary Therapies and Healing Practices</td>
</tr>
<tr>
<td>DENTT</td>
<td>Dentistry</td>
</tr>
<tr>
<td>DES</td>
<td>Design—see Architecture; Landscape Architecture</td>
</tr>
<tr>
<td>DHA</td>
<td>Design, Housing, and Apparel</td>
</tr>
<tr>
<td>DNCE</td>
<td>Dance—see Theatre Arts</td>
</tr>
<tr>
<td>DSSC</td>
<td>Development Studies and Social Change</td>
</tr>
<tr>
<td>DTCH</td>
<td>Dutch—see Germanic Studies</td>
</tr>
<tr>
<td>EAS</td>
<td>East Asian Studies—see Asian Literatures, Cultures, and Media</td>
</tr>
<tr>
<td>ECON</td>
<td>Economics</td>
</tr>
<tr>
<td>ECP</td>
<td>Experimental and Clinical Pharmacology—see Pharmacology; Social, Administrative and Clinical Pharmacy</td>
</tr>
<tr>
<td>EDHD</td>
<td>Education and Human Development</td>
</tr>
<tr>
<td>EDPA</td>
<td>Educational Policy and Administration</td>
</tr>
<tr>
<td>EDUC</td>
<td>Education—see Education, Curriculum, and Instruction; Work and Human Resource Education</td>
</tr>
<tr>
<td>EE</td>
<td>Electrical Engineering—see also Computer Engineering</td>
</tr>
<tr>
<td>EEB</td>
<td>Ecology, Evolution, and Behavior</td>
</tr>
<tr>
<td>ENGL</td>
<td>English: Literature—see Creative Writing; English</td>
</tr>
<tr>
<td>ENGW</td>
<td>English: Creative Writing</td>
</tr>
<tr>
<td>ENT</td>
<td>Entomology</td>
</tr>
<tr>
<td>EPSY</td>
<td>Educational Psychology</td>
</tr>
<tr>
<td>ESPM</td>
<td>Environmental Sciences, Policy, and Management</td>
</tr>
<tr>
<td>FIN</td>
<td>Finnish—see Germanic Studies</td>
</tr>
<tr>
<td>FINA</td>
<td>Finance—see Business Administration; Business Taxation</td>
</tr>
<tr>
<td>FM</td>
<td>Financial Mathematics</td>
</tr>
<tr>
<td>FMCH</td>
<td>Family Medicine and Community Health</td>
</tr>
<tr>
<td>FPPOL</td>
<td>Family Policy Minor</td>
</tr>
<tr>
<td>FR</td>
<td>Forest Resources—see Natural Resources Science and Management</td>
</tr>
<tr>
<td>FREN</td>
<td>French</td>
</tr>
<tr>
<td>FRT</td>
<td>French and Italian—see French; Italian</td>
</tr>
<tr>
<td>FSCN</td>
<td>Food Science and Nutrition—see Food Science; Nutrition</td>
</tr>
<tr>
<td>FSOS</td>
<td>Family Social Science</td>
</tr>
<tr>
<td>FSSP</td>
<td>Foreign Study—SPAN</td>
</tr>
<tr>
<td>FW</td>
<td>Fisheries and Wildlife—see Wildlife Conservation</td>
</tr>
<tr>
<td>GCD</td>
<td>Genetics, Cell Biology, and Development—see Molecular, Cellular, Developmental Biology and Genetics</td>
</tr>
<tr>
<td>GEO</td>
<td>Geology and Geophysics—see Geology; Geophysics</td>
</tr>
<tr>
<td>GEOE</td>
<td>Geological Engineering—see also Civil Engineering</td>
</tr>
<tr>
<td>GEOG</td>
<td>Geography</td>
</tr>
<tr>
<td>Course Designators</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
</tr>
<tr>
<td>LA</td>
<td>Landscape Architecture</td>
</tr>
<tr>
<td>LAMP</td>
<td>Laboratory Medicine and Pathology—related courses</td>
</tr>
<tr>
<td>LAT</td>
<td>Latin—see Ancient and Medieval Art and Archaeology; Classical and Near Eastern Studies; Classics</td>
</tr>
<tr>
<td>LGTT</td>
<td>Language, Teaching, and Technology—related courses</td>
</tr>
<tr>
<td>LM</td>
<td>Logistics Management—see Business Administration; Business Taxation</td>
</tr>
<tr>
<td>LS</td>
<td>Liberal Studies</td>
</tr>
<tr>
<td>MAR</td>
<td>Marathi—see Asian Literatures, Cultures, and Media</td>
</tr>
<tr>
<td>MATH</td>
<td>Mathematics</td>
</tr>
<tr>
<td>MATS</td>
<td>Materials Science—see Chemical Engineering; Materials Science and Engineering</td>
</tr>
<tr>
<td>MBT</td>
<td>Master of Business Taxation—see Business Administration; Business Taxation</td>
</tr>
<tr>
<td>MCDG</td>
<td>Molecular, Cellular, Developmental Biology and Genetics</td>
</tr>
<tr>
<td>MCOM</td>
<td>Managerial Communications</td>
</tr>
<tr>
<td>MDGK</td>
<td>Modern Greek</td>
</tr>
<tr>
<td>ME</td>
<td>Mechanical Engineering—see also Industrial Engineering</td>
</tr>
<tr>
<td>MEDC</td>
<td>Medicinal Chemistry</td>
</tr>
<tr>
<td>MEST</td>
<td>Medieval Studies</td>
</tr>
<tr>
<td>MGMT</td>
<td>Management—see Business Administration; Business Taxation</td>
</tr>
<tr>
<td>MHA</td>
<td>Master of Healthcare Administration—related courses</td>
</tr>
<tr>
<td>MICA</td>
<td>Microbiology, Immunology, and Cancer Biology</td>
</tr>
<tr>
<td>MICB</td>
<td>Microbiology</td>
</tr>
<tr>
<td>MICE</td>
<td>Microbial Engineering</td>
</tr>
<tr>
<td>MKTG</td>
<td>Marketing—see Business Administration; Business Taxation</td>
</tr>
<tr>
<td>MS</td>
<td>Manufacturing Systems—see Industrial and Systems Engineering; Manufacturing and Systems Engineering</td>
</tr>
<tr>
<td>MSTEM</td>
<td>Museum Studies</td>
</tr>
<tr>
<td>MTHE</td>
<td>Mathematics Education</td>
</tr>
<tr>
<td>MUED</td>
<td>Music Education—see also Music</td>
</tr>
<tr>
<td>MUS</td>
<td>Music—see also Music Education</td>
</tr>
<tr>
<td>MUSA</td>
<td>Music Applied—see Music; Music Education</td>
</tr>
<tr>
<td>NPSE</td>
<td>Nanoparticle Science and Engineering</td>
</tr>
<tr>
<td>NR</td>
<td>Natural Resources Science and Management</td>
</tr>
<tr>
<td>NSC</td>
<td>Neuroscience</td>
</tr>
<tr>
<td>NSCI</td>
<td>Neuroscience Department</td>
</tr>
<tr>
<td>NSU</td>
<td>Neurosurgery—related courses</td>
</tr>
<tr>
<td>NOR</td>
<td>Norwegian—see Germanic Studies</td>
</tr>
<tr>
<td>NURS</td>
<td>Nursing</td>
</tr>
<tr>
<td>NUTR</td>
<td>Nutrition</td>
</tr>
<tr>
<td>OBIO</td>
<td>Oral Biology</td>
</tr>
<tr>
<td>OMS</td>
<td>Operations and Management Science—see Business Administration; Business Taxation</td>
</tr>
<tr>
<td>OT</td>
<td>Occupational Therapy—related courses</td>
</tr>
<tr>
<td>OTOL</td>
<td>Otolaryngology</td>
</tr>
<tr>
<td>PA</td>
<td>Public Affairs—see also Public Policy; Science, Technology, and Environmental Policy; Urban and Regional Planning</td>
</tr>
<tr>
<td>PBIO</td>
<td>Plant Biology—see Plant Biological Sciences</td>
</tr>
<tr>
<td>PBS</td>
<td>Plant Biological Sciences</td>
</tr>
<tr>
<td>PHCL</td>
<td>Pharmacology</td>
</tr>
<tr>
<td>PHIL</td>
<td>Philosophy</td>
</tr>
<tr>
<td>PMH</td>
<td>Pharmaceutics</td>
</tr>
<tr>
<td>PHSL</td>
<td>Physiology—see Cellular and Integrative Physiology</td>
</tr>
<tr>
<td>PHYS</td>
<td>Physics</td>
</tr>
<tr>
<td>PLPA</td>
<td>Plant Pathology</td>
</tr>
<tr>
<td>PLSH</td>
<td>Polish—related courses</td>
</tr>
<tr>
<td>PMED</td>
<td>Physical Medicine and Rehabilitation—see Physical Therapy; Rehabilitation Science</td>
</tr>
<tr>
<td>POL</td>
<td>Political Science</td>
</tr>
<tr>
<td>PORT</td>
<td>Portuguese—see Hispanic and Lusophone Literatures, Cultures, and Linguistics</td>
</tr>
<tr>
<td>PREV</td>
<td>Preventive Science Minor</td>
</tr>
<tr>
<td>PSY</td>
<td>Psychology</td>
</tr>
<tr>
<td>PT</td>
<td>Physical Therapy</td>
</tr>
<tr>
<td>PUBH</td>
<td>Public Health—see also Biostatistics; Environmental Health; Epidemiology; Health Services Research, Policy and Administration</td>
</tr>
<tr>
<td>RAD</td>
<td>Radiology</td>
</tr>
<tr>
<td>REC</td>
<td>Recreation, Park, and Leisure Studies—related courses</td>
</tr>
<tr>
<td>RELS</td>
<td>Religious Studies</td>
</tr>
<tr>
<td>RRM</td>
<td>Recreation Resource Management</td>
</tr>
<tr>
<td>RSC</td>
<td>Rehabilitation Science</td>
</tr>
<tr>
<td>RUSS</td>
<td>Russian</td>
</tr>
<tr>
<td>SACP</td>
<td>Social, Administrative, and Clinical Pharmacy</td>
</tr>
<tr>
<td>SAGR</td>
<td>Sustainable Agricultural Systems</td>
</tr>
<tr>
<td>SALC</td>
<td>South Asian Languages and Cultures—see Asian Literatures, Cultures, and Media</td>
</tr>
<tr>
<td>SAPH</td>
<td>Social and Administrative Pharmacy—see Social, Administrative, and Clinical Pharmacy</td>
</tr>
<tr>
<td>SCAN</td>
<td>Scandinavian—see Germanic Studies</td>
</tr>
<tr>
<td>SCB</td>
<td>Stem Cell Biology</td>
</tr>
<tr>
<td>SCIC</td>
<td>Scientific Computation</td>
</tr>
</tbody>
</table>

For definitions of course numbers, abbreviations, and symbols, see page 3.
<table>
<thead>
<tr>
<th>Course Designator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCMC</td>
<td>Studies in Cinema and Media Culture—related courses</td>
</tr>
<tr>
<td>SENG</td>
<td>Software Engineering</td>
</tr>
<tr>
<td>SKT</td>
<td>Sanskrit—see Asian Literatures, Cultures, and Media</td>
</tr>
<tr>
<td>SLHS</td>
<td>Speech-Language-Hearing Sciences</td>
</tr>
<tr>
<td>SOC</td>
<td>Sociology</td>
</tr>
<tr>
<td>SOIL</td>
<td>Soil, Water, and Climate—see Land and Atmospheric Sciences</td>
</tr>
<tr>
<td>SPAN</td>
<td>Spanish—see Hispanic and Lusophone Literatures, Cultures and Linguistics</td>
</tr>
<tr>
<td>SPPT</td>
<td>Spanish-Portuguese—see Hispanic and Lusophone Literatures, Cultures and Linguistics</td>
</tr>
<tr>
<td>SST</td>
<td>Studies of Science and Technology</td>
</tr>
<tr>
<td>STAT</td>
<td>Statistics</td>
</tr>
<tr>
<td>SUM</td>
<td>Sumerian—see Classical and Near Eastern Studies</td>
</tr>
<tr>
<td>SURG</td>
<td>Surgery—see also Experimental Surgery</td>
</tr>
<tr>
<td>SW</td>
<td>Social Work</td>
</tr>
<tr>
<td>SWAH</td>
<td>Swahili</td>
</tr>
<tr>
<td>SWED</td>
<td>Swedish—see Germanic Studies</td>
</tr>
<tr>
<td>TESL</td>
<td>Teaching English as a Second Language—see English as a Second Language</td>
</tr>
<tr>
<td>TH</td>
<td>Theatre Arts</td>
</tr>
<tr>
<td>TRAD</td>
<td>Therapeutic Radiology—related courses</td>
</tr>
<tr>
<td>TRIN</td>
<td>Translation and Interpreting—see English as a Second Language</td>
</tr>
<tr>
<td>TXCL</td>
<td>Toxicology</td>
</tr>
<tr>
<td>TURK</td>
<td>Turkish</td>
</tr>
<tr>
<td>URBS</td>
<td>Urban Studies—see Urban and Regional Planning</td>
</tr>
<tr>
<td>URDU</td>
<td>Urdu</td>
</tr>
<tr>
<td>VMED</td>
<td>Veterinary Medicine, Graduate</td>
</tr>
<tr>
<td>WHRE</td>
<td>Work and Human Resource Education</td>
</tr>
<tr>
<td>WRIT</td>
<td>Writing Studies—see Literacy and Rhetorical Studies</td>
</tr>
<tr>
<td>WRS</td>
<td>Water Resources Science</td>
</tr>
<tr>
<td>YOST</td>
<td>Youth Development and Research—see Social Work</td>
</tr>
</tbody>
</table>
Twin Cities Campus

Aerospace Engineering and Mechanics M.Aero.E.

Aerospace Engineering & Mechanics

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@aem.umn.edu
Website: http://www.aem.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Aerospace Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers M.S. and Ph.D. degrees in aerospace engineering and mechanics, as well as a professionally-oriented master of aerospace engineering. The graduate programs emphasize engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year B.S. degree in an engineering, basic science, or mathematics program is required. Admission depends primarily on the applicant's undergraduate record and letters of recommendation.

GRE scores are not required but are strongly recommended for students applying for graduate fellowships. In all cases, these test scores are taken into account if provided. Students are admitted fall semester only. Only under unusual circumstances are students allowed to begin their studies at another time during the academic year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 22 major credits and 8 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

This program emphasizes coursework in engineering sciences that are basic to this field: fluid mechanics, aerospace systems, and solid mechanics. Options include coursework in aerodynamics and aerospace systems, dynamical systems, material properties, and fluid and solid behavior.

The M.Aero.E program emphasizes the application of fluid mechanics, aerospace systems, and solid mechanics in aerospace engineering. The program must include at least 12 credits of 5xxx or 8xxx courses, and no more than 8 credits of 4xxx courses. Two semesters of AEM colloquium attendance are also required. In addition to the minimum credit requirement, the student must demonstrate an understanding of aerodynamics and aerospace vehicle mechanics, either from previous study or from additional coursework in the graduate program.
Twin Cities Campus
Aerospace Engineering and Mechanics M.S.
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@aem.umn.edu
Website: http://www.aem.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers M.S. and Ph.D. degrees in aerospace engineering and mechanics, as well as a professionally-oriented master of aerospace engineering. The graduate programs emphasize engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A four-year B.S. degree in an engineering, basic science, or mathematics program is required. Admission depends primarily on the applicant's undergraduate record and letters of recommendation.

Special Application Requirements:
GRE scores are not required but are strongly recommended for students applying for graduate fellowships. In all cases, these test scores are taken into account if provided. Students are admitted fall semester only. Only under unusual circumstances are students allowed to begin their studies at another time during the academic year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.
Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

This program emphasizes coursework in engineering sciences that are basic to this field: fluid mechanics, aerospace systems, and solid mechanics. Options include coursework in aerodynamics and aerospace systems, dynamical systems, material properties, and fluid and solid behavior.

Plan A requires 30 graduate credits, a minimum of 20 course credits, and 10 thesis credits. No seminar credits can be used to satisfy the 20-course credit requirement.

Plan B requires 30 credits including the 3-credit Plan B project course. Of the remaining 27 credits, a minimum of 24 credits of coursework is required. If seminar credits are used to meet the 30-credit requirement, they must be in 1-credit modules and AEM 8000 may only be used once.

For both Plan A and Plan B, the program must include at least one sequence of 5xxx or 8xxx courses in aerospace engineering and mechanics, and no more than 8 credits of 4xxx courses. Two semesters of AEM colloquium attendance are also required. Also, the student must demonstrate an understanding of aerodynamics and aerospace vehicle mechanics, either from prior study or from additional coursework beyond the 30-credit minimum.
Twin Cities Campus
Aerospace Engineering and Mechanics Minor
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@aem.umn.edu
Website: http://www.aem.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers M.S. and Ph.D. degrees in aerospace engineering and mechanics, as well as a professionally-oriented master of aerospace engineering. The graduate programs emphasize engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor Requirements for Ph.D. Degree Students Majoring in Other Fields: At least 12 credits in aerospace engineering and mechanics are required, including at least one sequence of two 5xxx or 8xxx courses.

Minor Requirements for Master's Degree Students Majoring in Other Fields: At least 6 credits in aerospace engineering and mechanics are required, including one sequence of two 5xxx or 8xxx courses.
Twin Cities Campus

Aerospace Engineering and Mechanics Ph.D.
Aerospace Engineering & Mechanics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Aerospace Engineering and Mechanics, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-8000; fax: 612-626-1558)
Email: aem-dgs@aem.umn.edu
Website: http://www.aem.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Aerospace Engineering and Mechanics offers a Ph.D. degree in aerospace engineering and mechanics. The Ph.D. program emphasizes engineering sciences that are basic to fluid mechanics, aerospace systems, and solid mechanics. Theoretical, analytical, experimental, and computational aspects of these fields are covered by the courses and research opportunities offered by the department.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A four-year B.S. degree in an engineering, basic science, or mathematics program is required.

Admission depends primarily on the applicant's undergraduate record, personal statement, and letters of recommendation.

Special Application Requirements:
GRE scores are not required but are strongly recommended for students applying for graduate fellowships. In all cases, these test scores are taken into account if provided. Students are admitted fall semester only. Only under unusual circumstances are students allowed to begin their studies at another time during the academic year.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. program emphasizes coursework and research in engineering sciences that are basic to this field. Options include coursework and research in aerodynamics and aerospace systems, dynamical systems, material properties, and fluid and solid behavior.

The Ph.D. requires about two years of coursework, but the heart of the program is the student's thesis research. The program must include a minimum of 42 credits of approved courses and four semesters of colloquium attendance. Of the 42 credits, a minimum of 36 credits must be in approved coursework, not including seminar credits. If seminar credits are used to meet the 42-credit minimum requirement, they must be in 1-credit modules. The program also must include at least four 8xxx courses in aerospace engineering (at least four 8xxx courses in mechanics for the Ph.D. in mechanics) and can contain no more than two 4xxx courses. The first year of the Ph.D. program is similar to the master's program and most Ph.D. students receive the master's degree. The second year is devoted to more advanced courses and beginning research. Subsequent years include some coursework with increased focus on research. The time required to complete a research project varies, but most students finish the Ph.D. within five years after the bachelor's degree.
Twin Cities Campus
Astrophysics M.S.
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 356 Physics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: grad-rec@astro.umn.edu
Website: http://www.astro.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The department conducts research in observational, theoretical, and computational astrophysics as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For major work, an undergraduate degree in astronomy or physics or the equivalent is required. Contact the Graduate Studies Committee for exceptions.

A statement of career goals, scores from the GRE General (Aptitude) Test and Subject (Advanced) Test in physics, and three letters of recommendation are required. Applications for financial aid are due January 10. Students are admitted fall semester only.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's degree requires a minimum of 30 credits, including one semester of classical physics (PHYS 5011-5012). Additional requirements depend on whether the student chooses the thesis (Plan A) or non-thesis (Plan B) option. Plan A requires 20 credits of coursework and 10 thesis credits. Plan B requires 30 credits of coursework. Completion of the degree normally takes two years.
Twin Cities Campus

Astrophysics Minor
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 116 Church Street S.E., Minneapolis, MN 55455
Main Office: 356 Physics (612-624-4811; fax: 612-626-2029)
Website: http://www.astro.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The department conducts research in observational, theoretical, and computational astrophysics as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus
Astrophysics Ph.D.
Astrophysics, Minnesota Institute for
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Minnesota Institute for Astrophysics, 356 Physics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-4811; fax: 612-626-2029)
Email: grad-req@astro.umn.edu
Website: http://www.astro.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Astrophysics is the study of the universe and its constituent parts. The department conducts research in observational, theoretical, and computational astrophysics as well as instrument development. The main research areas include minor planetary bodies, solar system properties, dynamics of normal and active galaxies, stellar evolution, interaction of stars with their environments, the interstellar medium, astrophysical magnetohydrodynamics, and galactic and cosmological structure. Observational research includes activities that cover X-ray, ultraviolet, optical, infrared, and radio wavelengths. Extensive research programs in space physics, nucleosynthesis, and the elementary particle-cosmology interface are also carried out in interdisciplinary connections with the graduate program in physics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For major work, an undergraduate degree in astronomy or physics or the equivalent is required. Contact the Graduate Studies Committee for exceptions.

A statement of career goals, scores from the GRE General (Aptitude) Test and Subject (Advanced) Test in physics, and three letters of recommendation are required. Applications for financial aid are due January 10. Students are admitted fall semester only.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The Ph.D. degree requires a minimum of 40 course credits, including a year of classical physics (PHYS 5011-5012) and 12 credits in a minor or supporting program; 24 thesis credits are also required. The graduate written examination, held during spring term, must be passed on the second "real" attempt (first-year students are given a free trial). A second-year project must be defended by the end of the fall semester of the third year. The preliminary oral exam must be passed by the end of the third year. Ordinarily these two oral exams are combined.
Twin Cities Campus
Biomedical Engineering M.S.
Department of Biomedical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax 612-626-6583)
Email: bmengp@umn.edu
Website: http://bme.umn.edu/grad

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 35
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A baccalaureate degree in engineering or in a physical or biological science is required. Successful applicants without an engineering degree are required to complete appropriate coursework (including linear algebra and differential equations) before being admitted as a candidate for the degree. In most cases, this coursework is not considered part of the degree program.

All application materials must be submitted online through the ApplyYourself application system. See bme.umn.edu/grad/appinfo.html for detailed instructions.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 84

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 29 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under two plans: Plan A (with thesis) and Plan B (with project). Each program requires courses in mathematics, biology, biomedical engineering, and relevant areas of science and engineering, and in a minor or related field. Plan A requires completion of 25 course credits. Plan B requires completion of 35 course credits, including the research project. Coursework in a minor or supporting field must include a minimum of 6 credits for both Plan A and Plan B.
Twin Cities Campus

Biomedical Engineering Minor

Department of Biomedical Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax: 612-626-6583)
Email: bmengp@umn.edu
Website: http://bme.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires at least 6 course credits, including one BMEN core course (5001, 5101, 5201, 5311, 5351, or 5401), and one other BMEN course at 5xxx or higher.

The doctoral minor requires at least 12 credits, including two BMEN core courses (5001, 5101, 5201, 5311, 5351, or 5401), one course with a biological sciences emphasis (may be BMEN 5501), and one course with an engineering emphasis. All courses must be at 5xxx or higher.
**Twin Cities Campus**

**Biomedical Engineering Ph.D.**

*Department of Biomedical Engineering*

**College of Science and Engineering**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Biomedical Engineering Graduate Program, 7-105 Nils Hasselmo Hall, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax: 612-626-6583)
Email: bmengp@umn.edu
Website: [http://bme.umn.edu/grad](http://bme.umn.edu/grad)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Biomedical engineering is the application of engineering principles and methods to problems in biology and medicine. The discipline includes the study of fundamental processes in biology and physiology, the study of the diagnosis and treatment of disease and injury, and the design and development of medical devices and techniques. Students take courses in mathematics, biology, biomedical engineering, and areas of science and engineering that are relevant for the degree objectives.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 84

Key to [test abbreviations](#) (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. program requires coursework in mathematics, biology, biomedical engineering, and relevant areas of science and engineering, a written preliminary exam, an oral preliminary exam, a dissertation, and a final oral exam.
Twin Cities Campus
Chemical Engineering M.Ch.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Chemical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

The master of chemical engineering (M.Ch.E.), also known as the professional master's, is designed for working professionals who are interested in obtaining a master's degree part time. This degree requires a design project.

CEMS also offers the M.S.Ch.E. (Plan A) degree, which is a thesis-based master's. However, prospective students should note that (with the exception of the professional M.Ch.E.), the department focuses on the Ph.D. and does not generally admit students for the M.S.Ch.E. Rather, the M.S.Ch.E. is generally reserved for current graduate students who choose not to seek the Ph.D. degree.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or other related field.

This professional master of engineering degree (M.Ch.E.) is designed for employees of local industries who wish to pursue their studies part time. No financial support is available. Applicants should contact the program before applying for admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560
- IELTS
- Total Score: 6.5
- MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All master's students must complete at least four core courses chosen from CHEN 8101, 8201, 8301, 8401, 8402, and 8501. In addition, master's students must complete a total of 30 credits, including 14 from the major program (this includes the four required courses), 6 from the minor or related program, and 10 thesis credits (for the M.Ch.E., thesis credits are used for the design project). Precise coursework plans are approved by the director of graduate studies. The minimum required GPA for completion is 2.80.

In addition to the coursework, M.Ch.E. students are required to complete a design project. The work-related M.Ch.E design project consists of an in-depth study of an engineering design. It need not represent a publishable research project. While the amount of work should be the same as for a master's thesis, the project can contain elements that the thesis would not, such as economic considerations, design consultation, and social relevance. The written design report must be approved by a three-person faculty committee. The final exam consists of the written design report and an oral presentation to the faculty committee.
Twin Cities Campus

Chemical Engineering M.S.Ch.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Science in Chemical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: With the exception of the professional master's degree (the M.Ch.E.), the Chemical Engineering and Material Science (CEMS) Department focuses on the Ph.D. and does not generally admit students directly to the M.S.Ch.E. (Plan A) degree.

Research activities in CEMS focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

The CEMS Department offers two types of master's degrees. The M.S.Ch.E. (Plan A) degree, is a thesis-based master's and is generally reserved only for current graduate students who choose not to seek a Ph.D. Working professionals who are interested in obtaining a master's degree part time should follow the requirements for the M.Ch.E. degree (also known as the professional master's), which requires a design project.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in chemical engineering or other related field.

Special Application Requirements:
Note: With the exception of the professional master's degree (the M.Ch.E.), the CEMS Department focuses on the Ph.D. and does not generally admit students directly to the M.S.Ch.E. (Plan A) degree. A thesis-based master's, the M.S.Ch.E. is generally reserved only for current graduate students who choose not to seek a Ph.D.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560

• IELTS
  - Total Score: 6.5

• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S.Ch.E. is offered only under Plan A (with thesis). Students interested in a degree without a thesis should consider the professional master's in chemical engineering (M.Ch.E.).

All master's students must complete four required core courses, CHEN 8101, 8201, 8301, 8401, 8402, and 8501. In addition, master's students must complete a total of 30 credits, including 14 from the major program (this includes the 4 required courses), 6 from the minor or related program and 10 thesis credits. Precise coursework plans are approved by the director of graduate studies. The minimum required GPA for completion is 2.80.
Twin Cities Campus

Chemical Engineering Minor
Chemical Engineering & Materials Science
College of Science and Engineering

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

For a minor in chemical engineering, students must successfully complete at least two (for a master's) or four (for a Ph.D.) of the core graduate courses in the minor program and obtain approval by the director of graduate studies. Core courses in chemical engineering are: CHEN 8101, 8201, 8301, 8401, 8402, and 8501.
**Twin Cities Campus**

**Chemical Engineering Ph.D.**

*Chemical Engineering & Materials Science*

**College of Science and Engineering**

Link to a list of faculty for this program.

**Contact Information:**

Department of Chemical Engineering and Materials Science and Engineering, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)

Email: cemsgrad@umn.edu

Website: [http://www.cems.umn.edu](http://www.cems.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Research activities in the Chemical Engineering and Materials Science (CEMS) Department focus on the development of renewable energy technologies, the solution of important medical and biological engineering challenges, the development of advanced materials, and the application of sophisticated mathematical and theoretical models.

Graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

A bachelor's degree in Chemical Engineering or related field.

Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results. Submission of all application materials by January 1 is strongly encouraged to ensure priority consideration for fellowships and assistantships; late applications are considered if space is available.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560
- IELTS
  - Total Score: 6.5
- MELAB
Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

All Ph.D. students must complete at least four core courses chosen from CHEN 8101, 8201, 8301, 8401, 8402, and 8501. In addition, Ph.D. students must complete a total of 57 credits, including 21 from the major program (this includes the four required courses), 12 from the minor or related program, and 24 thesis credits. Precise coursework plans are approved by the director of graduate studies. The minimum required GPA for completion is 3.00.
Twin Cities Campus
Chemical Physics M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu/chemphys

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on areas where the techniques of chemistry and physics are brought together for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, optical properties, laser applications, molecular collisions, chemical dynamics, quantum mechanics, computational chemistry, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, biochemistry, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
All applicants must submit scores from the General GRE and Subject GRE (any science or engineering subject).

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 20 major credits, null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 30 major credits and null credits outside the major. The final exam is written.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. degree offered under Plan A (with thesis) requires at least 20 course credits and 10 thesis credits. The M.S. Plan B degree requires 30 course credits, which would include 8 credits for the two Plan B project courses. The course credits must include at least 6 credits each in chemistry and physics or at least 3 credits each in quantum mechanics, thermodynamics, and statistical mechanics.
Twin Cities Campus  
Chemical Physics Minor  
Chemistry  
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu/chemphys

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on areas where the techniques of chemistry and physics are brought together for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, optical properties, laser applications, molecular collisions, chemical dynamics, quantum mechanics, computational chemistry, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, biochemistry, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor Requirements for Students Majoring in Other Fields: Minor requirements are determined by the director of graduate studies, the student, and the adviser.
Twin Cities Campus
Chemical Physics Ph.D.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Chemical Physics Program, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7444; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu/chemphys

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Chemical physics focuses on areas where the techniques of chemistry and physics are brought together for the study of atoms and molecules; their interactions in gases, liquids, and solids; and the detailed structure and dynamics of material changes. Areas of research and specialization include spectroscopy, optical properties, laser applications, molecular collisions, chemical dynamics, quantum mechanics, computational chemistry, statistical mechanics, thermodynamics, low-temperature behavior, polymers and macromolecules, surface science, biochemistry, and biochemical and heterogeneous catalysis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
All applicants must submit scores from the General GRE and Subject GRE (any science or engineering subject).

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Each first-year chemical physics student will choose a program of study in consultation with his or her TMC (three-member committee). Ordinarily, course programs for Ph.D. students will include at least 24 graduate credits (5xxx or 8xxx), which must include either:
(a) at least 5 credits in chemistry (CHEM) and at least 5 credits in physics (PHYS), or
(b) at least 16 credits in chemistry and/or physics combined, including at least 5 credits of quantum mechanics and at least 5 credits chosen from among the areas of thermodynamics, statistical mechanics, statistical physics, and chemical dynamics.
Twin Cities Campus
Chemistry M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate work in the Department of Chemistry is organized into six specialty areas: analytical chemistry, chemical biology, inorganic chemistry, materials chemistry, organic chemistry, and physical chemistry. Interdisciplinary work is also an option.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An undergraduate degree in chemistry or a related field is required for admission.

Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry that are required of undergraduate majors in the University of Minnesota chemistry curriculum. They must also have at least one year of college physics, plus college mathematics through calculus.

Three letters of recommendation are required for all applications. Scores from General (Aptitude) and Subject (Advanced) Tests of the GRE are required for all applicants. International applicants are expected to provide scores of at least 550 (paper), 213 (computer), or 85 (Internet) on the TOEFL, as well as GRE scores.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is written. A capstone project is required.

**Capstone Project:** Each Plan B project should involve a combined total of approximately 160 hours (the equivalent of four full-time weeks) of library research, reading, and/or writing resulting in the preparation of a significant written document. Students who plan to work on Plan B projects independent of the Preliminary Examination should present a plan, after consultation with the chosen instructor for the Plan B project, outlining the number and content of their projects to the DGS. Projects should be completed to the satisfaction of the instructor; the final grade is determined by the instructor.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

M.S. students are expected to pass the proficiency exam in their specialty area during their first academic year in residence. Plan A requires 20 course credits and 10 thesis credits; Plan B requires 30 course credits, which include 8 credits for the two Plan B project courses.
Twin Cities Campus
Chemistry Minor
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate work in the Department of Chemistry is organized into six specialty areas: analytical chemistry, chemical biology, inorganic chemistry, materials chemistry, organic chemistry, and physical chemistry. Interdisciplinary work is also an option.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Six course credits from graduate-level chemistry courses are required for a master's minor. Twelve course credits from graduate-level chemistry courses are required for a Ph.D. minor.
Twin Cities Campus
Chemistry Ph.D.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Assistant to the Director of Graduate Studies, Department of Chemistry, University of Minnesota, 137 Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7444 or 1-800-777-2431; fax: 612-626-7541)
Email: chmapply@umn.edu
Website: http://www.chem.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate work in the Department of Chemistry is organized into six specialty areas: analytical chemistry, chemical biology, inorganic chemistry, materials chemistry, organic chemistry, and physical chemistry. Interdisciplinary work is also an option.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An undergraduate degree in chemistry or a related field is required for admission.

Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry that are required of undergraduate majors in the University of Minnesota chemistry curriculum. They must also have at least one year of college physics, plus college mathematics through calculus.

Special Application Requirements:
Three letters of recommendation are required for all applications. Scores from General (Aptitude) and Subject (Advanced) Tests of the GRE are required for all applicants. International applicants are expected to provide scores of at least 550 (paper), 213 (computer), or 85 (Internet) on the TOEFL, as well as GRE scores.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 85
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. program requires 24 course credits and 24 thesis credits.

Students in the Ph.D. program are expected to pass four of five proficiency examinations during their first year in residence. The exams, which are at the level of an advanced undergraduate course, are in analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry. The exams are given during the chemistry first-year orientation program in August. In the event that a student does not pass the first exam, the exams are offered two more times during the academic year.
Civil Engineering M.C.E.
Civil Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: civesgs@umn.edu
Website: http://www.ce.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Civil Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics engineering (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

The master of civil engineering (M.C.E.) degree is designed for the practicing engineer who would like to obtain an advanced degree on a part-time or full-time basis. Students who intend to proceed to the Ph.D. program or who think they may later wish to be admitted to the Ph.D. program should apply for the master of science program. Students are expected to follow a coherent program of coursework in one of the following subareas of civil engineering: environmental, geomechanics, structural, transportation, or water resources engineering. The program is selected with the help of a faculty adviser and approved by the director of graduate studies. In addition to completing graduate level courses, students must demonstrate professional competence either by carrying out and defending a design project or by taking a coursework-related final oral exam (without a project).

The degree typically takes 2-3 semesters (12-18 months) to complete on a full-time basis or 6-8 semesters on a part-time basis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An ABET-accredited, four-year bachelor's degree in engineering is required for admission.

Applicants are required to submit results of the GRE in support of their applications. The TOEFL is required of foreign applicants from non-English-speaking countries, with a score of at least 550 (paper), 213 (computer), or 79 (Internet). Admission requirements also include three letters of recommendation and a statement of purpose that outlines the prospective student's research interests, reasons for pursuing graduate studies, and career plans after graduation. Students are admitted each semester, but applicants are encouraged to begin fall semester and to submit their applications by December 31 before the year their studies are expected to begin.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 18 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.C.E. degree requires 30 credits and is offered under two plans. Plan A requires a minimum of 20 course credits and preparation of a thesis/design project (10 cr); the thesis/design project must be carried out by the student in consultation with a faculty adviser. Plan C is a coursework-only degree program and requires 30 course credits. At least 6 of the course credits must be taken outside the major for either plan.
Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics engineering (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

The master of science (M.S.) degree balances education in engineering fundamentals and design, and provides preparation for students wishing to pursue a career in industry as well as those wanting to continue studies toward a Ph.D. degree. Programs range from the Plan C, which is a coursework-only program, to the Plan A, which balances coursework with research and development. The Plan C program is intended for practicing engineers who want to pursue a degree on a part-time basis, self-funded full-time students, as well as students who plan to continue on for a Ph.D. degree.

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in an engineering, basic science, or mathematics program is preferred.

Applicants are required to submit results of the GRE in support of their applications. A preferred TOEFL score of 550 (paper), 213 (computer), or 79 (Internet) is required of foreign applicants from non-English-speaking countries. Admission requirements also include three letters of recommendation and a statement of purpose that outlines the prospective student's research interests, reasons for pursuing graduate studies, and career plans after graduation. Students are admitted each semester, but applicants are strongly encouraged to submit their applications by December 15 in order to begin the following fall semester.

Special Application Requirements:
Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack civil engineering training are often required to complete one or more appropriate courses from the undergraduate civil engineering program. Graduate credit is not awarded for such preparatory work.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to [test abbreviations](GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](catalog website) section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. requires at least 30 credits and is offered under three plans. Plan A emphasizes research and preparation of a thesis; Plan B emphasizes coursework and a project; Plan C is coursework only. The thesis is written on a research project carried out in consultation with a faculty adviser. Under Plan B, students complete one to three Plan B papers as determined by the faculty adviser. Plan B papers can include computer programs, annotated bibliographies, field investigations, and analysis/design of special engineering problems. Plan A requires at least 20 course credits and 10 thesis credits. Plan B requires at least 27 course credits and Plan C requires 30 course credits. At least 6 credits of coursework must be from outside the major for all plans. A program typically takes 18 to 24 months to complete.
Twin Cities Campus
Civil Engineering Minor
College of Science and Engineering

Contact Information:
Department of Civil Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: civesgs@umn.edu
Website: http://www.ce.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics engineering (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Minor Requirements for Students Majoring in Other Fields: For a master's minor, two or more 5xxx or 8xxx courses from the same subarea of civil engineering are required, for a total of 6 or more credits.

Minor Requirements for Students Majoring in Other Fields: For a Ph.D. minor, four or more 5xxx to 8xxx courses from one or two subareas of civil engineering are required for a total of 12 or more credits.
Civil Engineering Ph.D.

Civil Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Civil Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-5522; fax: 612-626-7750)
Email: civesgs@umn.edu
Website: http://www.ce.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 69
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Civil engineering emphases are available in environmental engineering (e.g., pollutant fate and transport, process modeling, soil and groundwater remediation, water and wastewater treatment), geomechanics engineering (e.g., fracture and localization, groundwater flow, stability and liquefaction, wave and shock propagation), structural engineering (e.g., computational and structural mechanics, earthquake engineering, infrastructure performance and durability, new systems and materials), transportation engineering (e.g., intelligent transportation systems, pavement design and materials, transportation economics, traffic safety), and water resources engineering (e.g., earthscape processes, environmental and biological systems, hydrologic and climate dynamics, hydrodynamics, and turbulence).

The Ph.D. degree couples independent research with coursework in a comprehensive program for those wishing to attain mastery of their field. The Ph.D. degree demands the ability and desire to pursue independent and original studies and can be earned with emphasis in environmental, geomechanics, structural, transportation, or water resources engineering. Research performance, as judged by preparation of a dissertation on an independently pursued research topic, is the primary requirement for the Ph.D. degree.

Students enter the Ph.D. program two to four years following the bachelor's degree, normally after completing the M.S. degree. The Ph.D. program is typically completed in four to six years following the bachelor's degree. Each program of study is designed in consultation with a faculty adviser to meet the special needs of the student, although programs must be approved by the director of graduate studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in an engineering, basic science, or mathematics program is preferred.

Applicants are required to submit results of the GRE in support of their applications. A preferred TOEFL score of 550 (paper), 213 (computer), or 79 (Internet) is required of foreign applicants from non-English-speaking countries. Admission requirements also include three letters of recommendation and a statement of purpose that outlines the prospective student's research interests, reasons for pursuing graduate studies, and career plans after graduation. Students are admitted each semester, but applicants are strongly encouraged to submit their applications by December 15 in order to begin the following fall semester.

Special Application Requirements:
Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack civil engineering training are often required to complete one or more appropriate courses from the undergraduate civil engineering program. Graduate credit is not awarded for such preparatory work. For the M.C.E. program, an ABET-accredited bachelor's degree in engineering is required.
Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

33 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

A typical program consists of 45 credits of coursework beyond the bachelor's degree, plus 24 thesis credits. A supporting program or minor consisting of at least 12 credits taken outside the department must be included. Credits earned in a M.S. program may be presented in partial fulfillment of the Ph.D. requirements. Rigid requirements for the number of 8xxx courses appropriate for Ph.D. programs have not been set; nonetheless, the Ph.D. represents the highest level of scholarly achievement and coursework should be selected accordingly.
Twin Cities Campus

Computer Science M.C.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Computer Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the M.C.S., a coursework-only degree that is intended to be a terminal degree.

The department also offers the M.S. (Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects) and the Ph.D. In addition, the department supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation, and Human Factors and Ergonomics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program requires all applicants to complete the department's online application as well as the Graduate School online application. The names and email addresses of three recommenders are required; they will be asked to upload their letters of recommendation to the CSE online application only. The department only accepts students for fall admission; the application deadline is April 1.

Special Application Requirements:
A degree in any major with a substantial background in computer science is required; a computer science major is preferred. Applicants with an inadequate background must resolve any deficiencies before applying to the program.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
- Total Score: 6.5
  • MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 16 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.C.S. is a coursework-only degree. Students are required to complete 31 credits of graduate work, with the following conditions:
1) at least 16 of the credits must be from CSCI courses; 2) students must fulfill a breadth requirement of three courses in three different areas: theory, systems, and applications; 3) at least 6 credits must be from related fields outside the department; 4) at least 6 credits must be from CSCI 8xxx courses; and 5) students must complete 1 credit of CSCI colloquium, which cannot be counted toward any of the other requirements. Students must maintain a GPA above 3.00 after completing 8 credits.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Rochester**

University of Minnesota Rochester (UMR) offers the M.C.S. degree. Students may complete all degree requirements in Rochester by combining courses taught via streaming video using the UNITE (University-Industry Television for Education) instructional television system. Students are able to watch class live via the internet or pick up class on a special server at a later time.
Twin Cities Campus

Computer Science M.S.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 31
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. The graduate program's faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bio-informatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the M.S. (offered Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects), the M.C.S. (a terminal, coursework-only degree), and the Ph.D. The department also supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation, and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

The program requires all applicants to complete the department's online application as well as the Graduate School online application. The names and email addresses of three recommenders are required; they will be asked to upload their letters of recommendation to the CSE online application only. Scores from the General (Aptitude) Test of the GRE are required for M.S. program applicants. The Subject Test is optional, although recommended, especially for those seeking financial assistance. If taken, it should be in the undergraduate major field or, if not offered in that field, in computer science, mathematics, or engineering. Master's students are accepted for fall admission only. The application deadline is April 1. Students seeking financial aid must apply by December 1.

Special Application Requirements:
A degree in any major with a substantial background in computer science is required; a computer science major is preferred. Applicants with an inadequate background must resolve any deficiencies before applying to the program.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 13 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 16 major credits and 6 credits outside the major. The final exam is oral.

Plan C: Plan C requires 16 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. requires a minimum of 31 credits, with at least 13 of these from CSCI courses (at least 3 of which must be CSCI 8xxx courses) and 6 from related fields outside the department. There is a breadth requirement of three courses in three different areas: theory, systems, and applications.

For Plan A, at least 10 thesis credits are required; for Plan B, the Plan B project course (3 cr) is required. Plan C requires that a student take an additional CSCI 8xxx course and also complete a minimum of 100 hours of course-based project work, a written research report, and an oral presentation within CSCI courses taken for graduate credit. Students must also complete 1 credit of CSCI colloquium, which cannot be counted toward the other requirements. Students are expected to maintain a GPA of at least 3.25 for all courses listed on their degree program.

The Plan B project is a significant project demonstrating the student's familiarity with the tools of research, the capability to work independently, and the ability to effectively relate their results to their committee.

Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
University of Minnesota Rochester (UMR) offers the M.S. in computer science. Students may complete all degree requirements in Rochester via streaming video using the UNITE (University-Industry Television for Education) instructional television system. Students are able to watch class live via the internet or pick up class on a special server at a later time.
Twin Cities Campus

Computer Science Minor
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 9
• Length of program in credits (Doctorate): 13
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the M.C.S., the M.S. (Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects), and the Ph.D. The department also supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation and Human Factors and Ergonomics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minor in computer science for master's students majoring in other fields must include 9 credits of graduate courses in CSCI. The colloquium credit may not be included. There is a limit of one 4xxx course and a requirement of at least one 8xxx course or a 5xxx course that has a prerequisite of a 5xxx course. A minimum GPA of 3.00 is preferred for these courses.

A minor in computer science for Ph.D. students majoring in other fields must include 13 credits of graduate courses in CSCI, and should include the colloquium credit. There is a limit of one 4xxx course and a requirement of at least one 8xxx course or a 5xxx course that has a prerequisite of a 5xxx course. A minimum GPA of 3.25 is preferred for these courses.
Twin Cities Campus

Computer Science Ph.D.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Computer Science and Engineering, University of Minnesota, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612- 625-4002; fax: 612-625-0572)
Email: admissions@cs.umn.edu
Website: http://www.cs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 67
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in computer science offers coursework from across a broad spectrum of theoretical and applied computer science, combined with research opportunities in nearly all areas of the field. Faculty members advise students in such areas as algorithms and theoretical computer science; numerical, parallel, and high-performance computing; distributed computing and systems; artificial intelligence, robotics, and computer vision; databases and data mining; human-computer interaction and information systems; graphics and visualization; software engineering and programming languages; computer architecture and compilers; networking; bioinformatics and computational biology; and computer security. In addition, students may choose a course of study that integrates research in computer science with applications in other fields.

Computer science degrees include the Ph.D., as well as the M.C.S. (a terminal, coursework-only degree), and the M.S. (offered Plan A with thesis, Plan B with project, or coursework-only Plan C with coursework-based projects). The department also supports a master of science in software engineering (M.S.S.E.) degree.

Faculty from the Department of Computer Science and Engineering also participate in a variety of other graduate programs, including BioInformatics and Computational Biology, Health Informatics, Cognitive Science, Scientific Computation and Human Factors and Ergonomics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.45.

The program requires all applicants to complete the department's online application as well as the Graduate School online application. The names and email addresses of three recommenders are required; they will be asked to upload their letters of recommendation to the CSE online application only. Scores from the General (Aptitude) Test of the GRE are required for Ph.D. program applicants. The Subject Test is optional, although recommended, especially for those seeking financial assistance. If taken, it should be in the undergraduate major field or, if not offered in that field, in computer science, mathematics, or engineering. Ph.D. students are accepted for fall admission only. The application deadline is April 1. Students seeking financial aid must apply by December 1.

Special Application Requirements:
All doctoral students must demonstrate background knowledge in computer science as explained in the document "Background Knowledge Requirements."

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
16 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.45 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

The Ph.D. requires at least 43 course credits of which 16 must be in CSCI courses and at least 12 in a minor or supporting program. Students must also fulfill the breadth requirement of five courses in three different areas: theory, systems, and applications. Additionally, at least 24 thesis credits are required. Students are expected to complete all courses in their degree program with a GPA of at least 3.45.
Twin Cities Campus
Earth Sciences M.S.
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Earth Sciences, University of Minnesota, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: geo@umn.edu
Website: http://www.geo.umn.edu/dept/programs/Graduate.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, biogeochemistry, biogeology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students may accommodate other areas of interest such as engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Materials required for a complete application file include the student's statement of purpose, three letters of recommendation, transcripts, official GRE scores, and the Application for Admission. Applications are considered at any time; however, to be considered for financial aid, all materials must be submitted by January 8. Studies may begin in any semester or summer session, although fall semester is preferable. IMPORTANT: Refer to the Graduate Programs section of the department website (www.geo.umn.edu/dept/programs/gradprosp.html) for a listing of all required application materials and preferred method of submission.

Special Application Requirements:
Most candidates for advanced degrees have completed a bachelor's degree in geology, geophysics, or the broad field of earth and material sciences. However, the department encourages applications from students in fields such as chemistry, physics, or biology.

At least one year each of study in calculus, chemistry, and physics is required. In general, an outstanding academic record is expected.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 8 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: Students must demonstrate familiarity with the tools of research or scholarship in their track, the ability to work independently, and the ability to present the results of their investigation effectively, by completing one or more projects, which may take the form of a research paper, presentation of research results, or completion of a faculty-supervised research experience. The Plan B project(s) should involve a minimum combined total of approximately 120 hours (the equivalent of three full-time weeks) of work.

Plan C: Plan C requires 14 major credits and 9 credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

All students must take ESCI 8001 - Introductory Graduate Seminar (2 cr). At the onset of studies, a coursework "compact" will be developed with the student, his/her adviser, and the graduate studies committee. The compact will be reviewed annually to assure timely progress and revise as needed.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Biogeology

Biogeology represents a rapidly growing area at the intersection between Earth and the life sciences. It includes research in microbial evolution and biochemistry, microbe/mineral chemical interactions, the role of organisms in basic geological processes, the principles through which organisms or organic compounds can be used to reconstruct surface conditions, biogeochemical cycling, pollution control and remediation, the origin of life on Earth, and astrobiology. This is a broad field that is moving in new and exciting directions, and witnessing explosive growth in understanding the variety of ways biology mediates geology and vice versa. Many of the most basic earth surface processes are now seen as intimately biological with rates and pathways dictated by organic processes. Understanding the importance of these processes, quantifying them through time and place, and learning to utilize and/or control them will be major components of earth Sciences research in the 21st century.

[ESCI 4402 - Biogeochemical Cycles in the Ocean (3 cr); ESCI 4801 - Geobiology (3 cr)]

Earth Sciences

This generalist track exists for students whose curriculum and/or thesis (paper or project for M.S. Plan B) do not fit any of the other four tracks. Because it is not specific to a discipline, there are no mandatory courses in the major apart from the introductory graduate seminar, a minimum of 6 additional graduate-level credits in the major program, 12 supporting program credits or completion of all requirements for a minor, and thesis credits. A curriculum specific to the student will be set through the compact process.

6-credit minimum; courses determined on an individual basis.
Geology
Geology uses field observation, laboratory work, analog and computer modeling, chemical and biological probes and assays to understand Earth's coupled rock, water and biological systems, the underlying processes, and their history of interaction as evidenced in the rock record.

6-credit minimum from any two of the following courses: ESCI 5302 - Isotope Geology; ESCI 5351 - Geochemical Modeling of Aqueous Systems; ESCI 5353 - Electron Microprobe Theory and Practice; ESCI 5502 - Advanced Structural Geology; ESCI 5503 - Advanced Petrology; ESCI 5601 - Advanced Sedimentology; ESCI 5602 - Depositional Mechanics; ESCI 5705 - Limnogeology and Paleoenvironment.

Geophysics
Geophysics uses remote sensing probes (seismic waves, potential fields, etc.), laboratory simulation of deep earth conditions and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history and dynamics of solid Earth and other planets.

6-credit minimum including ESCI 4211 - Solid Earth Geophysics I; plus at least one of the following courses: ESCI 4203 - Principles of Geophysical Exploration; ESCI 4204 - Geomagnetism and Paleomagnetism; ESCI 4212 - Solid Earth Geophysics II; ESCI 5201 - Time-Series Analysis of Geological Phenomena; ESCI 5203 - Rock and Mineral Physics; ESCI 5204 - Geostatistics and Inverse Theory.

Hydrogeology
Hydrogeology uses direct observation and remote sensing, computer modeling and laboratory simulation to constrain the interaction of water and rock in Earth's shallow subsurface. Freshwater is Earth's most precious and increasingly overexploited resource. Hydrogeology is a key discipline in the effective shepherding of this important reserve. This track establishes a baseline curriculum for hydrogeology at the graduate level. The compact process will identify additional coursework appropriate to the student's prior training and research directions.

6-credit minimum including ESCI 4702 - General Hydrogeology; plus at least one of the following courses: ESCI 5108 - Principles of Environmental Geology; ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences; ESCI 5713 - Tracers and Karst Hydrogeology; ESCI 5971 - Field Hydrogeology.
Twin Cities Campus
Earth Sciences Minor
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

**Contact Information:**
Graduate Program, Department of Earth Sciences, University of Minnesota, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: geo@umn.edu
Website: [http://www.geo.umn.edu/dept/programs/Graduate.html](http://www.geo.umn.edu/dept/programs/Graduate.html)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](http://www.geo.umn.edu/dept/programs/General.html) section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, biogeochemistry, biogeology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students may accommodate other areas of interest such as engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the program.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The minor is established individually with approval by the graduate studies committee. Typically, no more than 50 percent of the total course credits are 4xxx.
Twin Cities Campus
Earth Sciences Ph.D.
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Graduate Program, Department of Earth Sciences, University of Minnesota, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-1333; fax: 612-625-3819)
Email: geo@umn.edu
Website: http://www.geo.umn.edu/dept/programs/Graduate.html.

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The modern earth sciences are a remarkable synthesis of the physical and biological sciences. They are at the forefront of inquiry into and solutions of most of the major issues involving the global environment: climate, oceans, freshwater in all its forms, natural resources, and natural disasters. Like no other field, they integrate all the systems, from surface to great depth, from physics to chemistry to biology, and over all of geologic time and all geographic scales. The program includes the fields of structural geology, tectonics, petrology, hydrogeology, geomorphology, sedimentology, surface processes, geochemistry, biogeochemistry, biogeology, chemical oceanography, mineralogy, mineral and rock magnetism, rock and mineral physics, geodynamics, seismology, geostatistics, planetary geology, and geophysics and applied geophysics.

Students may accommodate other areas of interest such as engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Materials required for a complete application file include the student's statement of purpose, three letters of recommendation, transcripts, official GRE scores, and the Application for Admission. Applications are considered at any time; however, to be considered for financial aid, all materials must be submitted by January 8. Studies may begin in any semester or summer session, although fall semester is preferable. IMPORTANT: Refer to the Graduate Programs section of the department website (www.geo.umn.edu/dept/programs/gradprosp.html) for a listing of all required application materials and preferred method of submission.

Special Application Requirements:
Most candidates for advanced degrees have completed a bachelor's degree in geology, geophysics, or the broad field of earth and material sciences. However, the department encourages applications from students in fields such as chemistry, physics, or biology.

At least one year of study each in calculus, chemistry, and physics is required. In general, an outstanding academic record is expected.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
- Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
8 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

In addition to track-specific courses, all students must take ESCI 8001 - Introductory Graduate Seminar (2 cr). At the onset of studies, a coursework "compact" will be developed with the student, his/her adviser, and the graduate studies committee. The compact will be reviewed annually to assure timely progress and revise as needed.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Biogeology
Biogeology represents a rapidly growing area at the intersection between Earth and the life sciences. It includes research in microbial evolution and biochemistry, microbe/mineral chemical interactions, the role of organisms in basic geological processes, the principles through which organisms or organic compounds can be used to reconstruct surface conditions, biogeochemical cycling, pollution control and remediation, the origin of life on Earth, and astrobiology. This is a broad field that is moving in new and exciting directions, and witnessing explosive growth in understanding the variety of ways biology mediates geology and vice versa. Many of the most basic earth surface processes are now seen as intimately biological with rates and pathways dictated by organic processes. Understanding the importance of these processes, quantifying them through time and place, and learning to utilize and/or control them will be major components of earth sciences research in the 21st century.

ESCI 4402 - Biogeochemical Cycles in the Ocean (3 cr); ESCI 4801 - Geobiology (3 cr).

Earth Sciences
This generalist track exists for students whose curriculum and/or thesis (paper or project for M.S. Plan B) do not fit any of the other four tracks. Because it is not specific to a discipline, there are no mandatory courses in the major apart from the introductory graduate seminar, a minimum of 6 additional graduate-level credits in the major program, 12 supporting program credits or completion of all requirements for a minor, and thesis credits. A curriculum specific to the student will be set through the compact process.

6-credit minimum; courses determined on an individual basis.

Geology
Geology uses field observation, laboratory work, analog and computer modeling, chemical and biological probes and assays to understand Earth's coupled rock, water and biological systems, the underlying processes, and their history of interaction as evidenced in the rock record.

6-credit minimum from any two of the following courses: ESCI 5302 - Isotope Geology; ESCI 5351 - Geochemical Modeling of Aqueous Systems; ESCI 5353 - Electron Microprobe Theory and Practice; ESCI 5502 - Advanced Structural Geology; ESCI 5503 - Advanced Petrology; ESCI 5601 - Advanced Sedimentology; ESCI 5602 - Depositional Mechanics; ESCI 5705 - Limnogeology and Paleoenvironment.
Geophysics
Geophysics uses remote sensing probes (seismic waves, potential fields, etc.), laboratory simulation of deep Earth conditions and computer modeling of fluid and continuum mechanical dynamics to investigate the structure, composition, history and dynamics of solid Earth and other planets.

6-credit minimum including ESCI 4211 - Solid Earth Geophysics I; plus at least one of the following courses: ESCI 4203 - Principles of Geophysical Exploration; ESCI 4204 - Geomagnetism and Paleomagnetism; ESCI 4212 - Solid Earth Geophysics II; ESCI 5201 - Time-Series Analysis of Geological Phenomena; ESCI 5203 - Rock and Mineral Physics; ESCI 5204 - Geostatistics and Inverse Theory.

Hydrogeology
Hydrogeology uses direct observation and remote sensing, computer modeling and laboratory simulation to constrain the interaction of water and rock in Earth's shallow subsurface. Freshwater is Earth's most precious and increasingly overexploited resource. Hydrogeology is a key discipline in the effective shepherding of this important reserve. This track establishes a baseline curriculum for hydrogeology at the graduate level. The compact process will identify additional coursework appropriate to the student's prior training and research directions.

6-credit minimum including ESCI 4702 - General Hydrogeology; plus at least one of the following courses: ESCI 5108 - Principles of Environmental Geology; ESCI 5205 - Fluid Mechanics in Earth and Environmental Sciences; ESCI 5713 - Tracers and Karst Hydrogeology; ESCI 5971 - Field Hydrogeology.]
Twin Cities Campus

Electrical Engineering M.S.E.E.

Electrical and Computer Engineering

College of Science and Engineering

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-3564; fax: 612-626-1136)

Email: jager001@umn.edu
Website: http://www.ece.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Electrical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Students are considered for admission beginning fall semester only (except for part-time students living in Minnesota who work in industry and who may apply for other terms). The deadline for applying for fall semester is December 1.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

All documents must be submitted electronically. No documents should be mailed to the department or the Graduate School.

Every applicant must submit the University of Minnesota application for graduate admission and the Electrical Engineering Department Application (this is part of the application for graduate admission).

The department requires three letters of recommendation. Letters of recommendation must be written on university stationery and include the recommender's signature. Recommenders will be emailed a link where they can submit their letters of recommendation electronically.

Every applicant must upload a resume to the online department application.

Every applicant must submit the General Test of the GRE (except University of Minnesota Bachelor of Electrical Engineering graduates who have a GPA of 3.40 or better). The GRE Subject Test is not required for admission.

Special Application Requirements:
Consideration is given to students who have completed another curriculum in engineering, science, physics, or mathematics that includes sufficient preparation to pursue a graduate program in electrical engineering. In some instances, additional preparatory studies
may be required after admission.

M.S. students who want to continue on to the Ph.D. must pass the Ph.D. Preliminary Written Examination by the end of their second year in residence. Students have two chances to pass the exam. The Ph.D. Preliminary Written Examination is typically held in November and in April.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan C:** Plan C requires 14 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

The M.S. requires a minimum of 30 credits, 14 credits from EE courses 5xxx and above, and 6 credits from related fields outside of the department but within CSE. For Plan A, 10 thesis credits are required. For Plan C, an additional 10 credits are required, which can be either major credits or credits from outside the major. Students must satisfy a paper and a project requirement, which may be fulfilled either in approved EE coursework or by registering for the Plan C Project. Students choosing to pursue a minor must satisfy both EE and the outside minor department requirements. Courses that are cross-listed with EE must be counted for major field credit. Part-time students must choose Plan C; full-time students may choose either Plan A or Plan C. The student's Degree Program Form, listing all courses to be included toward the degree, should be submitted no later than the end of the first year of the program. The department limits project, seminar, special investigation, directed study credits, and GRAD 0999 registrations.

Use of 4xxx courses toward program requirements is permitted, limited to 9 credits. 4xxx courses may not be counted toward the major field requirement. Only 4xxx credits from the approved list may be counted toward degree requirements.

All coursework must be taken A-F, unless only offered S-N, to be counted toward degree requirements.

A 5-year combined bachelor's/master's degree is available for select U of M undergraduates.

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.
The University of Minnesota Rochester (UMR) offers the M.S. degree in electrical engineering. Students may complete all degree requirements in Rochester by combining courses taught by College of Science and Engineering faculty in person (face-to-face), or via streaming video using the UNITE (University-Industry Television for Education) instructional television system. UNITE enables students to watch class live via the internet or pick up class on a special server at a later time.
Twin Cities Campus
Electrical Engineering Minor
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200
Union Street S.E., Minneapolis, MN 55455 (612-625-3564; fax: 612-626-1136)
Email: jager001@umn.edu
Website: http://www.ece.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for
requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of
modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental
work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics,
thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power
electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor
properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer
and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar
energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor coursework must be taken A-F.

Minor credits must be 5xxx or 8xxx. Coursework must be from classroom and laboratory courses. No colloquia, seminar, or special
investigation credits count toward meeting the minor requirements.
Twin Cities Campus
Electrical Engineering Ph.D.
Electrical and Computer Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Electrical and Computer Engineering, University of Minnesota, 3-166 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-3564; fax: 612-626-1136)
Email: jager001@umn.edu
Website: http://www.ece.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Department of Electrical and Computer Engineering offers diverse educational programs that encompass nearly all aspects of modern electrical and computer engineering, ranging from the very theoretical system and information theory to highly experimental work in novel device research and microelectronics. Emphases in the major are solid state and physical electronics, surface physics, thin films, sputtering, noise and fluctuation phenomena, quantum electronics, plasma physics, automation, power systems and power electronics theory, wave propagation, communication systems and theory, optics, lasers, fiber optics, magnetism, semiconductor properties and devices, VLSI and WSI engineering in theory and practice, network theory, signal and image processing, and computer and systems engineering. Interdisciplinary work is also available in bioelectrical sciences, control sciences, computer sciences, solar energy, applications of systems theory to urban transportation and economic planning, and biological modeling.

Students are considered for admission beginning fall semester only (except for part-time students living in Minnesota who work in industry who may apply for other terms). The deadline for applying for fall semester is December 1.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.40.

All documents must be submitted electronically. No documents should be mailed to the department or the Graduate School.

Every applicant must submit the University of Minnesota application for graduate admission and the Electrical Engineering Department Application (this is part of the application for graduate admission).

The department requires three letters of recommendation. Letters of recommendation must be written on university stationery and include the recommender's signature. Recommenders will be emailed a link where they can submit their letters of recommendation electronically.

Every applicant must upload a resume and a writing sample to the online department application. The writing sample should consist of a minimum of one, to a maximum of three, class papers or publications.

Special Application Requirements:
Every applicant must submit the General Test of the GRE (except University of Minnesota bachelor of electrical engineering graduates who have a GPA of 3.40 or better). The GRE Subject Test is not required for admission.

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

14 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. degree requires a minimum of 40 course credits and 24 thesis credits. The program must include 14 credits of EE courses 5xxx and above and 12 credits from the supporting field outside of EE but within the College of Science and Engineering.

Ph.D. students who enter the department with a M.S. degree in Electrical Engineering must pass the Ph.D. Preliminary Written Examination by the end of their third semester in residence. Ph.D. students who enter with an M.S. in another field have until the end of their second year in residence to pass the exam. Students who enter with a bachelor's degree have until the end of their second year in residence to pass the exam. Students have two chances to pass the exam. The exam is typically held in November and in April.

Students choosing to minor must satisfy both EE and the outside minor department requirements.

Courses that are cross-listed with EE must be counted for major field credit.

The department limits seminar, special investigation, and GRAD 0999 registrations.

Use of 4xxx courses toward program requirements is permitted, but limited to 9 credits. 4xxx courses may not be counted toward the major field requirement. Only 4xxx credits from the approved list may be counted toward degree requirements.

All coursework must be taken A-F unless only offered S-N to be counted toward degree requirements.

Ph.D. students may obtain a M.S. degree as part of their Ph.D. degree.
Twin Cities Campus

Environmental Restoration Engineering and Science M.S.
Civil Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Environmental Restoration Engineering and Science Graduate Program, 122 Civil Engineering, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: volle001@umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program is not yet admitting students.

The goal of the master of science in environmental restoration engineering and science is to produce graduates who will understand how to combine engineering with physical, biological, and social sciences in order to contribute to the process of prioritizing, designing, implementing, evaluating, and setting policy for environmental restoration projects. In short, the program aims to generate future leaders who will both succeed in practice and set the national agenda for restoring, maintaining, and sustaining the Earth-surface environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree in a field related to ecology, civil engineering, or environmental and earth sciences. Other degrees will be accepted based on relevant experience at the discretion of the DGS.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 16
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 major credits and null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Students complete the capstone project either by undertaking a field research internship offered as CE 8063 - Environmental Restoration Field Research for 6 credits, or by taking one additional course from the Restoration Methods and Practice theme area and conducting an independent research course. In both routes, students will be required to document 100 hours of project-based work. Students will complement this work with a required 10-minute oral presentation on the required Restoration Practice and Tools course.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

Completion of the program requires a minimum of 30 credits. Three required core classes (Introduction to Stream Restoration, Restoration and Reclamation Ecology, and Environmental Restoration Practice and Tools) account for 8 credits. An additional 16 credits are made up of approved electives chosen from four theme areas: Restoration Environmental Policy and Management; Restoration Physical Science and Engineering; Restoration Ecology, Biology, and Chemistry; and Restoration Methods and Practice. The remaining 6 credits are met by undertaking a field-based internship or additional coursework with a documented research/practice component.

The following courses are required:

- CE 8061 (EEB 8061, GEO 8061) - Introduction to Stream Restoration (3 cr)
- HORT 5071 - Restoration and Reclamation Ecology (3 cr)
- CE 8062 (EEB 8062, GEO 8062) - Environmental Restoration Practice and Tools (2 cr)
Twin Cities Campus

Environmental Restoration Engineering and Science Minor

Civil Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Environmental Restoration Science and Engineering Graduate Program, 122 Civil Engineering, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: volle001@umn.edu
Website: http://www.ce.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 8
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program is not yet admitting students.

The goal of the Environmental Restoration Engineering and Science Program is to produce graduates who will understand how to combine engineering with physical, biological, and social sciences in order to contribute to the process of prioritizing, designing, implementing, evaluating, and setting policy for environmental restoration projects. In short, the program aims to generate future leaders who will both succeed in practice and set the national agenda for restoring, maintaining, and sustaining the Earth-surface environment.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The following courses are required:
CE 8061 (EEB 8061, GEO 8061) - Introduction to Stream Restoration (3 cr)
HORT 5071 - Restoration and Reclamation Ecology (3 cr)
CE 8062 (EEB 8062, GEO 8062) - Environmental Restoration Practice and Tools (2 cr)
Twin Cities Campus

Financial Mathematics M.F.M.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: mfmath@umn.edu
Website: http://www.math.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Financial Mathematics

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of financial mathematics degree program helps students understand the underlying mathematics of quantitative finance. The program offers a range of courses, from theoretical to practical, including a mathematical course on stochastic processes, a practitioner's course offering hands-on application of financial software tools, and a programming course focusing on C# and MATLAB.

Courses are offered in the evenings to accommodate working professionals. The program is designed with the possibility for full-time students to complete all requirements in one year.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited U.S. university or foreign equivalent.

At least one year of college freshman calculus with a grade of B or better.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 30 major credits and null credits outside the major. The is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
At least 1 semesters must be completed before filing a Degree Program Form.

The M.F.M. requires 30 credits, consisting of four year-long course sequences. Each sequence has a fall term course and a spring term course, which must be taken in sequence. The course sequences are: FM 5011/5012 - Mathematical Background for Finance; FM 5021/5022 - Mathematical Theory Applied to Finance; FM 5031/5032 - A Practitioner's Course in Finance; and FM 5091/5092 - Computation, Algorithms, and Coding in Finance. In addition to the 30 required credits, students who either do not have a strong mathematics background or who need a refresher may be asked to take FM 5001/5002 - Preparation for Financial Mathematics.
Twin Cities Campus
Fundamentals of Quantitative Finance Postbaccalaureate Certificate
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: http://www.math.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Fundamentals of Quantitative Finance PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in fundamentals of quantitative finance (FQF) is a 12-credit certificate with four required courses. The certificate is good preparation for the master of financial mathematics (M.F.M.) degree program.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Internet Based - Speaking Score: 23

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must complete four required courses totaling 12 credits.
Twin Cities Campus
Geoengineering M.GeoE.
Civil Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Geoengineering Program, University of Minnesota, Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: civesgs@umn.edu
Website: http://www.ce.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of GeoEngineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of geoengineering (M.GeoE.) degree is for the practicing engineer who would like to obtain an advanced degree enrolling part-time or full-time. Students who intend to proceed to the Ph.D. program or who think they may later wish to be admitted to the Ph.D. program should apply for the master of science program. Students are expected to follow a coherent program of coursework selected with the help of a faculty adviser and approved by the director of graduate studies. Students also must demonstrate professional competence by carrying out and defending a design project. The degree typically takes 12 to 18 months, full-time, to complete.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing. The graduate program in geological engineering is administered in the Department of Civil Engineering. Students interested in pursuing doctoral studies should see the Ph.D. program in civil engineering.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

An ABET-accredited, four-year bachelor's degree in engineering is required for admission.

Applicants are required to submit results of the GRE in support of their applications. The TOEFL is required of foreign applicants from non-English-speaking countries. A TOEFL score of at least 550 (paper), 213 (computer), or 79 (Internet) is required for admission. Admission requirements also include three letters of recommendation and a statement of purpose that outlines the prospective student's research interests, reasons for pursuing graduate studies, and career plans after graduation. Students are admitted each semester, but applicants are encouraged to begin fall semester and to submit their applications by December 31 before the year their studies are expected to begin.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
- Total Score: 6.5
  • MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 18 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.GeoE. requires at least 30 credits and is offered under two plans. Plan A requires at least 20 course credits and preparation of a thesis/design project (10 cr); the thesis/design project must be carried out by the student in consultation with a faculty adviser. Plan C is a coursework-only degree program and requires at least 30 course credits. At least 6 of the course credits must be taken outside the major for either plan.
Twin Cities Campus
Geoengineering M.S.
Civil Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Geological Engineering Program, University of Minnesota, Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455
(612-625-5522; fax: 612-626-7750)
Email: civesgs@umn.edu
Website: http://www.ce.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science (M.S.) degree balances education in engineering fundamentals and design with research and development. It is designed for students wishing to pursue a career in industry or to continue toward a Ph.D. degree.

The graduate program in geological engineering is administered in the Department of Civil Engineering. Students interested in pursuing doctoral studies should see the Ph.D. program in civil engineering.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in engineering, basic science, or mathematics is preferred.

Admission depends primarily on the applicant's academic record and letters of recommendation. Applicants who lack geological engineering training are often required to complete at least one appropriate course from the undergraduate program. Graduate degree credit is not awarded for such preparatory work.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

**Plan C:** Plan C requires 14 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students in the M.S. follow a program selected with the help of a faculty adviser and approved by the director of graduate studies. A program typically takes 18 to 24 months to complete.

The M.S. requires at least 30 credits and is offered under three plans. Plan A emphasizes research and preparation of a thesis; Plan B emphasizes coursework and a project; Plan C is coursework only.

The Plan A thesis is written on a research project carried out in consultation with a faculty adviser. Under Plan B, students complete one to three Plan B papers as determined by the faculty adviser. Plan B papers can include computer programs, annotated bibliographies, field investigations, and analysis/design of special engineering problems.

Plan A requires at least 20 course credits and 10 thesis credits. Plan B requires at least 27 course credits and Plan C requires 30 course credits. At least 6 credits of coursework must be from outside the department for all plans.
**Twin Cities Campus**

**Geoengineering Minor**

**Civil Engineering**

**College of Science and Engineering**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Civil Engineering, University of Minnesota, 122 Civil Engineering Building, 500 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-625-5522; fax: 612-626-7750)
Email: cievesgs@umn.edu
Website: [http://www.ce.umn.edu](http://www.ce.umn.edu)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The graduate program in geological engineering is administered in the Department of Civil Engineering. Students interested in pursuing doctoral studies should see the Ph.D. program in civil engineering.

Emphases are in fundamental aspects of geomechanics and its applications. Research focuses on the use and development of discrete and continuum theories such as elasticity, plasticity, fracture mechanics, and poroelasticity for solving engineering problems. Numerical methods are being developed for obtaining solutions; experimental methods and novel apparatus are being developed for gathering physical evidence. Applications include processes of comminution, flow of granular materials, hydraulic fracturing, and nondestructive testing.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Program Requirements**
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For a master's minor, two or more 5xxx to 8xxx courses from the same area of geoengineering are required, for a total of 6 or more credits.
Twin Cities Campus
Industrial and Systems Engineering M.S.I.Sy.E.
Industrial and Systems Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax 612-624-2010)
Email: gradinfo@ie.umn.edu
Website: http://www.ie.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Industrial & Systems Engr

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 16 major credits and 6 credits outside the major. The final exam is oral.

Plan C: Plan C requires 17 major credits and 6 credits outside the major. There is no final exam.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

At least 1 semesters must be completed before filing a Degree Program Form.

The master of science in industrial and systems engineering (M.S.I.Sy.E.) requires at least 30 credits. Students can choose one of two tracks. The industrial engineering (IE) track has two options: Plan A (thesis) option and Plan B (non-thesis) option. The IE track requires at least 12 course credits in the major if Plan A is chosen, and 16 course credits in the major if Plan B is chosen. At least 6 course credits in a minor or related field and at least 1 credit of graduate seminar must be included in the 30 credits.

The systems engineering (SE) track is a coursework-only option (Plan C). It requires at least 17 course credits in the major field, and 6 course credits in a minor or related field.

All M.S.I.Sy.E. students must complete a zero-credit Research Ethics and Professional Conduct course offered by the Department of Mechanical Engineering.

**Joint- or Dual-degree Coursework:** Dual M.S. in ISyE and Civil Engineering (Transportation Engineering Focus): Student may take a total of 15 credits in common among the academic programs.

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Industrial Engineering**

Plan A (thesis) Option: Required courses include IE 5531, IE 8532, and one of the following courses—IE 5545, 5551, or 8541. Students may replace a required course with a qualifying replacement course if they have taken the equivalent of the required course elsewhere. A list of qualifying replacements is available on the ISyE program web page. Students must also take 10 thesis credits.

Plan B (non-thesis) Option: Required courses include IE 5531, IE 8532, and two of the following courses—IE 5545, 5551, or 8541. Students may replace a required course with qualifying replacement course if they have taken the equivalent of the required course elsewhere. A list of qualifying replacements is available on the ISyE program web page. Students must either take the Plan B course IE 8951/8953, or complete one to three Plan B papers, determined in consultation with the adviser.

**Systems Engineering**

Required courses are IE 5111, 5112, 5113, 5541, and 5553.
Twin Cities Campus

Industrial and Systems Engineering Minor
Industrial and Systems Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Industrial and Systems Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gradinfo@ie.umn.edu
Website: http://www.ie.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

At least 6 credits in industrial and systems engineering are required for a master's minor. At least 12 credits in industrial and systems engineering are required for a doctoral minor.
**Twin Cities Campus**

**Industrial and Systems Engineering Ph.D.**

**Industrial and Systems Engineering**

**College of Science and Engineering**

Link to a list of faculty for this program.

**Contact Information:**
Industrial and Systems Engineering Graduate Program, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)  
Email: gradinfo@ie.umn.edu  
Website: [http://www.ie.umn.edu](http://www.ie.umn.edu)

- Program Type: Doctorate  
- Requirements for this program are current for Fall 2011  
- Length of program in credits: 68  
- This program does not require summer semesters for timely completion.  
- Degree: Doctor of Philosophy  

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The industrial and systems engineering (ISyE) program offers coursework and research in industrial and systems engineering, operations research, and human factors. Special emphasis is on methodologies for design, planning, and management of service and manufacturing systems. Examples of research applications include logistics, transportation, healthcare delivery systems, revenue management, and supply chain management.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE  

International applicants must submit score(s) from one of the following tests:
- TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based – Reading Score: 19  
  - Paper Based - Total Score: 550  
- IELTS  
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
32 credits are required in the major.  
12 credits are required outside the major.  
24 thesis credits are required.  

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. degree requires at least 44 course credits, including at least 12 course credits in a minor field, or supporting program and at least 2 credits of graduate seminar; 24 thesis credits are also required. Required courses include IE 5531, IE 8532, and two of the following courses: IE5545, 5551, or 8541. Students may replace a required course with a qualifying replacement course if they have taken the equivalent of the required course elsewhere. A list of qualifying replacements is available on the ISyE program web page.

All Ph.D. students must complete a zero-credit Research Ethics and Professional Conduct course offered by the Department of Mechanical Engineering.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Industrial Engineering
Twin Cities Campus
Infrastructure Systems Engineering M.S.I.S.E
Civil Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Technological Leadership Institute, University of Minnesota, 1300 South Second Street, Suite 510, Minneapolis, MN 55454 (612-624-5474; fax: 612-624-7510)
Email: tliss@umn.edu
Website: http://www.tli.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Infrastructure Systems Engr

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in infrastructure systems engineering (M.S.I.S.E.) focuses on developing management and engineering tools that address issues in local, county, and state infrastructure. It is an interdisciplinary program offered through the College of Science and Engineering's Technological Leadership Institute and the Department of Civil Engineering. The two-year, professional-format program integrates the fields of water systems, pavement, structures, mechanics modeling, traffic engineering, transportation policy, and environmental issues, among others.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 2.80.

A B.S. degree in engineering plus a minimum of one year of professional work experience in an infrastructure area, or a B.S. degree in a related science or technology field and a minimum of two years professional work experience in an infrastructure area are required.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 23 major credits and 7 credits outside the major. The final exam is oral.

This program may not be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.25 is required for students to remain in good standing.

The M.S.I.S.E. requires 30 credits with 23 credits in required core courses and 7 credits in related fields, such as geography and public administration. In addition, students must complete a capstone project to address an on-the-job issue or problem.
Twin Cities Campus
Management of Technology M.S.M.O.T.
CSE TLI Mgmt of Technology
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Management of Technology Graduate Program, Technological Leadership Institute, University of Minnesota, 510 West Bank Office Building, 1300 South Second Street, Minneapolis, MN 55454 (612 624-5747; fax: 612 624-7510)
Email: MOT@umn.edu
Website: http://www.tli.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 36
• This program does not require summer semesters for timely completion.
• Degree: Master of Science in Management of Technology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in the management of technology (M.S.MOT.) program is administered by the College of Sciences and Engineering's Technological Leadership Institute (TLI). The two-year, executive-format program integrates the fields of technology and management and provides working engineers and scientists with management knowledge and skills needed to assume a technical leadership role within their organizations. The program focuses on management in technology-based environments in traditional and emerging industries. The curriculum includes technical and advanced management courses, such as pivotal technologies, technology forecasting, project management, management of innovation, intellectual property management, and strategic management of technology. The core management curriculum includes areas such as finance, marketing, accounting, strategic planning and decision making, and conflict management. Students proceed through the program and advance as a cohort, taking a prescribed sequence of courses together. Case studies, class discussions, and study-group interaction stimulate the learning process. Students also participate in off-campus residencies, including an international residency; complete individual and team projects; and develop final projects as part of a capstone course. Most students receive corporate financial support.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in an engineering, science, or other technology-related field from an accredited program.

Applicants should have completed coursework (or show proficiency) in economics, mathematical modeling, statistics, and computer literacy.

Special Application Requirements:
At least 5 years of professional experience in the applicant's technical field. (In exceptional circumstances, promising candidates with less experience may be considered.) Applicants must submit three letters of recommendation, a resume, and a statement of purpose.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 36 major credits and null credits outside the major. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. MOT. requires 36 credits. In addition to course requirements, students must complete an oral exam and a written report for the capstone project (MOT 8234), which consists of an independent, original investigation requiring between 110 and 130 hours of effort.
Twin Cities Campus
Management of Technology Minor
CSE TLI Mgmt of Technology
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Management of Technology Graduate Program, Technological Leadership Institute, University of Minnesota, 510 West Bank Office Building, 1300 South Second Street, Minneapolis, MN 55454 (612 624-5747; fax: 612 624-7510)
Email: MOT@umn.edu
Website: http://www.tli.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Management of Technology minor is not currently accepting new students. Please contact the Technology Leadership Institute for more information regarding the status of this program.

The management of technology program is administered by the College of Sciences and Engineering's Technological Leadership Institute (TLI). The program integrates the fields of technology and management and provides working engineers and scientists with management knowledge and skills needed to assume a technical leadership role within their organizations. The program focuses on management in technology-based environments in traditional and emerging industries. The curriculum includes technical and advanced management courses, such as pivotal technologies, technology forecasting, project management, management of innovation, intellectual property management, and strategic management of technology. The management curriculum includes areas such as finance, marketing, accounting, strategic planning and decision making, and conflict management.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus

Materials Science and Engineering M.Mat.S.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.chem.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Materials Science And Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate courses offered by the Chemical Engineering and Materials Science (CEMS) Department cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

The master of materials science and engineering (M.Mat.S.E.), also known as the professional master's, is designed for working professionals who are interested in obtaining a master's degree part time. This degree requires a design project.

The department also offers the M.S.Mat.S.E. (Plan A) degree, which is a thesis based master's. However, prospective students should note that (with the exception of the professional M.Mat.S.E. program) the M.S.Mat.S.E. is generally reserved for current graduate students who choose not to seek a Ph.D. The CEMS focuses on the Ph.D. and does not generally admit students for the M.S.Mat.S.E. (Plan A) degree.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

The professional master's in engineering degree is designed for employees of local industries who wish to pursue their studies part-time. No financial support is available. Applicants should contact the program before applying for admission.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 14 major credits and 6 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All master's students must complete the four required core courses, MATS 8001, 8002, 8003, and 8004. In addition, master's students must complete a total of 30 credits, including 14 from the major program (this includes the 4 required courses), 6 from the minor or related program, and 10 thesis credits (for the M.Mat.S.E., thesis credits are used for the design project). Precise coursework plans are approved by the director of graduate studies. The minimum required GPA for completion is 2.80.

In addition to their coursework, M.Mat.S.E. students are required to complete a design project. This work-related design project consists of an in-depth study of an engineering design. It need not represent a publishable research project. While the amount of work should be the same as that required for an M.S. thesis, the project can contain elements that the thesis would not, such as economic considerations, design consultation, and social relevance. The written design report must be approved by a three-person faculty committee. The final exam consists of the written design report and an oral presentation to the faculty committee.
Twin Cities Campus

Materials Science and Engineering M.S.Mat.S.E.
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Science Materials Science And Engr

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: With the exception of the professional master's degree (M.Mat.S.E.), the Chemical Engineering and Materials Science (CEMS) Department focuses on the Ph.D. and does not generally admit students for the master of science (M.S.Mat.S.E., Plan A) degree. The M.S.Mat.S.E. is generally reserved only for current graduate students who choose not to seek a Ph.D.

Graduate courses offered by CEMS cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

The M.S.Mat.S.E. (Plan A) degree, is a thesis-based master's, and is generally reserved only for current graduate students who choose not to seek a Ph.D. Working professionals who are interested in obtaining a master's degree part time should follow the requirements for the M.Mat.S.E. degree (also known as the professional master's), which requires a design project.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in materials science or other related field.

The M.S.Mat.S.E. is offered only under Plan A (with thesis). Students interested in a degree without a thesis should consider the professional master's in materials science (M.Mat.S.E.).

Special Application Requirements:
Note: With the exception of the professional master's degree (M.Mat.S.E.), the Chemical Engineering and Materials Science (CEMS) Department focuses on the Ph.D. and does not generally admit students for the M.S.Mat.S.E. (Plan A) degree. The M.S.Mat.S.E. is generally reserved only for current graduate students who choose not to seek a Ph.D.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 560
  - IELTS
    - Total Score: 6.5
  - MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A**: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

All master's students must complete the four required core courses, MATS 8001, 8002, 8003, and 8004. In addition, master's students must complete a total of 30 credits, including 14 from the major program (this includes the 4 required courses), 6 from the minor or related program, and 10 thesis credits. Precise coursework plans are approved by the director of graduate studies. The minimum required GPA for completion is 2.80.
Twin Cities Campus
Materials Science and Engineering Minor
Chemical Engineering & Materials Science
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Department of Chemical Engineering and Materials Science, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate courses offered by the Chemical Engineering and Materials Science (CEMS) Department cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
**Twin Cities Campus**

**Materials Science and Engineering Ph.D.**

*Chemical Engineering & Materials Science*

**College of Science and Engineering**

Link to a list of faculty for this program.

**Contact Information:**
Department of Chemical Engineering and Materials Science and Engineering, University of Minnesota, 151 Amundson Hall, 421 Washington Avenue S.E., Minneapolis, MN 55455 (612-625-0382; fax: 612-626-7246)
Email: cemsgrad@umn.edu
Website: http://www.cems.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 57
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Graduate courses offered by the Chemical Engineering and Materials Science (CEMS) Department cover core areas of materials science and engineering (structure and symmetry of materials; thermodynamics and kinetics; electronic, optical, and magnetic properties of materials; and mechanical properties of materials). In addition, several specialized topics are offered, including rheology, coating process fundamentals, process control, finite element methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, solid state reaction kinetics, electronic structure of materials, organic semiconductors, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and the science of porous media.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
A bachelor's degree in materials science or other related field.

**Special Application Requirements:**
Applicants must submit scores from the General Test of the GRE, three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. International students are required to provide TOEFL results. Submission of all application materials by January 1 is strongly encouraged to ensure priority consideration for fellowships and assistantships; late applications are considered if space is available.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 560
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

All Ph.D. students must complete the four required core courses, MATS 8001, 8002, 8003, and 8004. In addition, Ph.D. students must complete a total of 57 credits, including 21 from the major program (this includes the 4 required courses), 12 from the minor or related program, and 24 thesis credits. Precise coursework plans are approved by the director of graduate studies. The minimum required GPA for completion is 3.00.
Twin Cities Campus
Mathematics M.S.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: http://www.math.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a master of science (M.S.) in mathematics. Students may also earn the M.S. degree with emphasis in applied and industrial mathematics or with emphasis in mathematics education. For more information, see the Graduate Studies in Mathematics brochure.

Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

The M.S. Plan A includes an emphasis in applied and industrial mathematics. The M.S. Plan B includes an emphasis in mathematics education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Undergraduate degree in mathematics or equivalent.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 15 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. is offered under Plan A and Plan B. Plan A requires at least 20 course credits and 10 thesis credits. Plan B allows more breadth; students complete at least 30 course credits, half of which may be in areas outside of mathematics.
Twin Cities Campus
Mathematics Minor
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-6391, fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: http://www.math.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a minor for both the master's and the Ph.D.

Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires a two-semester 8xxx or 5xxx sequence. The Ph.D. minor requires two year-long sequences of 5xxx or 8xxx courses. Consult the director of graduate studies in mathematics.
Twin Cities Campus
Mathematics Ph.D.
School of Mathematics
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-6391; fax: 612-624-6702)
Email: gradprog@math.umn.edu
Website: http://www.math.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The School of Mathematics offers a Ph.D. in mathematics, and a Ph.D. in mathematics with emphasis in applied and industrial mathematics.

Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional, and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics, mathematical biology, and dynamical systems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Undergraduate degree in mathematics or equivalent.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Internet Based - Speaking Score: 23

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Language Requirement: French, German, Italian, or Russian

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. preliminary written examination, given twice each year, covers real analysis, complex analysis, algebra, and manifolds and topology. Students are expected to pass the exam by the end of their second year. After passing the exam and completing required
coursework, students may take the preliminary oral exam, which they are expected to pass by the end of their fourth year. If a supporting program is chosen, it may consist partly or entirely of mathematics courses.

Reading proficiency is required in one of the following: French, German, Italian, or Russian

For more information, see the program's website at www.math.umn.edu/grad.
Twin Cities Campus

Mechanical Engineering M.S.M.E.

Mechanical Engineering

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gradinfo@me.umn.edu
Website: http://www.me.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Mechanical Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research for all graduate degrees are offered in bioengineering; biomechanics; combustion; computer-aided design; computer-aided manufacturing; computer graphics; control systems; design; energy conservation; environmental control; environmental engineering; fluid mechanics; heat and mass transfer; history of science and technology; human factors engineering; industrial engineering; innovative methodologies; integration of structural and environmental systems; lubrication; manufacturing engineering; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; socioeconomic systems; solar energy; solar processing and thermochemistry; statistics; structures; systems dynamics; technology assessment; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; tribology; vibration; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- IELTS
  - Total Score: 6.5

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The M.S.M.E. requires at least 30 credits, including at least 14 course credits in the major and 6 course credits in a minor or related field. At least 1 credit of graduate seminar and one mathematics/numerical methods course from an approved list must be included in the 30 credits. Also, of the 30 credits, Plan A (thesis) students must enroll for 10 thesis credits. For Plan B (without thesis), students must either take the Plan B course, ME 8951/8953, or must complete one to three Plan B papers, determined in consultation with the adviser.
Twin Cities Campus

Mechanical Engineering Minor
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gradinfo@me.umnx.edu
Website: http://www.me.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research for all graduate degrees are offered in bioengineering; biomechanics; combustion; computer-aided design; computer-aided manufacturing; computer graphics; control systems; design; energy conservation; environmental control; environmental engineering; fluid mechanics; heat and mass transfer; history of science and technology; human factors engineering; industrial engineering; innovative methodologies; integration of structural and environmental systems; lubrication; manufacturing engineering; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; socioeconomic systems; solar energy; solar processing and thermochemistry; statistics; structures; systems dynamics; technology assessment; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; tribology; vibration; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

At least 6 credits in mechanical engineering are required for a master's minor. At least 12 credits in mechanical engineering are required for a doctoral minor.
Twin Cities Campus
Mechanical Engineering Ph.D.
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax: 612-624-2010)
Email: gradinfo@me.umn.edu
Website: http://www.me.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 68
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Coursework and research for all graduate degrees are offered in bioengineering; biomechanics; combustion; computer-aided design; computer-aided manufacturing; computer graphics; control systems; design; energy conservation; environmental control; environmental engineering; fluid mechanics; heat and mass transfer; history of science and technology; human factors engineering; industrial engineering; innovative methodologies; integration of structural and environmental systems; lubrication; manufacturing engineering; particle technology; plasma chemistry; plasma heat transfer; power, propulsion, and applied thermodynamics; socioeconomic systems; solar energy; solar processing and thermochemistry; statistics; structures; systems dynamics; technology assessment; thermal energy storage; thermal environmental engineering; thermodynamics; transportation; tribology; vibration; and interdisciplinary finite element methodology. Additional instructional and research programs can be formulated.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
32 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. requires at least 44 course credits, including at least 12 course credits in a minor field or supporting program and at least 2 credits of graduate seminar, along with at least one mathematical/numerical methods course from an approved list. Students are also required to complete 24 thesis credits.
Twin Cities Campus

Nanoparticle Science and Engineering Minor
Mechanical Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Graduate Minor Program in Nanoparticle Science and Engineering, Integrative Graduate Education and Research Traineeship Program, University of Minnesota, 2101 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-4028; fax: 612-625-4344)
Website: http://www.nanoigert.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Integrative Graduate Education and Research Traineeship Program offers a minor in nanoparticle science and engineering for M.S. and Ph.D. students. The curriculum is designed to allow completion of the minor without an increase in overall course load. The minor requires one or two core courses and electives relevant to nanoparticle research. The program of courses is tailored in advance consultation between the student and director of graduate studies.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

M.S. students must complete NPSE 8001 - Introduction to Nanoparticle Science and Engineering (3 cr) and 3 elective credits. Ph.D. students must complete NPSE 8001 and 8002 - Nanoparticle Science and Engineering Laboratory (3 cr) and 6 elective credits.

Electives must be chosen from existing courses relevant to nanoparticle research. Examples include CHEM 8021 - Computational Chemistry, EE 5624 - Optical Electronics, ME 8361 - Introduction to Plasma Technology, PHYS 5701 - Solid State Physics for Engineers and Scientists, CHEN 8301 - Physical Rate Processes I: Transport, and MATS 8212 - Solid State Reaction Kinetics.
**Twin Cities Campus**

**Physics M.S.**

*School of Physics & Astronomy*

*College of Science and Engineering*

Link to a [list of faculty](http://www.physics.umn.edu/grad) for this program.

**Contact Information:**
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. S.E., Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: grad@physics.umn.edu
Website: [http://www.physics.umn.edu/grad](http://www.physics.umn.edu/grad)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](http://www.physics.umn.edu/grad) section of the catalog website for requirements that apply to all major fields.

Note: Students applying for a terminal M.S. degree are not admitted unless they arrange for their own financial support. Students admitted to the Ph.D. program are automatically eligible for the M.S. program.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.50.

Upper-division courses in the core areas of classical mechanics, electricity and magnetism, quantum mechanics, and statistical and thermal physics are required. It is advisable to have taken an upper-division course in experimental methods in physics.

**Special Application Requirements:**

Students admitted to the Ph.D. program are automatically eligible for the M.S. program. Students applying for a terminal M.S. degree are not admitted unless they arrange for their own financial support.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](http://www.physics.umn.edu/grad) section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Use of certain 4xxx courses toward degree requirements is permitted under certain conditions with director of graduate studies approval. Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy the requirements.

The M.S. requires a minimum of 20 course credits (Plan A) or 30 course credits (Plan B), including classical physics (PHYS 5011-5012) or quantum mechanics (PHYS 5001-5002) and a minimum of 6 credits in a minor or related field. Plan A also requires 10 thesis credits. The minor requirement may be satisfied by completion of courses in one or two areas outside the specialization with an approval of the director of graduate studies in the minor field. Any course may be used to satisfy the related field requirement.

The Plan B Project involves a small, self-contained research problem, which may or may not be publishable. The project should be described in a written paper. Students must register for 4 credits of Physics 8500, which do count toward the program requirement of 30 credits.

The Plan B Paper option does not require original research. It consists of the writing of one to three Plan B papers which are based on courses that the student has taken.
Twin Cities Campus
Physics Minor
School of Physics & Astronomy
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. S.E., Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: grad@physics.umn.edu
Website: http://www.physics.umn.edu/grad

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

For the master’s minor, students must complete a minimum of 6 credits in physics. A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics.

For the doctoral minor, students must complete a minimum of 12 credits in physics, including either the classical physics sequence (PHYS 5011-5012) or the quantum mechanics sequence (PHYS 5001-5002).

Use of certain 4xxx courses toward degree requirements is permitted under certain conditions with director of graduate studies approval. Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy the requirements.
Physics Ph.D.

School of Physics & Astronomy

College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies in Physics, School of Physics and Astronomy, University of Minnesota, 116 Church St. S.E., Minneapolis, MN 55455 (612-626-5982; fax: 612-624-4578)
Email: grad@physics.umn.edu
Website: http://www.physics.umn.edu/grad

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemistry, chemical engineering and materials science, electrical and computer engineering, mechanical engineering, and the history of science and technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Teaching assistantships and a few fellowships are available upon admittance to the School of Physics and Astronomy.

Applicants are required to submit three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; and a clearly written statement of career interests, goals, and objectives. Submission of GRE scores is strongly recommended. Fall semester entry is strongly recommended for all students. Application by December 15 is strongly encouraged to ensure priority consideration for fellowships awarded for the next academic year.

Special Application Requirements:
Courses at the upper division level in the core areas of classical mechanics, electricity and magnetism, quantum mechanics, and statistical and thermal physics are required. It is advisable to have taken an upper division course in experimental methods in physics.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 55
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

Use of certain 4xxx courses toward degree requirements is permitted under certain conditions with director of graduate studies approval. Physics 4001, 4002, 4101, 4201, and 4303 cannot be used to satisfy the requirements.

Required Orientation: During the two weeks before the beginning of fall semester, new graduate students are expected to participate in the department orientation program. This includes TA orientation sessions, which are required if a student's financial support comes from TA assignments.

Requirement for International Students: International students who want to teach as TAs must take CSE TALK, a workshop on American teaching culture and language skills, prior to the department orientation described above and achieve an ELP (English Language Proficiency) rating of 1. This includes passing an English test, which is given in late July and August. Students who do not achieve an ELP of 1 must take an English training course geared to their level of skills, such as GRAD 5105, GRAD 5102, or Foundations. These courses are given during the academic year and are required until the student achieves an ELP of 1.

The Ph.D. requires a minimum of 40 credits, including classical physics (PHYS 5011-5012), quantum mechanics (PHYS 5001-5002), thermal and statistical physics (PHYS 5201), and two semesters of seminar. The minor requirement may be satisfied by completing courses in one or two areas outside the specialization with an approval of the director of graduate studies in the minor field. Any course will satisfy the supporting program requirement.
Twin Cities Campus
Quaternary Paleoecology Minor
Department of Earth Sciences
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Quaternary Paleoecology Graduate Program, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-7881; fax: 612-625-3819)
Email: qpminor@umn.edu
Website: http://lrc.geo.umn.edu/qpminor/index.html

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The faculty of the graduate minor in quaternary paleoecology (QP) hold appointments in several departments. Students in this unique program benefit from the broad range of expertise and experience available at a large research university. From their coursework in the minor, graduate students learn techniques and approaches from other areas that can be applied to their own research.

The minor is available to master's (M.A. and M.S.) and doctoral students.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Students develop their curricula in consultation with their major advisers and the director of graduate studies in the quaternary paleoecology program. Students choose courses from relevant fields outside their major field. A list of courses that fulfill the QP requirement can be obtained from the program web page (updated periodically). Master's students must take a total of 6 credits. Ph.D. students take a total of 12 credits (one course may be in the major field). Some requirements may be waived depending on the student's background.
Twin Cities Campus
Scientific Computation M.S.
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Scientific Computation Program, University of Minnesota, 241A Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-0769; fax: 612-626-5009)
Website: http://www.scicomp.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate degree program in scientific computation encompasses course work and research on the fundamental principles necessary to use intensive computation to support research in the physical, biological, and social sciences and engineering. There is a special emphasis on research issues, state-of-the-art methods, and the application of these methods to outstanding problems in science, engineering, and other fields that use scientific computation, numerical analysis and algorithm development, symbolic and logic analysis, high-performance computing tools, supercomputing and heterogeneous networks, and visualization.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
A bachelor's degree in a field that uses scientific computation is required for admission.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based – Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 2.8 is required for students to remain in good standing.

The program is offered under Plan A (thesis), which includes a minimum of 20 course credits and 10 thesis credits. The course credits must include at least 6 credits from the scientific computation core and at least 6 credits in a minor. Only 3 credits from courses offered in a student's minor may be counted toward the core requirements in scientific computation. A course listed in both the core requirements of scientific computation and a student's minor may not be counted under both.
Twin Cities Campus

Scientific Computation Minor
Chemistry
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Scientific Computation Program, University of Minnesota, 241A Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-0769; fax: 612-626-5009)
Website: http://www.scicomp.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate degree program in scientific computation encompasses course work and research on the fundamental principles necessary to use intensive computation to support research in the physical, biological, and social sciences and engineering. There is a special emphasis on research issues, state-of-the-art methods, and the application of these methods to outstanding problems in science, engineering, and other fields that use scientific computation, numerical analysis and algorithm development, symbolic and logic analysis, high-performance computing tools, supercomputing and heterogeneous networks, and visualization.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

The master's minor requires approval of the director of graduate studies and a minimum of 6 credits from the core curriculum; the credits may not be from courses in the student's major field. A doctoral minor requires approval of the director of graduate studies and a minimum of 12 credits (a minimum of 6 of these in core courses with remaining credits from supplementary courses). A student may use one course from their major field to satisfy the requirement of a minor in scientific computation, provided there is no rule prohibiting this in the student's major field.
**Twin Cities Campus**

**Scientific Computation Ph.D.**
*Chemistry*

**College of Science and Engineering**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Scientific Computation Program, University of Minnesota, 241A Smith Hall, 207 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-0769; fax: 612-626-5009)
Website: [http://www.scicomp.umn.edu](http://www.scicomp.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The graduate degree program in scientific computation encompasses course work and research on the fundamental principles necessary to use intensive computation to support research in the physical, biological, and social sciences and engineering. There is a special emphasis on research issues, state-of-the-art methods, and the application of these methods to outstanding problems in science, engineering, and other fields that use scientific computation, numerical analysis and algorithm development, symbolic and logic analysis, high-performance computing tools, supercomputing and heterogeneous networks, and visualization.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
A bachelor's degree in a field that uses scientific computation is required for admission.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

A minimum of 24 course credits is required with a minimum of 12 credits in core courses; 24 thesis credits are also required. Students have two options:

1. Ph.D. with supporting program - In addition to the core credits, this option requires 12 credits in subjects that support computational science. These can include core credits beyond the required 12 credits.

2. Ph.D. with minor - In addition to the core credits, this option requires 12 credits in a minor. Many minor programs require more than 12 credits; in such cases, the greater requirements will be in effect. The minor field must be declared before the student takes the preliminary oral exam.
Twin Cities Campus
Security Technologies M.S.S.T.
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Security Technologies Graduate Program, Technological Leadership Institute, University of Minnesota, 510 West Bank Office Building, 1300 South Second Street, Minneapolis, MN 55454 (612-624-5747; fax: 612-624-7510)
Email: tliss@umn.edu
Website: http://www.tli.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 32
• This program does not require summer semesters for timely completion.
• Degree: Master of Science in Security Technologies

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in security technologies (M.S.S.T.) shapes tomorrow's analytical and risk management policymakers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. During the 14-month program and through a multidisciplinary systems approach, the program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. Through elective courses, students also choose a learning track in either security systems technologies or security risk management. Students can further specialize through a range of elective courses. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree in a related field, e.g. in biological or physical sciences, engineering, computer science, mathematics, statistics, social sciences, or public policy.

Minimum requirements include one year of calculus, probability/statistics, and two science or engineering courses.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 25 to 26 major credits and 6 to 7 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S.S.T. program requires 32 credits in the fields of systems risk analysis, engineering (hardware and software), emerging technologies, economics, human factors, law, food and bio safety, and public policy to teach and investigate security technologies and address pertinent issues. The curriculum comprises a balance of courses from the following core areas:

* Foundations of security science and technology, methods, and algorithms
* Application areas, including critical infrastructures (e.g., communications/IT/cyber, power/energy, water, and transportation; food/infectious diseases, financial networks, supply chain management, etc.)
* Coupled dynamic systems infrastructure interdependencies and dynamics of coupled infrastructures, system-wide risk/threat management, and complex interactive networks (including finance and economics, policy and regulation)
* Regulatory, policy, legal, economic, and business implications
* Management and leadership development (including communication skills, change management, ethics, project management, and conflict management)

The Plan B project is an independent applied investigation on a relevant issue in security technologies or homeland security.
Twin Cities Campus

Security Technologies Minor
Technological Leadership Institute
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
Security Technologies Graduate Program, Technological Leadership Institute, University of Minnesota, 510 West Bank Office Building, 1300 South Second Street, Minneapolis, MN 55454 (612-624-5747; fax: 612-624-7510)
Email: tliss@umn.edu
Website: http://www.tli.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 7
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Security Technologies Graduate Program shapes tomorrow's analytical and risk management policymakers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. Through a multidisciplinary systems approach, the program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. Through elective courses, students choose a learning track in either security systems technologies or security risk management. Students can further specialize through a range of elective courses. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus

Software Engineering M.S.S.E.
Computer Science and Engineering
College of Science and Engineering

Link to a list of faculty for this program.

Contact Information:
MSSE Program, Department of Computer Science and Engineering, College of Science and Engineering, 4-192 Keller Hall, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-1381; fax: 612-625-0572)
Email: msse@cs.umn.edu
Website: http://www.msse.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science in Software Engineering

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in software engineering (M.S.S.E.) program provides a thorough understanding of the fundamental issues related to software development and the software development process. It fosters an awareness of the problems and opportunities associated with software-intensive systems and explains the methods for quickly evaluating, adopting, and taking advantage of emerging technologies. This program introduces emerging technologies and their applications and lays the foundation for lifelong learning and professional development in a rapidly changing field. The M.S.S.E. program is an interdisciplinary program administered by the College of Science and Engineering's Department of Computer Science and Engineering.

The program is offered in a format designed for full-time working professionals. Students take courses one day per week (alternating Fridays and Saturdays) and move through the curriculum as a cohort, taking all classes together for four semesters.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Prospective students should have an undergraduate degree in computer science or a closely related field and a minimum of one year of professional experience working in the software industry. Students with degrees in other fields may be considered for admission based on extensive industrial experience.

Special Application Requirements:
Because the M.S.S.E. program is designed for full-time working professionals, international applicants must hold an H-1B visa.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 30 major credits and null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S.S.E. requires 30 credits. Students take eight core courses, two industrial seminar courses, and two elective courses. The project requirement can be met by a combination of class projects, or by an independent project elective.
**Twin Cities Campus**

**Stream Restoration Science and Engineering Postbaccalaureate Certificate**

Civil Engineering

College of Science and Engineering

Link to a list of faculty for this program.

**Contact Information:**

Stream Restoration Graduate Certificate Program, National Center for Earth-surface Dynamics, Saint Anthony Falls Laboratory, 2 Third Avenue S.E., Minneapolis, MN 55414 (612-624-4606; fax: 612-624-0066)

Email: srsegrad@umn.edu

Website: [http://www.nced.umn.edu/content/certificate-program-stream-restoration-science-and-engineering](http://www.nced.umn.edu/content/certificate-program-stream-restoration-science-and-engineering)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Stream Rest. Science & Engineering PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in stream restoration science and engineering is a three-semester program producing graduates who understand how to blend engineering, physical, biological, and social sciences in prioritizing, designing, implementing, and evaluating stream restoration projects. Two courses, including an introduction to stream restoration and a restoration design experience are required. The remaining courses are chosen from a specified list of relevant courses taught across a number of University departments.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree in a related field from an accredited postsecondary U.S. institution or its foreign equivalent.

In addition to the Graduate School Application Form, students must submit a program application and submit one letter of reference. The SRSE program application form and directions for submission can be found at [www.nced.umn.edu/content/certificate-program-stream-restoration-application-procedure](http://www.nced.umn.edu/content/certificate-program-stream-restoration-application-procedure).

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 3.00 is required for students to remain in good standing.

GEO/CE/EEB 8601 - Introduction to Stream Restoration (3 cr, offered alternative fall terms) covers key background topics and skills involved in stream restoration.

GEO/CE/EEB 8602 - Stream Restoration Practice (2 cr, offered alternative fall terms) is a course in which students participate in a stream restoration design experience.

Students obtaining a degree in either geology and geophysics; civil engineering; or ecology, evolution and behavior should register for these courses under a designator other than their major field. In addition to core courses, students are required to take a minimum of 11 elective credits from four theme areas: river and floodplain science and engineering (3 to 8 cr); river and floodplain ecology (up to 8 cr); water quality (up to 8 cr); water policy and management (up to 4 cr). A full listing of approved electives can be found on the web page http://www.nced.umn.edu/srcp.
Twin Cities Campus
Accountancy M.Acc.
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Department of Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-7511; fax: 612-626-7795)
Email: macct@umn.edu
Website: http://www.carlsonschool.umn.edu/master-accountancy

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Accountancy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.Acc. program offers students a one-year program with a broad selection of graduate courses in accounting, taxation, finance, operations management, and information systems, including master of business taxation (M.B.T.) and M.B.A. courses.

The curriculum has been designed and developed by Carlson School faculty with extensive input and ongoing consultation with executives from the professional community. The ongoing collaborative efforts with the professional community are a key component in the pursuit of the mission for the M.Acc. program. For the students, such efforts ensure relevant, practical, and challenging courses that enhance their professional development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Application to the M.Acc. program requires a baccalaureate degree with a major in accounting (or equivalent) from an accredited U.S. institution (or a foreign equivalent). Students may apply during their senior year, but must complete the baccalaureate degree prior to entering the M.Acc. program.

The undergraduate degree program should include at least 24 semester hours (36 quarter hours) in accounting, including coverage of, but not necessarily separate courses in, financial accounting, intermediate accounting, auditing, taxation, and management accounting; and the student should have completed at least an additional 24 semester hours (36 quarter hours) in business-related or accounting courses.

Special Application Requirements:
Three letters of recommendation from persons qualified to evaluate most recent work and potential for graduate study. Either an in-person, telephone, or e-mail interview with program director, depending on applicant's location. Applicants are considered for admission for fall and spring semesters.

Results of the GMAT are required. Admitted Carlson School of Management undergraduate students are exempt from taking the GMAT.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 12 major credits and 18 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.Acc. program requires 30 credits, including 12 required credits with courses in advanced accounting topics; 8-10 credits in accounting and tax electives; 8-10 credits in general business electives such as operation management science, finance, information and decision sciences, and master of business administration.

Refer to Accounting (ACCT), Tax (MBT), Supply Chain and Operations (SCO), Finance (FINA), Marketing (MKTG) and Information and Decision Sciences (IDSC) in the course section of this catalog or in Twin Cities Courses on the University Catalog website for courses pertaining to the program.
Twin Cities Campus
Business Administration M.B.A.
Graduate Business Career Center
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
M.B.A. Programs Office, 1-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-625-5555; fax: 612-626-7582)
Email: mba@umn.edu
Website: http://www.carlsonschool.umn.edu/MBA

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 57 to 64
- This program does not require summer semesters for timely completion.
- Degree: Master of Business Administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

At the Carlson School, students tailor their education to meet their career objectives. Supported by outstanding faculty, cutting-edge coursework, and extensive networking opportunities, students compile an impressive record of professional achievements even before they graduate.

The master of business administration can be achieved in any one of three ways: through the Full-Time M.B.A., the Part-Time M.B.A., or the Executive M.B.A. The program offers courses on the west bank of the University of Minnesota Twin Cities campus at the Carlson School of Management and in Hanson Hall. Most Full-Time M.B.A. courses meet Monday-Friday between 8 a.m. and 5:25 p.m.; Part-Time M.B.A. courses meet Monday-Thursday evenings from 5:45 to 9:05 p.m. and on Saturdays from 8-11:20 a.m. and 12:30-3:50 p.m.; Executive M.B.A. courses meet predominately on alternate weekends.

Accreditation
This program is accredited by AACSB International.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Applicants must have a bachelor's degree from an accredited college or university.

Please review the Admissions Checklist online for detailed admissions requirements.

Special Application Requirements:
Applicants must have an acceptable score on the GMAT. In addition, international students must have an acceptable score on the Test of English as a Foreign Language (TOEFL), the International Language Testing System (IELTS), or the Pearson Test of English Academic (PTE).

Applicants must submit their test score(s) from the following:
- GMAT
- Pearson Test of English Academic (PTE Academic)

International applicants must submit score(s) from one of the following tests:
- TOEFL
- IELTS

Key to test abbreviations (GMAT, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan C: Plan C requires 33 to 42 major credits and 22 to 24 credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

The Carlson Full-Time M.B.A. program offers an intense curriculum of coordinated core courses that provide a sound foundation in essential managerial disciplines, along with electives customized to fit the student's career path. The Full-Time M.B.A. involves a rigorous time commitment, varying from 30 to 50 hours spent on campus per week, with students expected to complete the 64 credits required for the degree in two years.

The Carlson Part-Time M.B.A. curriculum includes a set of core courses that offer an in-depth study of the foundational and functional areas of business, as well as advanced electives, international study options, and areas of emphasis which allow students to tailor a program to their long-term career goals.

The Carlson Executive M.B.A. is built on a foundation of time-tested business principles. By emphasizing a global perspective, the rigorous curriculum helps students develop a deeper understanding of theory and practice. Each class moves through the program together as a cohort, following set schedules. From orientation to graduation, it takes about 21 months to complete the program. Classes are held Fridays and Saturdays, predominately on alternate weekends, and do not meet during the summer.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

Full-Time Master of Business Administration

The Carlson Full-Time M.B.A. program offers an intense curriculum that gives students a distinct edge. They start by taking coordinated core courses that provide a sound foundation in essential managerial disciplines, while at the same time, customizing their education to fit their career paths. The full-time program involves a rigorous time commitment. While the amount of time spent on campus varies from 30-50 hours per week, all students are expected to complete the degree in two years with 64 credits.

Full-Time M.B.A. Core Requirements

- MBA 6300 - Strategic Management (3 cr)
- MBA 6150 - Managerial Communications (1 cr)
- MBA 6120 - Data Analysis and Statistics (3 cr)
- MBA 6030 - Financial Accounting (3 credits)
- MBA 6220 - Operations Management (3 cr)
- MBA 6230 - Financial Management (3 cr)
- MBA 6210 - Marketing Management (3 cr)
- MBA 6235 - Managerial Accounting (2 cr)
- MBA 6110 - Management and Organizational Behavior (2 cr)
- MBA 6140 - Managerial Economics (2 cr)
- MBA 6240 - Information Technology Management (2 cr)
- MBA 6315 - Business Ethics (2 cr)
- IBUS 6400 - Global Discovery (3 cr)

Carlson Enterprise (10 credits)

Electives (22 credits)

Part-Time Master of Business Administration

The Carlson Part-Time M.B.A. curriculum includes core courses that offer an in-depth study of the foundational and functional areas of business. Advanced electives, international study options, and areas of emphasis allow students to tailor a program that meets their long-term career goals. To graduate, students must earn 48-57 credits. Up to 9 credits of core courses may be waived based on prior academic coursework.
Part-Time M.B.A. Core Requirements in Recommended Sequence
MBA 6300 - Strategic Management (3 cr)
MBA 6120 - Data Analysis and Statistics (3 cr)
MBA 6030 - Financial Accounting (3 cr)
MBA 6220 - Operations Management (3 cr)
MBA 6230 - Financial Management (3 cr)
MBA 6210 - Marketing Management (3 cr)
MBA 6035 - Managerial Accounting (3 cr)
MBA 6110 - Management and Organizational Behavior (2 cr)

Information Technology Management Coursework (2 credits)
Choose 1 of the following:
IDSC 6040 - Information Technology Management (2 cr)
IDSC 6050 - Information Technology and Solutions (2 cr)

Economics Coursework (2-4 credits)
Choose 1 of the following:
MBA 6140 - Managerial Economics (2 cr)
FINA 6341 - World Economy (4 cr)

Ethics Coursework (2 credits)
MBA 6315 - Business Ethics (2 cr)

International Experience (4 credits)
All students are required to complete international course work or participate in an experiential learning abroad program.

Elective Courses
After completion of the core courses, M.B.A. students pursue a number of elective courses to reach the 48-57 credits required for degree completion. Elective courses are chosen from a broad range of department offerings.

Carlson Executive Master of Business Administration
The Carlson Executive M.B.A. is built on a foundation of time-tested business principles. By emphasizing a global perspective, the rigorous curriculum helps students develop a deeper understanding of theory and practice. Each class moves through the program together as a cohort, following set schedules. From orientation to graduation, it takes about 21 months to complete the program. Classes are held Fridays and Saturdays, predominately on alternate weekends, 7:30 a.m. to 4:30 p.m., and do not meet during the summer.

China Executive M.B.A.

Full-time Dual Degree
Juris Doctor/Master of Business Administration

Hamline Law/M.B.A. Dual Degree

Doctor of Medicine/Master of Business Administration

Master of Healthcare Administration/Master of Business Administration

Master of Public Health/Master of Business Administration

Vienna Masters of Business Administration

Vienna
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.
Twin Cities Campus

Business Administration Minor
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Ph.D. Program in Business Administration, Carlson School of Management, Suite 4-205, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-0875 or 612-624-5065; fax 612-624-8221)
Email: brons003@umn.edu
Website: http://www.carlsonschool.umn.edu/phd-BA

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 16
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. Program in Business Administration offers full-time advanced graduate education for students seeking academic placement at leading universities or research-oriented positions in business or government. The program is for individuals who have the intellectual capacity for advanced study, enjoy independent research and analytical thinking, and who wish to master a discipline within business administration.

Students working toward a doctoral minor within the program complete a cohesive program of study in one of six areas of specialization: accounting; finance; information and decision sciences (including the management information systems and decision science subfields); marketing; supply chain and operations; and strategic management and organization (covering the subfields of strategy, organizational behavior, and international management-entrepreneurship).

Accreditation
This program is accredited by AACSB International

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

For a doctoral minor, students must complete a cohesive program of at least 16 credits (minimum of four courses, preferably at the Ph.D. level) of graduate work in one of the six business administration areas of concentration. This program of study is developed in consultation with the Ph.D. coordinator for the area of concentration chosen for the minor.
Twin Cities Campus
Business Administration Ph.D.
Curtis L. Carlson School of Management - Adm
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Carlson School of Management, Business Administration Ph.D. Program, Suite 4-205, 321 19th Avenue South, Minneapolis, MN 55455
(612-624-0875; fax: 612-624-8221)
Email: brons003@umn.edu
Website: http://www.carlsonschool.umn.edu/phd-BA

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program offers full-time advanced graduate education for students seeking academic placement at leading universities or research-oriented positions in business or government. The program is for individuals who have the intellectual capacity for advanced study, enjoy independent research and analytical thinking, and who wish to master a discipline within business administration.

Students choose to concentrate in one of six areas of specialization: accounting; finance; information and decision sciences (including the management information systems and decision science subfields); marketing; supply chain and operations; and strategic management and organization (covering the subfields of strategy, organizational behavior, and international management-entrepreneurship).

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have completed a four-year undergraduate degree in any relevant field of study.

Admission depends on the applicants grades, test scores (GMAT or GRE), and strength of both the letters of recommendation and the statement of purpose.

Preferred test scores are 650 or above on the GMAT, 1380 combined on the verbal and quantitative sections of the GRE General test, or 320 total on revised GRE general test.s

Special Application Requirements:
Applicants should submit to the Carlson School Ph.D. Program Office the following items: (1) an official copy of the GMAT or GRE from a test taken no more than five years prior to application to the Ph.D. Program in Business Administration; and (2) official TOEFL or IELTS scores (international applicants only) from a test taken within the last two years. All other application materials (official application, application fee, statement of purpose, resume/vita, three letters of recommendation and transcripts should be entered directly or uploaded into the ApplyYourself online application system. The application deadline is December 31 each year for fall admission consideration only. Applications are evaluated on a rolling basis beginning late January and continuing through April 15.

Applicants must submit their test score(s) from the following:
- GRE
Program Requirements

24 credits are required in the major.
16 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.30 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Degree requirements vary by area of concentration. Each student's coursework is determined in consultation with an adviser, but in general, a degree program includes courses in the field of specialization, in research methodology, and in a minor or supporting program. Students in all areas must complete at least 40 semester credits of graduate coursework. While some areas may require a first-year examination or presentation, all areas require a written and oral preliminary examination at the end of the second year, as well as a research paper requirement and dissertation proposal defense.

Areas of Concentration

Accounting

This area of concentration requires a minimum of 12 credits from accounting Ph.D. seminars and a total of at least 40 credits of degree program coursework. Students may take a minimum of 16 credits in a minor area outside the Carlson School of Management, or at least 16 credits in supporting programs taken across fields relevant to their research interests, e.g. finance, economics, statistics, etc. Students also must choose to work under one of two research paradigms: analytical or empirical.

-OR-

Finance

The Ph.D. program views finance as a subfield of applied economics. Students achieve a strong foundation in economic theory and empirical methods, while taking required finance seminars and supporting coursework. Forty credits are required to move to the prelim stage. Supporting coursework typically consists of a sequence in micro-economic theory and econometric analysis. In addition, students complete at least 8 elective credits in fields such as economics, statistics, and accounting.

FINA 8802 - Theory of Capital Markets I: Discrete Time (2.0 cr)
FINA 8803 - Theory of Capital Markets II: Continuous Time (2.0 cr)
FINA 8812 - Corporate Finance I (2.0 cr)
FINA 8813 - Corporate Finance II (2.0 cr)
FINA 8822 - Empirical Methods in Finance (2.0 cr)
FINA 8823 - Empirical Corporate Finance (2.0 cr)

-OR-

Information and Decision Sciences

Students are required to complete at least 46 semester credits of degree program coursework, including 14 credits of IDSC Ph.D. seminars, 8 credits of research methodology, and 16 credits of supporting or minor field coursework. Students are required to take IDSC 8511, 8521, 8711, and both section 1 and 2 of 8801. Research methods courses that students can take include regression, experimental design, multivariate statistics, and econometric modeling.
IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (4.0 cr)
IDSC 8521 - System Development (2.0 cr)
IDSC 8711 - Cognitive Science (4.0 cr)
IDSC 8801 - Research Seminar in Information and Decision Sciences (2.0 cr)

-OR-

Marketing
Students are required to complete all scheduled marketing Ph.D. seminars plus a minimum of 12 credits of research methodology courses outside the department. Minor or supporting program coursework is determined by the student and adviser, and must total at least 16 credits (these credits could overlap with the research methods coursework requirements).

-OR-

Supply Chain and Operations
This area of concentration requires seven (21 credits) supply chain and operations (SCO) Ph.D. seminars (SCO 8651, 8652, 8711, 8721, 8735, 8745, and 8755) and a minimum of 40 credits of degree program coursework. Beyond the 21 credits, students take at least 16 credits of supporting or minor coursework, which should include relevant methods coursework.

SCO 8651 - Experimental Design (3.0 cr)
SCO 8652 - Regression Analysis (3.0 cr)
SCO 8711 - Research in Operations Strategy (3.0 cr)
SCO 8721 - Management of Technological Operations (3.0 cr)
SCO 8735 - Supply Chain Management (3.0 cr)
SCO 8745 - Research on Quality Management (3.0 cr)
SCO 8755 - Behavioral Operations (3.0 cr)

-OR-

Strategic Management and Organization
Students are required to take at least five core MGMT Ph.D. seminars (20 cr), including at least one course each from the areas of strategy, organization studies, and international management-entrepreneurship. As part of the supporting field requirement, students must take a strong methods sequence, which can be tailored to individual student needs, as well as coursework that leads to a good understanding of the fundamentals of a specific external discipline (e.g., economics, sociology, etc).
Twin Cities Campus
Business Taxation M.B.T.
Accounting
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Department of Accounting, 3-110 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-7511; fax: 612-626-7795)
Email: mbt@umn.edu
Website: http://www.carlsonschool.umn.edu/master-business-taxation

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Business Taxation

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program helps students acquire a conceptual understanding of taxation and develop technical competence in the practical application of the rules of taxation in business and personal decision making.

Offered only in the evenings, the program accommodates both part-time and full-time students. Historically, more than 80 percent of students are employed in the business community and take courses on a part-time basis. Graduates of the program possess a common body of knowledge in traditional business areas such as accounting, finance, and marketing. In addition, courses in business, government, and economic tax policy provide breadth to complement the technical tax courses that make up the majority of credits. Students enrolled part-time can expect to complete the program in approximately two to three years. Students enrolled full-time can complete the program in a shorter period.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Results of the GMAT or the Law School Admission Test (LSAT) are required. Applicants are considered for admission for fall, spring, and summer terms.

The results from one of the following English language tests are required: TOEFL, IELTS, MELAB, or MN Batt.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 18 to 30 major credits and 12 credits outside the major. The is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.B.T. requires 30 credits, including 12 required credits in specified courses and 18 elective credits in accounting, taxation, and business law. ACCT 2050, BLAW 3058, and ACCT 5135 or equivalent courses are prerequisites to taking M.B.T. courses. Students without these prerequisites may be admitted to the program, but these prerequisites must be completed before M.B.T. courses are taken. Usually students who enter the program with business degrees have completed most, if not all, of this coursework.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 22, 2012
Courses--Refer to Master of Business Taxation (MBT) in the course section of this catalog or in Twin Cities Courses on the University Catalog website for courses pertaining to the program.
Human resources and industrial relations (HRIR) studies the employment relationship. Teaching and research are guided by the belief that the employment relationship must be investigated through the lenses of different disciplines using systems thinking. The professional master of arts degree is for individuals interested in private and public sector careers in human resource management, labor relations, and related fields.

The curriculum is structured around the core HRIR areas of staffing, training, and development; compensation and benefits; and labor relations and collective bargaining. It is rooted in key concepts from the social and behavioral sciences and business, such as organizational behavior and theory, labor market analysis, leadership, and strategy. Quantitative analysis of employment problems and issues are also included. Master's candidates are encouraged to choose electives to support a generalist orientation with key business knowledge.

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Entering students have undergraduate degrees in many subjects ranging from the fine arts to engineering. The most common undergraduate majors of incoming students are in the areas of psychology, business, economics, human resource development, and speech communication.

An undergraduate course in microeconomics must be completed with a grade of at least C before enrolling.

Special Application Requirements:
Applicants must submit three letters of recommendation, a complete set of transcripts, a résumé, a personal statement and GRE or GMAT scores. Applicants whose native language is not English must also submit score results from the TOEFL or IELTS.

Students may enter the full-time M.A. program in the fall and the part-time M.A. program in either the fall or spring semesters. The application deadlines are June 15 for fall admission and October 15 for spring admission. The M.A. financial aid deadline for fall semester is February 1. Applicants are encouraged to apply early.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
  - IELTS
  - Total Score: 7
  - MELAB

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 40 major credits and 8 credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.A. is offered as a coursework-only program with day (full-time) and evening (part-time) options. Major coursework includes 8001, 8011, 8031, 8141/8241, 8051, 8071, 8101, and elective credits in HRIR. At least 8 credits must be earned in related fields. Commonly selected related fields include accounting, finance, operations management, managerial communications, economics, human resource development, law, psychology, public affairs, sociology, and research methods.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Evening
Human Resources and Industrial Relations Minor

Industrial Relations Center
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Department of Human Resources and Industrial Relations, Suite 3-300, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-5704; fax: 612-624-8360)
Email: hrirgrad@umn.edu
Website: http://www.carlsonschool.umn.edu/phd-human-resources/index.aspx

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human resources and industrial relations (HRIR) studies the employment relationship. Teaching and research are guided by the belief that the employment relationship must be investigated through the lenses of different disciplines using systems thinking. The doctoral degree is a research degree for individuals interested in academic careers.

The curriculum is designed to expose students to a multidisciplinary view of work-related research in terms of research questions, theory, methods, and analytic approaches, while allowing for in-depth and focused research within particular domains based on faculty expertise and student interest. The curriculum is rooted in key theorizing from the social and behavioral sciences and business, such as industrial-organizational psychology, organizational behavior, personnel and organizational economics, and industrial relations; and is complemented by intensive coursework in research methods and by seminars that focus on specific areas of applied research.

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A doctoral minor requires completion of HRIR 8801, 8802, and 8803; and at least 2 credits of HRIR 8820.
Twin Cities Campus
Human Resources and Industrial Relations Ph.D.
Industrial Relations Center
Curtis L. Carlson School of Management

Link to a list of faculty for this program.

Contact Information:
Department of Human Resources and Industrial Relations, Suite 3-300, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-5704; fax: 612-624-8360)
Email: hrirgrad@umn.edu
Website: http://www.carlsonschool.umn.edu/phd-human-resources/index.aspx

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Human resources and industrial relations (HRIR) studies the employment relationship. Teaching and research are guided by the belief that the employment relationship must be investigated through the lenses of different disciplines using systems thinking. The doctoral degree is a research degree for individuals interested in academic careers.

The curriculum is designed to expose students to a multidisciplinary view of work-related research in terms of research questions, theory, methods, and analytic approaches, while allowing for in-depth and focused research within particular domains based on faculty expertise and student interest. The curriculum is rooted in key theorizing from the social and behavioral sciences and business, such as industrial-organizational psychology, organizational behavior, personnel and organizational economics, and industrial relations; and is complemented by intensive coursework in research methods and by seminars that focus on specific areas of applied research.

Accreditation
This program is accredited by Association to Advance Collegiate Schools of Business (AACSB).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 580
• IELTS
  - Total Score: 7
• MELAB

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
18 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must complete at least 12 credits of research methods (most complete 18 or more credits), a 12-credit major core sequence, and at least 8 credits of human resources and industrial relations special topics seminars. Specific coursework is planned in consultation with the student's adviser and the director of graduate studies. Students must pass subject-related and research methods preliminary exams.
Twin Cities Campus
Dental Hygiene M.D.H.
Dentistry Primary Care Administration
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
Division of Dental Hygiene, 9-372 Moos Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612-625-9121; fax: 612-625-1605)
Email: jaliv003@umn.edu
Website: http://www.dentistry.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 37
- This program requires summer semesters for timely completion.
- Degree: Master of Dental Hygiene

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Master of Dental Hygiene Program prepares leaders in the profession for practice, research, the healthcare industry, and academia.

The curriculum provides meaningful academic experiences for each graduate student based on his/her career goals and interest. Courses in the management track will provide students with knowledge and skills necessary for careers in the healthcare industry such as sales, marketing and professional relations management, management of large dental clinics, practice management consulting, and entrepreneurship.

Courses in the education track will provide students with the knowledge and skills to teach didactic, clinic, and laboratory courses in the dental hygiene programs; conduct research; and assume administrative positions.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Baccalaureate or associate degree in dental hygiene from an accredited U.S. institution or foreign equivalent.

The Division of Dental Hygiene is committed to the philosophy that high-level clinical proficiency is essential for dental hygiene educators; knowledge and competency in the art and science of dental hygiene practice is requisite for the graduate of the Master of Dental Hygiene Program.

Special Application Requirements:
Applicants must submit directly to the Admissions Committee a typed essay including short and long term goals and an explanation of why an advanced degree is of interest, a current resume including evidence of leadership and dental hygiene clinic experience, and three letters of reference. Application deadline is February 1.

Applicants must submit their test score(s) from the following:
• GMAT
  - Total score: 500

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
Key to test abbreviations (GMAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C**: Plan C requires 37 major credits and null credits outside the major. There is no final exam.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Students in both the management and dental hygiene education tracks will participate in the following four core courses: instructional strategies, research methods in health sciences, administrative leadership and professional development, and biostatistics.

In addition to the core courses, management track students will complete the following courses: managerial accounting, marketing management, operations management, financial management, and electives chosen from the MBA and MILI curricula.

Dental hygiene education track students will participate in the following courses: the discipline of dental hygiene, curriculum and course development, dental hygiene supervised student teaching, dental hygiene clinic administration, web-based teaching/learning strategies, and principles of educational and psychological measurement.

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Dental Hygiene Education**
Courses in the dental hygiene education track provide students with the knowledge and skills to teach didactic, clinic, and laboratory courses in dental hygiene programs; conduct research; and assume administrative positions.

**Management**
Courses in the management track provide students with the knowledge and skills necessary for healthcare industry careers such as sales, marketing and professional relations management, management of large dental clinics, practice management consulting, and entrepreneurship.
Twin Cities Campus

Dental Therapy M.D.T.
Dentistry Primary Care Administration
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
Division of Dental Therapy, 9-436 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455
(612-625-4310; fax: 612-626-6096)
Email: atki0094@umn.edu
Website: http://www.dentistry.umn.edu/programs_admissions/DentalTherapyPrograms/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 91
- This program requires summer semesters for timely completion.
- Degree: Master of Dental Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.D.T. program blends a strong dental therapy education with the study of the biological, behavioral, and social sciences. It provides the didactic, laboratory, and clinical experiences required for the assessment and treatment of specified dental procedures. Dental therapy students learn alongside the dental and dental hygiene students with whom they will work with after graduation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor of science or bachelor of arts degree.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 92
  - Internet Based - Writing Score: 20
  - Internet Based - Reading Score: 20

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan C: Plan C requires 91 major credits and null credits outside the major. The is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Required courses
- DT 5210 - Head and Neck Anatomy (1.0 cr)
- DT 5330 - Clinical Application I (3.0 cr)
- DT 5429 - Introduction to Psychomotor Skill Development (1.0 cr)
DT 5430 - Oral Anatomy (2.0 cr)
DT 5431 - Oral Anatomy Laboratory (3.0 cr)
DT 5521 - Foundations of Interprofessional Professionalism, Communication, and Collaboration (1.0 cr)
DT 5212 - Local Anesthesia and Pain Management (2.0 cr)
DT 5230 - Oral and Maxillofacial Radiology (2.0 cr)
DT 5250 - Oral Histology and Embryology (2.0 cr)
DT 5331 - Provider Patient Relationships (2.0 cr)
DT 5332 - Cariology and Applied Nutrition in Dental Therapy Care (3.0 cr)
DT 5410 - Applied Dental Biomaterials (1.0 cr)
DT 5110 - Periodontology I (1.0 cr)
DT 5130 - Preclinical Pediatric Dentistry (2.0 cr)
DT 5211 - Applied Pharmacology for the Dental Therapist (2.0 cr)
DT 5232 - Oral and Maxillofacial Radiology Preclinical Laboratory (0.0 cr)
DT 5251 - General and Oral Pathology (1.0 cr)
DT 5432 - Operative Dentistry I (2.0 cr)
DT 5433 - Operative Dentistry I Pre-Clinic Laboratory (2.0 cr)
DT 5140 - Preventive Pediatric Dental Clinic (1.0 cr)
DT 5231 - Oral and Maxillofacial Radiology II (1.0 cr)
DT 5333 - Dental Public Health and Academic Service Learning I (3.0 cr)
DT 5334W - Dental Therapy Care Process: Clinical Application II [WI] (4.0 cr)
DT 5336 - Ethics and Jurisprudence for the Dental Therapist (1.0 cr)
DT 5434 - Operative Dentistry II Lecture (1.0 cr)
DT 5471 - Prosthodontic Topics for Dental Therapy (2.0 cr)
DT 5335 - Dental Practice Management (2.0 cr)
DT 5337 - Dental Public Health and Service Learning II (2.0 cr)
DT 5338W - Research Methods in Dental Therapy [WI] (3.0 cr)
DT 5460 - Essentials of Clinical Care II for the Dental Therapist (5.0 - 10.0 cr)
DT 5141 - Clinical Pediatric Dentistry III (2.0 cr)
DT 5241 - Oral Radiology Clinic II (1.0 cr)
DT 5320 - Comprehensive Care Clinic (4.0 cr)
DT 5361 - Outreach Experiences I (2.0 cr)
DT 5443 - Operative Clinic III (4.0 cr)
DT 5435 - Operative Dentistry II for the Dental Therapist, Lab (1.0 cr)
Twin Cities Campus
Dentistry M.S.
School of Dentistry - Adm
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
M.S.-Dentistry Program, 15-136 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN  55455 (612-624-7934; fax: 612-624-0027)
Email: wegne009@umn.edu
Website: http://www.dentistry.umn.edu

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program requires summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. program in dentistry prepares dentists with clinical expertise for positions of leadership in education, research, and program administration in the oral health field. A multidisciplinary faculty of dental educators, researchers, and clinicians teach the program, which is housed in the School of Dentistry. All students complete core coursework in teaching and evaluation of dentistry, research methods, and healthcare administration. Additional advanced coursework is offered in these same focus areas, as well as in selected clinical and oral science topics with multidisciplinary impact, including conscious sedation, craniofacial pain, geriatrics, oral biology, oral medicine and radiology, oral pathology, practice administration, and psychology. Students have flexibility in planning individualized programs to accommodate their specific areas of interest, and courses from other disciplines may be included for credit in the major area.

Students enrolled in an advanced clinical dental training program may be admitted to the dentistry graduate program for concurrent study, but must carefully plan their curriculum with their faculty adviser and the director of graduate studies so that their residency and M.S. programs are appropriately integrated and satisfy Graduate School registration requirements. Programs in the School of Dentistry that may enroll students for the M.S. degree include endodontics, orthodontics, pediatric dentistry, periodontics, and prosthodontics and TMJ disorders/orofacial pain.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

DDS/DMD or equivalent from accredited US institution or recognized foreign school. Clinical residency enrollment and 3.0 GPA or rank in top quarter of graduating professional school class preferred.

 Applicants must submit three letters of recommendation from individuals familiar with their academic capabilities. Also required is a brief essay (under 500 words) which relates the applicant's career goals to the goals of the program. Applications are received and reviewed throughout the year. Students may enter the program in any semester at the discretion of program faculty.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 80
  - Paper Based - Total Score: 600
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students pursuing either Plan A or Plan B must complete a minimum of 14 credits in the major, including four core courses in teaching and evaluation in dentistry, basic research methodology, introductory biostatistics, and fundamentals of health care administration. Courses from other disciplines may also be taken for credit in the major with the approval of the student's adviser and the director of graduate studies. All students must complete at least 6 credits outside the major field (either as a minor or related field credits) as well as program requirements for training in the Responsible Conduct of Research.
Twin Cities Campus
Oral Biology M.S.
School of Dentistry
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
School of Dentistry, 17-164 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455 (612-625-5984; fax: 612-626-2651)
Email: oralbio@umn.edu
Website: http://www.oralbiology.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary Oral Biology Program is offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. It gives students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics; epithelial biology and carcinogenesis; microbiology and immunology; sensory neuroscience; and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest; courses from other disciplines may be included as part of the major.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. in oral biology is intended for individuals who are currently involved in a research laboratory or program and are seeking to increase their scientific perspectives. This program generally requires a minimum of two years and a total of 30 credits. Students must complete the Plan A (with thesis) program, which requires a minimum of 14 credits in the major, including 4 credits of oral biology topics courses (8021-8028). Courses in the major may be taken from other disciplines with the approval of the adviser and the director of graduate studies. Registration and participation in the oral biology student seminar series (8030) is required each semester. Students must also complete a minor or related field program in an associated nonclinical discipline (minimum 6 cr) and 10 thesis credits. Students must conform to the Graduate School’s GPA requirements for master’s degree students.
Twin Cities Campus
Oral Biology Minor
School of Dentistry - Adm
School of Dentistry

Link to a list of faculty for this program.

Contact Information:
School of Dentistry, 17-164 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455 (612-625-5984; fax 612-626-2651)
Email: oralbio@umn.edu
Website: http://www.oralbiology.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary Oral Biology program is offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. It gives students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics; epithelial biology and carcinogenesis; microbiology and immunology; sensory neuroscience; and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor in oral biology consists of 6 credits, at least two advanced courses in oral biology, and other coursework determined in consultation with the director of graduate studies.

A Ph.D. minor in oral biology consists of 12 credits, at least two advanced courses in oral biology, and other coursework in consultation with the director of graduate studies.
Twin Cities Campus
Oral Biology Ph.D.
School of Dentistry - Adm

School of Dentistry

Link to a list of faculty for this program.

Contact Information:
School of Dentistry, 17-164 Moos Tower, 515 Delaware Street, S.E., Minneapolis, MN 55455 (612-625-5984; fax: 612-626-2651)
Email: oralbio@umn.edu
Website: http://www.oralbiology.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 59 to 61
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The interdisciplinary Graduate Program in Oral Biology is offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. It gives students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics; epithelial biology and carcinogenesis; microbiology and immunology; sensory neuroscience; and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest; courses from other disciplines may be included as part of the major.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must submit 1) scores from the General Test of the GRE, 2) three letters of recommendation from persons who can comment authoritatively about the applicant's potential for a research and academic career, 3) a clearly written personal statement (one to two pages) describing career goals, 4) an essay describing research aspirations (one to two pages), and 5) a résumé highlighting research experience and accomplishments. For D.D.S./Ph.D. applicants who are U.S. citizens, resident aliens, or Canadian citizens, U.S. or Canadian Dental Admission Test (DAT) scores at or above the national average will be accepted in lieu of the GRE. Applicants who have graduated from U.S. or Canadian dental or medical schools within three years of their application to the Ph.D. program may request that previous U.S. or Canadian DAT or MCAT scores be considered in lieu of the GRE.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 600
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 25
  - Internet Based - Reading Score: 25
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements
23 to 25 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. in oral biology is a four-year program. The first year consists primarily of a core curriculum specifically chosen for each student. The curriculum provides students with a working knowledge of the major concepts and research paradigms in their scientific area, a working vocabulary, and the basis for continued learning. During months 13-15, the student writes a major research thesis proposal, which is defended orally by month 16. The oral exam must capture the student's ability to think critically about the field and the application of logical experimental designs to test hypotheses and answer questions. Months 17-45 will focus on thesis research. Months 45-48 are used for dissertation writing. Students must also present a public seminar describing their thesis research (which is attended by the final oral exam committee) no later than 6 months before defense of the thesis. The dissertation is defended in month 48. Students are expected to complete a core curriculum of 23-25 credits including 8 credits of oral biology topics courses (8021-8028) and continued participation in the oral biology student seminar series (8030). Courses may be selected from departments and programs outside the oral biology program with the approval of the adviser and director of graduate studies. A minor (minimum 12 cr) in a nonclinical discipline and 24 thesis credits are also required. A cumulative GPA of at least 3.00 in both the major and minor is required. Only grades of A or B are acceptable in the core courses.

Joint- or Dual-degree Coursework: D.D.S./Ph.D. students typically complete all requirements for the Ph.D. program, except for the thesis defense, before entering the D.D.S. program. The Ph.D. and D.D.S. degrees may be awarded concurrently or separately.
Biochemistry, Molecular Biology and Biophysics M.S.
Biochemistry, Molecular Biology, & Biophysics TCBS
Graduate School

Link to a list of faculty for this program.

Contact Information:
Director of Graduate Studies, Department of Biochemistry, Molecular Biology and Biophysics, 6-155 Jackson Hall, 321 Church St. SE, Minneapolis, MN 55455, 612-625-5179, 612-625-2163.
Email: bmbbgp@umn.edu
Website: http://www.cbs.umn.edu/BMBB/graduate.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The biochemistry, molecular biology, and biophysics program focuses on an explanation at the molecular level of the structures and processes that occur in living organisms. In the broadest sense, the program encompasses the chemistry, physics, and biology of living systems. Included is the study of the structure and function of biomolecules (proteins, nucleic acids, lipids, and carbohydrates), enzyme catalysis, metabolic pathways, bioenergetics, and the biochemical nature of genetic information storage and transmission, as well as the control, regulation, and integration of these processes. The program has four areas of emphasis: regulatory biochemistry, molecular biology, microbial biotechnology, and molecular biophysics. All students are expected to demonstrate a minimum level of competence in these areas but emphasize that area most related to their thesis project. The program involves faculty from the Department of Biochemistry, Molecular Biology, and Biophysics, as well as many faculty members from several other departments in the College of Biological Sciences, Medical School, Institute of Technology, and College of Veterinary Medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program is flexible enough to accommodate students with a wide variety of educational backgrounds. Applications from students with undergraduate or master's degrees in the biological, chemical, or physical sciences are encouraged. Recommended academic preparation includes one year each of calculus, organic chemistry, and basic biology, including biochemistry and genetics. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study. Students are admitted only to the Ph.D. program.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The recommended date for receipt of completed applications is January 2. Completed files are reviewed between January and February.

Graduate studies typically begin fall semester. Information about an early start program involving participation in laboratory research beginning on July 1 may be obtained from the Director of Graduate Studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Requirements for the M.S. degree include core coursework and laboratory experiences taken by all students, followed by one or more courses in one of the areas of specialization. In addition, all students are expected to participate in the seminar involving student reports on current literature and research. A thesis based on original laboratory research is required.
Biochemistry, Molecular Biology and Biophysics Minor

Twin Cities Campus

Biochemistry, Molecular Biology, & Biophysics TCBS

Graduate School

Link to a list of faculty for this program.

Contact Information:
6-155 Jackson Hall, 321 Church St. SE, Minneapolis, MN 55455, 612-625-5179, 612-625-2163.
Email: bmbbgp@umn.edu
Website: http://www.cbs.umn.edu/BMBB/graduate.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The biochemistry, molecular biology, and biophysics program focuses on an explanation at the molecular level of the structures and processes that occur in living organisms. In the broadest sense, the program encompasses the chemistry, physics, and biology of living systems. Included is the study of the structure and function of biomolecules (proteins, nucleic acids, lipids, and carbohydrates), enzyme catalysis, metabolic pathways, bioenergetics, and the biochemical nature of genetic information storage and transmission, as well as the control, regulation, and integration of these processes. The program has four areas of emphasis: regulatory biochemistry, molecular biology, microbial biotechnology, and molecular biophysics. All students are expected to demonstrate a minimum level of competence in these areas but emphasize that area most related to their thesis project. The program involves faculty from the Department of Biochemistry, Molecular Biology, and Biophysics, as well as many faculty members from several other departments in the College of Biological Sciences, Medical School, Institute of Technology, and College of Veterinary Medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires 6 credits of general graduate level coursework which may be selected (with approval by the director of graduate studies) from the 5xxx and 8xxx courses offered by the program. BIOC 4331 and 4332 may also be considered if approved by the directors of graduate studies of both the major and minor programs. A doctoral minor requires BIOC 8002 (3 cr) plus additional courses (9 cr), approved by the director of graduate studies, to meet the minimum requirement of 12 credits total. In extenuating cases, students may petition the director of graduate studies for substitution of a required course.
Biochemistry, Molecular Biology and Biophysics Ph.D.

Biochemistry, Molecular Biology, & Biophysics TCBS

Graduate School

Link to a list of faculty for this program.

Contact Information:
Department of Biochemistry, Molecular Biology and Biophysics, 6-155 Jackson Hall, 321 Church St. SE, Minneapolis, MN 55455, 612-625-5179, 612-625-2163.
Email: bmbbgp@umn.edu
Website: http://www.cbs.umn.edu/BMBB/graduate.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 45
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The biochemistry, molecular biology, and biophysics program focuses on an explanation at the molecular level of the structures and processes that occur in living organisms. In the broadest sense, the program encompasses the chemistry, physics, and biology of living systems. Included is the study of the structure and function of biomolecules (proteins, nucleic acids, lipids, and carbohydrates), enzyme catalysis, metabolic pathways, bioenergetics, and the biochemical nature of genetic information storage and transmission, as well as the control, regulation, and integration of these processes. The program has four areas of emphasis: regulatory biochemistry, molecular biology, microbial biotechnology, and molecular biophysics. All students are expected to demonstrate a minimum level of competence in these areas but emphasize that area most related to their thesis project. The program involves faculty from the Department of Biochemistry, Molecular Biology, and Biophysics, as well as many faculty members from several other departments in the College of Biological Sciences, Medical School, Institute of Technology, and College of Veterinary Medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program is flexible enough to accommodate students with a wide variety of educational backgrounds. Applications from students with undergraduate or master's degrees in the biological, chemical, or physical sciences are encouraged. Recommended academic preparation includes one year each of calculus, organic chemistry, and basic biology, including biochemistry and genetics. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study. Students are admitted only to the Ph.D. program.

Special Application Requirements:
Applicants must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The recommended date for receipt of completed applications is December 15. Completed files are reviewed between January and February. Graduate studies typically begin fall semester. Information about an early start program involving participation in laboratory research beginning on July 1 may be obtained from the Director of Graduate Studies.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
9 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

Requirements for the doctoral degree include core coursework and laboratory experiences taken by all students, followed by one or more courses in one of the areas of specialization. In addition, all students are expected to participate in two continuing series of seminars: one involving student reports on current literature and research and the other involving prominent national and international scientists.
Twin Cities Campus
Bioethics M.A.
Bioethics, Center for
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Bioethics, University of Minnesota, Suite N504 Boynton, 410 Church Street S.E., Minneapolis, MN 55455 (612-624-9440; fax: 612-624-9108)
Email: bthxed@umn.edu
Website: http://www.bioethics.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Center for Bioethics offers a master's degree and a graduate minor in bioethics. Although bioethics has deep roots in the discipline of philosophy and maintains strong ties to that discipline, it has grown to be an essentially interdisciplinary field. Similarly, over its 25-plus year history, the Center for Bioethics has become a well-established and internationally recognized interdisciplinary center. This truly interdisciplinary approach is endorsed by the University, since the center is a program that spans the Academic Health Center and interacts throughout the University. The center's faculty represents a broad array of fields, with backgrounds in philosophy, medicine, nursing, public health, health policy, law, education, family social science, and religious studies. The faculty has expertise in clinical ethics, research ethics, and ethics in health policy. The center embraces a robust mission of public engagement. Its faculty influences policy nationally and internationally on a number of issues including decision-making at end of life, research on human subjects, ethics and genetic technologies, and public health preparedness.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree is required for admission.

Special Application Requirements:
Transcripts of all postsecondary academic work, a personal statement, a writing sample (preferably on a topic in bioethics), a description of research or relevant work experience, a C.V. or résumé, and at least three letters of reference are required. Applicants may also submit a statement on "Extenuating Circumstances" and "Diversity." See program website for more details.

Applications begin to be received on the first day of fall semester; with offers of admission being extended on a rolling basis. Preference will be given to early applicants. Application deadline is April 30. Admissions decisions are made on a rolling basis; students as early in the application timeline as possible. Students are admitted for matriculation in fall semester only.

Students are encouraged to link their degree in bioethics to a degree in a related field (either before entering the bioethics M.A. program or at the same time). Given the fundamentally interdisciplinary nature of bioethics, prospective students are advised against viewing the bioethics M.A. as a stand-alone degree that prepares them for career placement. This model prompts students to acquire a firm disciplinary grounding as well as interdisciplinary bioethics expertise—a practice that best prepares students for bioethics-related career placement. Thus, the admissions process will give preference to students who have already earned or are in the process of earning an advanced degree in a related field, although this will not strictly be required for admission.

Applicants must submit their test score(s) from the following:
- GRE
- MCAT
- LSAT

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

Key to test abbreviations (GRE, MCAT, LSAT, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students in this Plan A (thesis-based) master's degree program are required to take at least 20 credits of courses: 9 credits of required courses including one course fulfilling an area requirement, 5 credits of bioethics electives, and 6 credits of electives from a related field. Details about curriculum can be found at www.ahc.umn.edu/bioethics/education/gradprogram/degreq/home.html. Elective courses must be chosen in consultation with the DGS or student's adviser to ensure their appropriateness for the student's course of study. Students may elect a graduate minor to fulfill their elective credits in a related field. However, students may also elect to take courses from different programs, for example, a health policy course from the School of Public Health and a health law course from the Law School.

Of the 20 total course credits required, at least one BTHX course and at least two courses total are to be taken at the 8xxx level. Thesis credits do not count toward this requirement.

**Course Group 0**

**Joint- or Dual-degree Coursework:** Joint Degree Program in Law, Health, and the Life Sciences. Student may take a total of 11 credits in common among the academic programs.
Twin Cities Campus
Bioethics Minor
Bioethics, Center for
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Bioethics, University of Minnesota, Suite N504 Boynton, 410 Church Street S.E., Minneapolis, MN 55455 (612-624-9440; fax: 612-624-9108)
Email: bthxed@umn.edu
Website: http://www.bioethics.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 14
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Center for Bioethics offers a master's degree and a graduate minor in bioethics. Although bioethics has deep roots in the discipline of philosophy and maintains strong ties to that discipline, it has grown to be an essentially interdisciplinary field. Similarly, over its 25-plus year history, the Center for Bioethics has become a well-established and internationally recognized interdisciplinary center. This truly interdisciplinary approach is endorsed by the University, since the center is a program that spans the Academic Health Center and interacts throughout the University. The center's faculty represents a broad array of fields, with backgrounds in philosophy, medicine, nursing, public health, health policy, law, education, family social science, and religious studies. The faculty has expertise in clinical ethics, research ethics, and ethics in health policy. The center embraces a robust mission of public engagement. Its faculty influences policy nationally and internationally on a number of issues including decision-making at end of life, research on human subjects, ethics and genetic technologies, and public health preparedness.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A doctoral student must complete a minimum of 14 graduate credits in bioethics offered outside the major field: 8 credits of required courses and 6 credits of electives. A master's student must complete a minimum of 8 graduate credits in bioethics offered outside the major field: 6 credits of required courses and 2 credits of electives. All students must take BTHX 5010 - Bioethics Proseminar and one moral theory course, preferably BTHX 5300 - Foundations of Bioethics. Courses should be chosen in consultation with the bioethics director of graduate studies. Courses that satisfy requirements and serve as electives can be found at http://www.ahc.umn.edu/bioethics/education/graduate/home.html.
Twin Cities Campus
Biomedical Informatics and Computational Biology M.S.
R Bioscience/Biotechnology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Those interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

The M.S. is offered under two plans: Plan A (with thesis), and Plan B (with project). Plan A is considered suitable for students planning to pursue careers that require a limited research experience or those planning to continue their education in a Ph.D. program. It is also suitable for students with full-time employment whose thesis can be related to their work assignments. Plan B is suitable for students planning to work in settings where technical knowledge is more germane than research experience.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences. The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

In addition to completing the online application form, applicants must submit a personal statement, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in biomedical informatics and computational biology. Applicants should also indicate the names of the BICB graduate faculty whose interests overlap their own. Although there is no page limit for the personal statement, 2-3 pages are recommended.

Special Application Requirements:
Applications for the M.S. program are accepted throughout the year for either fall or spring.

GRE scores may be waived for students with significant work or academic experience.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
  • TOEFL
    - Internet Based - Total Score: 79
    - Internet Based - Writing Score: 21
    - Internet Based - Reading Score: 19
  • Paper Based - Total Score: 550
  • IELTS
    - Total Score: 6.5
  • MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, null credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and null credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S. is offered under two plans: Plan A (with thesis), and Plan B (with project).

Plan A is considered suitable for students planning to pursue careers that require a limited research experience or those planning to continue their education in a Ph.D. program. Plan A students defend their thesis in public and must pass an oral examination. Plan A is suitable for students with full-time employment whose thesis can be related to their work assignments.

Plan B is suitable for students planning to work in settings where technical knowledge is more germane than research experience.

The requirements include 20 course credits for Plan A and 30 course credits for Plan B.

Up to 6 credits outside the major may be taken but are not required.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
Biomedical Informatics and Computational Biology Minor
R Bioscience/Biotechnology

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Master's Minor: A minimum of 9 credits must be completed in Core Area 1 and one of Core Areas 2-5.

Doctoral Minor: A minimum of 12 credits must be completed in Core Area 1 and two of CoreAreas 2-5.

Graduate students choose from a list of courses that satisfy requirements in core areas and electives.

There are five core areas:
1. Biochemistry, molecular and cell biology
2. Database, data mining, and computing
3. Informatics, analysis, and machine learning
4. Mathematics, biostatistics, and statistics
5. Computational and systems biology

Students choose elective courses from the following eight areas:
1. Biochemistry, molecular and cell biology
2. Informatics, database, data mining, and computing
3. Mathematics, biostatistics, and statistics
4. Chemistry, chemical engineering, and physics
5. Biophysics and structural biology
6. Imaging, information theory, and signal processing
7. Computational chemistry, medicinal chemistry, and drug design
8. Clinical and translational sciences

Core/elective courses are listed on the courses page of the BICB Student Handbook (http://r.umn.edu/academics-research/bicb/graduate-program/student-handbook/courses). The adviser(s), together with the DGS, will ensure that the student selects appropriate courses.
Twin Cities Campus
Biomedical Informatics and Computational Biology Ph.D.
R Bioscience/Biotechnology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Biomedical Informatics and Computational Biology, 300 University Square, 111 South Broadway, Rochester, MN 55904 (507-258-8006; fax: 507-258-8066)
Email: bicbgrad@umn.edu
Website: http://www.r.umn.edu/academics-research/bicb

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program requires summer semesters for timely completion.
- The Biomedical Informatics and Computational Biology Program is an all-University program delivered on the Rochester and Twin Cities campuses. The University of Minnesota Twin Cities is the degree-granting authority for delivery of the Biomedical Informatics and Computational Biology Program in Rochester.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in biomedical informatics and computational biology (BICB) offers course work in five core areas: 1) biochemistry, molecular and cell biology; 2) database, data mining, and computing; 3) informatics, analysis, and machine learning; 4) mathematics, biostatistics, and statistics; and 5) computational and systems biology. In addition, students select courses from a diverse set of fields, including chemistry, chemical engineering, physics, biophysics, structural biology, imaging, signal processing, and clinical and translational sciences. The curriculum is individualized to fit the student's interest and research direction. Prior coursework may be used to fill the requirements if appropriate. Students may pursue a minor in a different program.

All students receive training in ethics, leadership, and management, including legal and intellectual property issues and entrepreneurship. The Ph.D. program includes an industrial or clinical internship. Students interested in academic careers have the opportunity to participate in development programs that focus on aspects of teaching and learning.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The program expects incoming graduate students to have a strong background in the quantitative sciences and varied backgrounds in the life/health sciences. The expected competencies of incoming students may be demonstrated by coursework completed at the undergraduate level or by informal competency examinations.

In addition to completing the online application form, applicants must submit a personal statement, which describes past experiences and career aspirations, and reasons for pursuing graduate studies in biomedical informatics and computational biology. Prospective students should also indicate the names of the BICB graduate faculty whose interests overlap with their own. The department strongly encourages applicants to contact these faculty members before applying. Although there is no page limit for the personal statement, 2-3 pages are recommended.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are admitted only for the fall semester.

GRE scores may be waived for students with significant work or academic experience.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
30 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

Ph.D. students take preliminary written exams at the end of the second year of study, which focuses on the development of a research proposal. An oral preliminary exam focuses on the plan for thesis research and the student's coursework and is taken by the fall of the third year of full-time registration or its equivalent. At least 24 course credits are required to gain competency in both biology and quantitative areas related to biomedical informatics and computational biology. An internship is required, which may be waived for students with equivalent experience. Additionally, 24 thesis credits are required. Ph.D. students defend their thesis in public and must pass an oral examination.

An internship is required, which may be waived for students with equivalent experience.

Up to 9 credits outside the major may be taken but are not required.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Biophysical Sciences and Medical Physics M.S.
Radiology
Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota School of Medicine, Department of Radiology, Box 292 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-0131; fax: 612-626-1951)
Email: riten001@tc.umn.edu
Website: http://www.med.umn.edu/radiology/research/physics/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program includes faculty members who have primary appointments in fields such as radiobiology, physics, engineering, computer science, physiology, dentistry, genetics, and biochemistry. Students concentrate in research areas such as molecular biophysics, medical imaging, magnetic resonance imaging and spectroscopy, radiobiology, radiation therapy physics, and mathematical biophysics and computation. A limited number of students prepare for employment as hospital-based medical physicists through a program that includes opportunities for coursework, laboratory work, and directed study to provide experience in areas such as purchase specification, acceptance testing, quality assurance, and radiation safety.

Program Delivery
This program is available:

- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are considered for admission in both semesters.

Applicants must submit their test score(s) from the following:

- GRE

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 2.80 is required for students to remain in good standing.

The M.S. is offered under two plans: Plan A, (with thesis), and Plan B, (with project). Plan A is considered suitable for students with full-time employment whose thesis can be related to their work assignments. Plan B is more suitable for students planning to work in government or hospital settings where technical knowledge is more germane than research experience. Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam. A total of 30 credits is required, including 14 in the major and 6 in a related field or minor.
Biophysical Sciences and Medical Physics Minor

Radiology
Graduate School

Contact Information:
University of Minnesota School of Medicine, Department of Radiology, Box 292 UMHC, 420 Delaware Street S.E., Minneapolis, Minnesota 55455 (612-626-0131; fax: 612-626-1951)
Email: riten001@tc.umn.edu
Website: http://www.med.umn.edu/radiology/research/physics/home.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program includes faculty members who have primary appointments in fields such as radiobiology, physics, engineering, computer science, physiology, dentistry, genetics, and biochemistry. Students concentrate in research areas such as molecular biophysics, medical imaging, magnetic resonance imaging and spectroscopy, radiobiology, radiation therapy physics, and mathematical biophysics and computation. A limited number of students prepare for employment as hospital-based medical physicists through a program that includes opportunities for coursework, laboratory work, and directed study to provide experience in areas such as purchase specification, acceptance testing, quality assurance, and radiation safety.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Programs are arranged on an individual basis and must consist of courses that represent a subfield of the discipline, e.g., radiobiology or medical physics.
Twin Cities Campus
Biophysical Sciences and Medical Physics Ph.D.

Radiology
Graduate School

Link to a list of faculty for this program.

Contact Information:
University of Minnesota School of Medicine, Department of Radiology, Box 292 UMHC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-0131; fax: 612-626-1951)
Email: riten001@tc.umn.edu
Website: http://www.med.umn.edu/radiology/research/physics/home.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program includes faculty members who have primary appointments in fields such as radiobiology, physics, engineering, computer science, physiology, dentistry, genetics, and biochemistry. Students concentrate in research areas such as molecular biophysics, medical imaging, magnetic resonance imaging and spectroscopy, radiobiology, radiation therapy physics, and mathematical biophysics and computation. A limited number of students prepare for employment as hospital-based medical physicists through a program that includes opportunities for coursework, laboratory work, and directed study to provide experience in areas such as purchase specification, acceptance testing, quality assurance, and radiation safety.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
All students should have some familiarity with physical chemistry, intermediate physics, intermediate mathematics, biostatistics, computer programming, biology, physiology, and biochemistry. This may be demonstrated by coursework completed at the undergraduate level or as part of the graduate program; by reading or practical experience; or by informal competency examinations.

Special Application Requirements:
Three letters of recommendation and scores from the General Test of the GRE are required. Applicants are considered for admission in both semesters.

Applicants must submit their test score(s) from the following:
- GRE

Key to test abbreviations (GRE).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Ph.D. students take preliminary written exams at the end of the first year of study or as soon as possible after completing the core course sequence in topics in physics for medicine and biology. An oral preliminary exam focuses on the plan for thesis research and
the student's grasp of related information and is taken by the fall of the third year of full-time registration or its equivalent. At least 12 credits are required in a minor or supporting program. Additionally, 24 thesis credits are required.
Twin Cities Campus
Health Care Design and Innovation Postbaccalaureate Certificate
School of Nursing
Graduate School

Link to a list of faculty for this program.

Contact Information:
Densford International Center for Nursing Leadership, University of Minnesota School of Nursing, 4-185 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-1187; fax: 612-624-0908)
Email: disch003@umn.edu
Website: http://www.hcdi.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Health Care Design & Innovation PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postbaccalaureate certificate in health care design and innovation prepares health care and design practitioners to create optimal healing environments. Students learn how to apply design thinking in creating new processes, systems, and care environments. The certificate emphasizes principles that promote healing and safe patient care while maximizing clinical and financial outcomes.

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the certificate program requires a baccalaureate degree from an accredited institution in a health-related field, interior design, architecture, or other design-related area.

Applicants are required to submit transcripts from all institutions where postsecondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, one essay, a current curriculum vitae/resume, and English language proficiency scores (if applicable). This certificate has two application deadlines: November 1 for spring admission and July 1 for fall admission.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Paper Based - Total Score: 550
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.8 is required for students to remain in good standing.

The certificate has four required courses, taken from the School of Nursing, the College of Design, and the Center for Spirituality and Healing:
1. Health Innovation and Leadership, which integrates whole systems thinking, relevant theories and generative leadership to enhance the student's ability to advance innovation and achieve sustainable change in contemporary health care settings.

2. Optimal Healing Environments, which focuses on the development and implementation of Optimal Healing Environments (OHE) and examines the evidence base supporting design of human and care processes, and begins to explore how OHEs are created.

3. The Design of Health Care Processes, which provides a foundation for the thinking required to design processes in health care to reduce/eliminate medical errors and examines the use of design principles and the role of human factors in reducing human error.

4. Evidence-based Design in Health Care, which emphasizes the evidence-based processes used in the design of health care environments by interdisciplinary teams of designers, health care practitioners, administrators, and other users.
Twin Cities Campus
Health Informatics M.H.I.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Institute for Health Informatics, MMC 912 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3348; fax: 612-626-7227)
Email: ihi@umn.edu
Website: http://www.bmhi.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Health Informatics

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants are expected to have at least a bachelor of science or equivalent degree from a recognized institution of higher education.

Applicants are required to have taken 6 semester credits or 9 quarter credits in medical, life, or biological sciences from a recognized institution of higher learning. This a broadly defined requirement and most courses with a health or biology emphasis will be accepted including biostatistics, health services research, and public health, as well as the more traditional biology or life science courses.

Applicants are required to have taken a course or to have documented work experience in a programming or application language such as C, C++, JAVA, Visual Basic, PASCAL, etc.

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
- MCAT
- PCAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, GMAT, MCAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 18 major credits and 6 credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone project is a 3-credit course in which students will have a final opportunity to apply their newly acquired knowledge and skills to a project involving a practical problem in health informatics. Students will learn how to design these projects properly, reviewing past exemplary projects as guides. Then, with the help of their advisers and the capstone course director, students will design and carry out their own projects which can take a variety of forms, including: developing design and evaluation specifications for software to address a specific healthcare need; working on, observing, analyzing, and reporting the actions of a team involved in implementing a new information system; or observing and measuring the impact of such a system in a healthcare setting. Students will submit a written project report in lieu of a final examination. The capstone project instructor and the student's adviser grade the report.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The master of health informatics (M.H.I.) is a degree intended for working professionals and others who would like training in understanding, implementing, and evaluating the many information technologies becoming more prevalent in the health care industry. This degree is designed so that it can be completed in as little as one calendar year, but may also be taken part-time over several years to accommodate work schedules.

The curriculum consists of 30 credits of coursework that includes:
6 credits of introductory health informatics, 2 credits of seminar, 3 credits of health care and clinical informatics courses, 2 credits of interprofessional health informatics, 5 credits of database and software management courses, 3 credits of statistics, 6 credits of coursework in the student's chosen area of specialization, and a 3-credit capstone course, in which students complete a project directly applicable to their own work environment. The program is designed to accommodate working professionals and can be completed in one calendar year by a full-time student and in up to three years on a part-time basis.
Twin Cities Campus
Health Informatics M.S.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Institute for Health Informatics, MMC 912 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3348; fax: 612-626-7227)
Email: ihi@umn.edu
Website: http://www bmhi.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants are expected to have at least a bachelor of science or equivalent degree from a recognized institution of higher education.

Applicants are required to have taken 6 semester credits or 9 quarter credits in medical, life, or biological sciences from a recognized institution of higher learning. This a broadly defined requirement and most courses with a health or biology emphasis will be accepted including biostatistics, health services research, and public health, as well as the more traditional biology or life science courses.

Applicants are required to have taken a course or to have documented work experience in a programming or application language such as C, C++, JAVA, Visual Basic, PASCAL, etc.

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
- MCAT
- PCAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, GMAT, MCAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 15 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 19 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The Plan B project is an independent project focused on a health informatics application, culminating in a written report. The general Graduate School requirement is that students must demonstrate familiarity with the tools of research or scholarship in the field, the ability to work independently, and the ability to present the results of investigation effectively, by completing at least one and up to three Plan B projects, equivalent to approximately 120 hours of work. In general, advisers are responsible for approving the project(s), determining relative worth for satisfying the entire requirement, and specifying how students will share their findings with their Examining Committee.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The research-oriented Plan A master's degree is available to advanced applicants. It requires 32 course credits and 10 thesis credits. The Plan B option requires 42 course credits. Both plans require 6 credits of introductory health informatics, 2 credits of seminar, 3 credits of health care and clinical informatics courses, 2 credits of interprofessional health informatics, 5 credits of database and software management courses, 3 credits of statistics.
Twin Cities Campus

Health Informatics Minor
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Institute for Health Informatics, MMC 912 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3348; fax: 612-626-7227)
Email: ihi@umn.edu
Website: http://www.bmhi.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. The minor provides an opportunity for the student to supplement their primary training with additional knowledge and skills in health informatics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• partially online (between 50% to 80% of instruction is online)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Master's students must take the introductory sequence in health informatics (HINF 5430 and HINF 5431). Ph.D. students must take a total of 12 credits in health informatics including the introductory sequence and at least 6 additional credits including one 8xxx course.
Twin Cities Campus

Health Informatics Ph.D.
Health Informatics, AHC Inst
Graduate School

Link to a list of faculty for this program.

Contact Information:
Institute for Health Informatics, MMC 912 Mayo, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3348; fax: 612-626-7227)
Email: ihi@umn.edu
Website: http://www.bmhi.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 66
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Health informatics is an interdisciplinary field of scholarship that applies computer, information, and cognitive sciences to promote the effective and efficient use and analysis of information, ultimately improving the health, well-being, and economic functioning of society. Students take a sequence of core courses in health informatics and biostatistics, and electives in technical and health science areas. Possible areas of emphasis include health information systems, telehealth, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, and physiological monitoring and control.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants are expected to have at least a bachelor of science or equivalent degree from a recognized institution of higher education.

Applicants are required to have taken 6 semester credits or 9 quarter credits in medical, life, or biological sciences from a recognized institution of higher learning. This is a broadly defined requirement and most courses with a health or biology emphasis will be accepted including biostatistics, health services research, and public health, as well as the more traditional biology or life science courses.

Applicants are required to have taken a course or to have documented work experience in a programming or application language such as C, C++, JAVA, Visual Basic, PASCAL, etc.

Applicants are required to have taken one semester of calculus.

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
- MCAT
- PCAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
Total Score: 6.5
• MELAB
- Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, GMAT, MCAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
20 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. program is for students who want to obtain advanced training and conduct research. Students are expected to complete the same requirements as those for the Plan B master's program (a survey of health informatics, biostatistics, selected health science areas, and advanced training in selected informatics areas), as well as advanced coursework in health informatics and an area of concentration complementary to health informatics. The work is completed with an original research project reported in the doctoral dissertation. Students are expected to have earned the equivalent of at least 70 credits, including 24 thesis credits.
Twin Cities Campus
Health Journalism and Communication M.A.
School of Journalism & Mass Communication
Graduate School

Link to a list of faculty for this program.

Contact Information:
Health Journalism and Communication M.A. Program, School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis MN 55455 (612-626-1851; fax 612-625-9525)
Email: dans@umn.edu
Website: http://sjmc.umn.edu/grad/hjComm.html#degree

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program has been temporarily suspended. Applications are not being accepted at this time. Please contact Graduate Student Services at sjmcgrad@umn.edu with questions.

A joint program of the School of Journalism and Mass Communication and the School of Public Health, the professional master's in health journalism and communication promotes improved public communication about health matters by combining knowledge, skills, and experience from both disciplines. The program is designed for journalists and health professionals, who earn a master's degree in health journalism. Journalists and communications professionals learn the fundamentals of medical research and public health. Health professionals learn basic journalistic principles and ethics, and how to develop meaningful health stories. Those pursuing other master's degrees, (e.g., master's in public health), earn the M.A. in health journalism and communication in addition to the other degree.

The Health Journalism and Communication program has two distinct, but overlapping, programs of study. Students in the health journalism emphasis will gain advanced knowledge about public health and the evaluation of claims from health, medical, and scientific sources, as well as advanced training on reporting health stories for different media. Students in the health communication emphasis will learn the fundamentals of writing about health topics for different audiences in different formats, as well as health campaign development and evaluation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The minimum requirement for admission is a B.A. or equivalent. The program is designed for journalists and communications professionals with at least two years of professional experience. It is also designed for health professionals with at least two years of public health or other professional health experience.

Special Application Requirements:
Applicants must submit an application to the University of Minnesota Graduate School and a department application to the School of Journalism and Mass Communication. The department application includes a clearly written statement of career interests, goals, and objectives; three letters of recommendation; a complete set of transcripts; professional work samples; IELTS or TOEFL scores (for every applicant whose previous degree was obtained from a non-English speaking country and whose native language is not English); and scores from the GRE. The director of graduate studies may waive the GRE requirement for students who have at least five years of professional experience and a strong academic record or have recently completed another graduate degree program. This program uses a rolling admission process: the sooner a complete application is received (this includes both the completed Graduate School and department applications), the sooner the applicant receives a decision. Applications received by January 15 receive first consideration. For fall enrollment, the final deadline for applications is May 15.

Applicants must submit their test score(s) from the following:
- GRE
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- **IELTS**
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 25 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Contact the program for capstone project information.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The M.A. in health journalism and communication requires a minimum of 33 semester credits, to be completed over a two-year schedule. The program has two distinct areas of emphasis: health journalism and health communication. Students in the health journalism emphasis area learn to evaluate claims from health, medical, and scientific sources and to tell health-oriented stories in broadcast or magazine journalism. Students in the health communication emphasis learn the fundamentals of writing about health topics for different audiences, as well as health campaign development and evaluation.
Twin Cities Campus
Health Journalism and Communication Minor
School of Journalism & Mass Communication
Graduate School

Link to a list of faculty for this program.

Contact Information:
Health Journalism and Communication M.A. Program, School of Journalism and Mass Communication, 111 Murphy Hall, 206 Church Street S.E., Minneapolis MN 55455 (612-626-1851; fax 612-625-9525)
Email: dans@umn.edu
Website: http://sjmc.umn.edu/grad/hjComm.html#degree

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: This program has been temporarily suspended. Applications are not being accepted at this time. Please contact Graduate Student Services at sjmcgrad@umn.edu with questions.

A joint program of the School of Journalism and Mass Communication and the School of Public Health, the professional master's in health journalism and communication promotes improved public communication about health matters by combining knowledge, skills, and experience from both disciplines. The program is designed for journalists and health professionals, who earn a master's degree in health journalism. Journalists and communications professionals learn the fundamentals of medical research and public health. Health professionals learn basic journalistic principles and ethics, and how to develop meaningful health stories. Those pursuing other master's degrees, (e.g., master's in public health), earn the M.A. in health journalism and communication in addition to the other degree.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires 6 credits. The doctoral minor requires 12 credits.
Twin Cities Campus

History of Science, Technology, and Medicine M.A.

History of Science & Technology
Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-625-3819)
Email: hstm@umn.edu
Website: http://www.hstm.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Arts

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students must have a bachelor's degree with a preferred grade average of B or better and should be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

Special Application Requirements:
In addition to the application sent to the Graduate School, applicants are encouraged to submit three letters of recommendation, a writing sample and GRE scores directly to the program. Check the HSTM website (www.hstm.umn.edu) for the program application form.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.
Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in one foreign language.

A minimum GPA of 3.30 is required for students to remain in good standing.

The M.A. is offered under Plan A and Plan B. Following the guidelines in the Graduate Student Handbook for the program (www.hstm.umn.edu), M.A. students select one of two tracks, the history of science and technology or the history of medicine, and, within the chosen track, select courses subject to distribution requirements in terms of area and period. In addition, each student must take one of the two courses in the two-semester sequence of historiography and research methods (HSCI/HMED 8112 and HSCI/HMED 8113). All of the courses selected for the requirements must be passed with a grade of B or better.

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

History of Medicine

History of Science and Technology
Twin Cities Campus

History of Science, Technology, and Medicine Minor

History of Science & Technology

Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-625-3819)
Email: hstm@umn.edu
Website: http://www.hstm.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Students who wish to take the graduate minor in the history of science, technology, and medicine are required to take four 3-credit courses. The Historiography course (HSCI or HMED 8112) is strongly recommended, along with other courses that are selected to define a course of study that should have some identifiable focus but also a certain breadth. Students should not plan to take all courses in the minor from the same faculty member.
Twin Cities Campus

History of Science, Technology, and Medicine Ph.D.

Graduate School

Link to a list of faculty for this program.

Contact Information:
Program in the History of Science, Technology, and Medicine, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-7069; fax: 612-625-3819)
Email: hstm@umn.edu
Website: http://www.hstm.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 57
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program offers opportunities for advanced research and study in the history of science and technology (with particular expertise in the history of the physical sciences, history of the biological sciences, history of technology, and history of American science and technology) and in the history of medicine.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Students must have a bachelor's degree with a preferred grade average of B or better and should be capable of interdisciplinary study. Depending on background and career objectives, additional preparatory studies may be necessary in either the science-technology area or in the humanities and social sciences.

Special Application Requirements:
In addition to the application sent to the Graduate School, applicants are encouraged to submit three letters of recommendation, a writing sample and GRE scores directly to the program. Check the HSTM website for the program application form.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
21 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Language Requirement: Reading proficiency in two foreign languages.

A minimum GPA of 3.30 is required for students to remain in good standing.

Following the guidelines in the Graduate Student Handbook for the program (www.hstm.umn.edu), Ph.D. students select one of two tracks, the history of science and technology or the history of medicine, and, within the chosen track, select courses subject to distribution requirements in terms area and period. In addition, each student must take the two-semester sequence of historiography and research preparation (HSCI/HMED 8112 and HSCI/HMED 8113). All of the courses selected for the requirements must be passed with a grade of B or better.

Program Sub-plans
Students are required to complete one of the following sub-plans.

Students may not complete the program with more than one sub-plan.

History of Medicine

History of Science and Technology
Twin Cities Campus

Integrated Biosciences M.S.

Graduate School - Adm

Link to a list of faculty for this program.

Contact Information:
University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218- 726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the master of science (M.S.) degree under Plan A (coursework and original thesis). The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college/university in the biological or physical sciences or a related field. Background in a variety of subdisciplines is appropriate preparation.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Recommended undergraduate courses for applicants pursuing the M.S. degree include one year each of chemistry, biology, and physics. One semester of calculus is also recommended. Applicants are strongly encouraged to have taken other advanced courses in chemistry, biology, additional calculus, and introductory statistics.

Required Coursework
Twin Cities Campus
Integrated Biosciences Ph.D.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Integrated Biosciences Graduate Program, University of Minnesota, 251 Swenson Science Building, 1035 Kirby Drive, Duluth, MN 55812 (218-726-6898; fax: 218-726-8152)
Email: ibs@d.umn.edu
Website: http://www.d.umn.edu/ibs

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- The Integrated Biosciences Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Integrated Biosciences Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The all-University integrated biosciences graduate program offers study toward the doctor of philosophy (Ph.D.) degree. The program has two areas of emphasis: cell, molecular, and physiological (CMP) biology and ecology, organismal, and population (EOP) biology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree or equivalent from an accredited college or university in the biological or physical sciences or a related field.

Recommended undergraduate courses for applicants pursuing the Ph.D. degree include one year each of chemistry, biology, physics, calculus, and advanced chemistry. One semester (minimum) of statistics is also recommended.

Additional recommended courses for students in the ecology, organismal, and population (EOP) emphasis include one year of calculus, one semester each of ecology and evolutionary biology along with one course in two of the following subjects: genetics, cell biology, biochemistry.

Additional recommended courses for students in the cell, molecular, and physiological (CMP) emphasis include one year of organic chemistry plus one course in each of the following: genetics, cell biology, and biochemistry.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

- 20 credits are required in the major.
- 12 credits are required outside the major.
- 24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

**Ph.D. Written Preliminary Examination:** In addition to completing the curriculum for the major and internal related fields, students will be required to pass both a written and oral preliminary examination prior to completing the Ph.D. program. The preliminary written examination will be administered once the student has completed the majority of the required coursework. This will typically occur in the summer of the second year. The written examination will consist of a completed NIH or NSF grant application for the student's proposed research project. The project will be evaluated by the Thesis Examining Committee, which will also serve as the student's Final Oral Examining Committee to provide continuity of advice during the length of the student's research program.

**Ph.D. Oral Preliminary Examination:** The oral preliminary examination will be administered within two months of the successful completion of the preliminary written examination. The examination will be administered by the graduate faculty according to Graduate School regulations and all students will be required to pass the oral examination to continue in the Ph.D. program. Within one semester of passing the preliminary oral examination, each Ph.D. student must file a Thesis Proposal Form with the Graduate School.

**Ph.D. Final Oral Defense:** Most students will complete the requirements for the Ph.D. degree within five years. The final oral defense will be conducted by the graduate faculty according to Graduate School regulations. It will consist of a public seminar presented by the student.
Twin Cities Campus

Integrative Therapies and Healing Practices Minor
Health Sciences-Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Center for Spirituality and Healing, Mayo Memorial Building, 5th floor, MMC 505, 420 Delaware Street S.E., Minneapolis, MN 55455
(612-624-9459; fax: 612-626-5280)
Website: http://www.csh.umn.edu

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate minor in integrative therapies and healing practices is an interdisciplinary program designed to expose students to the global range of complementary, cross-cultural, and spiritual healing practices. It enhances the preparation of graduate students in health sciences and other disciplines by developing knowledge and skills in the emerging field of complementary and alternative health care. Specifically, the minor provides students with a theoretical basis for applying complementary therapies and healing practices; prepares students to research complementary therapies and healing practices; and prepares students to work collaboratively with other health professionals and patients in a multicultural, pluralistic healthcare system. The minor includes a set of core courses that provide the theoretical foundation for the program. Students may elect to take additional courses offered by the Center for Spirituality and Healing in clinical applications, spirituality, or cross-cultural health and healing. A number of other University courses also satisfy the course requirements of the minor; contact the minor program office for more information.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• partially online (between 50% to 80% of instruction is online)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Master's and doctoral students take CSPH 5101 (3 cr) and 8101 (2 cr). Master's students take an additional 3 credits for a total 8 credits; doctoral students must take an additional 7 credits for a total of 12 credits. Note that students cannot use course credits to satisfy requirements for both a major and the minor.
**Twin Cities Campus**

**Integrative Therapies and Healing Practices Postbaccalaureate Certificate**

*Health Sciences-Adm*

**Graduate School**

Link to a list of faculty for this program.

**Contact Information:**
Center for Spirituality and Healing, Mayo Memorial Building, 5th floor, MMC 505, 420 Delaware Street S.E., Minneapolis, MN 55455  
(612-624-9459; fax: 612-626-5280)  
Website: [http://www.csh.umn.edu](http://www.csh.umn.edu)

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Integrative Thpys & Healing Practices PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate in integrative therapies and healing practices is an interdisciplinary program designed to expose students to the global range of complementary, cross-cultural, and spiritual healing practices. It enhances the preparation of health science practitioners by developing knowledge and skills in the emerging field of complementary and alternative health care. Specifically, the program provides students with a theoretical basis for applying complementary therapies and healing practices; prepares students to research complementary therapies and healing practices; and prepares students to work collaboratively with other health professionals and patients in a multicultural, pluralistic healthcare system. The certificate includes a set of core courses that provide the theoretical foundation for the program. Students may elect to take additional courses offered by the Center for Spirituality and Healing in clinical applications, spirituality, or cross-cultural health and healing.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

This field of study is designed for the healthcare professional, those currently enrolled in a graduate health professions program, board-certified chaplains with at least three years in a healthcare setting, and those with a non-health care bachelor's degree with life/work experience in health-related areas. Such fields include nursing, social work, psychology, medicine, nutrition, pharmacy, chiropractic, naturopathy, and licensed acupuncture.

The health coaching track of the certificate requires an applicant interview prior to admission.

**Special Application Requirements:**

In addition to the Graduate School online application, applicants must submit a letter describing their goals for obtaining the certificate and their professional qualifications. The statement should address the question, “What are your short- and long-term professional goals after you complete the postbaccalaureate certificate program in complementary therapies and healing practices?” Be as specific as possible. Two letters of support are required if the individual is not currently enrolled in a graduate program at the University of Minnesota, one from an academic source and one from an employer/supervisor. A current C.V. is also requested. All items can be uploaded to the graduate school online application. <www.grad.umn.edu/prospective_students/apply_online.html>

Applicants to the health coaching track will need three recommendations, and a three-five page personal statement focusing on what led to the applicant's interest in health coaching as a professional activity, including a description of interest in and experience with holistic integrative health and healing. Students should also include a current C.V. or resume. All items can be uploaded to the graduate school online application. <www.grad.umn.edu/prospective_students/apply_online.html>

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79

© 2005 by the Regents of the University of Minnesota

The University of Minnesota is an equal opportunity educator and employer.

Information current as of October 01, 2012
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

A total of 12 credits are required to complete the certificate. Required courses: CSPH 5101 - Introduction to Complementary Therapies and Healing Practices (3 cr) and CSPH 5102 - Art of Healing: Self as Healer (1 cr). Students are encouraged to choose the remaining 8 credits from courses consistent with their academic training and professional goals. The student's faculty adviser works with the student in designing a program plan that accommodates the student's unique learning objectives. To earn a certificate, the preferred GPA for all courses is 2.80.

Program Sub-plans
A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Health Coaching
The track requires four semesters of coursework, which can be spread over a variable amount of time up to a maximum of four years. Certain courses must be taken sequentially, leading to skill sets and a knowledge base which grows and matures over time. A total of 18 credits are required to complete this track within the certificate. In addition to the two required courses for the certificate, health coaching students must take CSPH 5701 - Fundamentals of Health Coaching I (4 cr), CSPH 5702 - Fundamentals of Health Coaching II (4 cr), CSPH 5703 - Advanced Health Coaching Practicum (3 cr), CSPH 5704 - Business of Health Coaching (1 cr), and a professional internship in health coaching. To earn a certificate, the preferred GPA for all courses is 2.80.

CSPH 5101 - Introduction to Complementary Healing Practices (3 cr)
CSPH 5102 - Art of Healing: Self as Healer (1 cr)
CSPH 5701 - Fundamentals of Health Coaching I, with Laboratory (4 cr)
CSPH 5702 - Fundamentals of Health Coaching II, with Laboratory (4 cr)
CSPH 5703 - Advanced Health Coaching Practicum (3 cr)
CSPH 5704 - Professional Internship in Health Coaching (2 cr)
CSPH 5705 - Business of Health Coaching (1 cr)
Twin Cities Campus
Molecular, Cellular, Developmental Biology and Genetics M.S.
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED

Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street S.E., University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30 to 50
- This program does not require summer semesters for timely completion.
- The clinical component of the program program in genetic counseling involves work multiple clinical settings throughout the Twin Cities, the Mayo clinic in Rochester and clinics in St. Cloud and Duluth.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in molecular, cellular, developmental biology and genetics is offered with either a focus in genetic counseling or an academic focus. These two program focuses are distinct and have different admissions procedures, different program structures, and different graduation requirements.

The focus in genetic counseling is a full-time program designed to provide students with the academic foundation and clinical expertise necessary to enter the profession of genetic counseling. The curriculum integrates selected coursework with firsthand experience in the diagnostic medical genetics laboratories and supervised work in multiple clinical genetics settings with patients and families. The program is accredited by the American Board of Genetic Counseling and all graduates are eligible to apply to the ABGC for active candidate status and sit for board certification.

The academic focus master's is an interdisciplinary program that provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, Genome Engineering, Stem Cell research and a center for developmental biology provide opportunities for graduate study.

Note: Students are admitted directly to the academic focus M.S. program only under exceptional circumstances (e.g., if they can be in the area for only two years), or if they are accepted into the genetic counseling specialization or into the Joint Degree Program in Law, Health, and the Life Sciences. Also, students who were admitted to the Ph.D. program but who leave before they have completed their degree MAY be offered the option of obtaining a master's degree subject to approval by the student's adviser and the DGS. In all cases, applicants to the academic focus M.S. must also be competitive for admission at the Ph.D. level.

Accreditation
This program is accredited by The American Board of Genetic Counseling.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.
An undergraduate or master's degree in the biological, chemical, or physical sciences is preferred.

Recommended academic preparation includes coursework in molecular biology, genetics, biology, and biochemistry.

Successful applicants to the J.D./M.S. or standard M.S. program must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate familiarity with and aptitude for basic science research prior to embarking on a graduate career in this program.

Applicants to the program in genetic counseling are required to have taken courses in organic chemistry, biochemistry, general genetics, statistics and probability, and psychology. In addition, all applicants to the genetic counseling program must have some type of client advocacy experience such as volunteer or paid work with troubled teens, working in a shelter for battered women, or a suicide prevention hotline, etc. The best experiences afford the applicant the opportunity to work in a helping profession.

Special Application Requirements:
Applicants to the J.D./M.S. program and the standard M.S. program must submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The recommended date for receipt of completed applications is December 15. Completed files are reviewed between January and February. Graduate studies typically begin fall semester. Information about an early start program involving participation in laboratory research beginning on July 1 may be obtained from the director of graduate studies. Entry into the J.D./M.S. program requires separate admittance to both the Law School and the MCDB&G Graduate Program.

Applications to the genetic counseling program are stronger if the applicant has spent some time with a practicing genetic counselor either in the clinical setting or in some capacity such as personal interviews that affords the applicant a real life understanding of the profession.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

- IELTS
  - Total Score: 6.5

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 14 to 40 major credits and 6 to 10 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: All Plan B students must complete a research or capstone project that is scholarly in quality, and present their results at their final oral examination.

Projects that qualify for the genetic counseling program include those that study a genetic counseling problem and add to the existing genetic counseling literature; produce materials that add to the profession such as teaching materials or ways of evaluating the service; or produce educational materials needed by patient populations or the general public.

Other Plan B students are expected to produce a report approximately 15 pages in length that thoughtfully discusses an important scientific topic that the student and adviser agree upon. The report should include an introduction that explains the significance of the topic, a review of the literature or an analysis of a specific aspect of the area and a discussion regarding current or future endeavors.

This program may be completed with a minor.
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The genetic counseling focus is offered under Plan B and is designed to be completed in 4 semesters and the interim summer. Most of the coursework takes place in the first year, leaving more open time during the second year for clinical experience. Students must complete a total of 50 graduate credits with at least 30 credits in the major area of study, a plan B project paper, and a final oral exam.

Students will be placed in laboratory and clinical observation experiences during the first year and four clinical genetic counseling internships during the second year. Students will complete a minimum of 200 hours of observation and a minimum of 800 hours of direct patient contact. Students must earn a passing grade in their four clinical internship rotations and present a completed log of at least 75 clinical cases before final oral exam. Only under exceptional circumstances will the course of study be varied to meet the needs of a student with many of the courses already completed or with extensive clinical laboratory experience.

Students in the academic focus may complete the M.S. under Plan A or Plan B. Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits and the completion of a Plan B paper. Students take a core curriculum, which is multidisciplinary and contributes to both the major and minor or related field requirements. Students may choose a concentration or specialization within the program such as cell biology, developmental biology, genetics, or human genetics.

**Degree Focuses**

**Genetic Counseling**

**Year 1**

Students will take courses that focus on medical, human, and behavioral genetics and genetic counseling practice. Students will have the option to choose between several electives from law and ethics, public health, and counseling psychology. In addition, students will observe in a clinical setting one day per week and gain experience in the clinical laboratories one day per week.

**Summer**

During the summer between the first and second year of the program, students will begin their first clinical internship rotation where the student will have patient responsibilities. This rotation will be a full 10 weeks long with the expectation that students will spend between 2-3 days per week in the clinic. The minimum time in the clinic will be 20 hours per week but will ultimately be set by the clinical supervisor and may exceed the minimum.

**Year 2**

Students will complete course work in counseling skills, psychosocial issues in genetic counseling, and ethical issues in genetic counseling. In addition students will spend 2-3 days per week in the clinic seeing patients and families under the supervision of a board certified genetic counselor.

**-OR-**

**Academic Focus**

**Joint- or Dual-degree Coursework:** Joint Degree Program in Law, Health and the Life Sciences. Student may take a total of 12 credits in common among the academic programs.
**Twin Cities Campus**

**Molecular, Cellular, Developmental Biology and Genetics Minor**

*Genetics, Cell Biology, and Development* TCBS, *Genetics, Cell Biology, and Development* TMED

**Graduate School**

Link to a list of faculty for this program.

**Contact Information:**

MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street S.E., University of Minnesota, Minneapolis, MN 55455 (612-624-7470, fax: 612-626-6140)

Email: mcdbg@umn.edu

Website: http://mcdbg.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, Genome Engineering, Stem Cell research and a center for developmental biology provide opportunities for graduate study.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Program Requirements**

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires 6 credits. A doctoral minor typically includes the genetics core (GCD 8131 and BIOC 8002 or GCD 4034), cell biology (GCD 8151 or 5036), and developmental biology (GCD 8161, 4151, or 4161), as appropriate to the student's field of specialization.
Twin Cities Campus
Molecular, Cellular, Developmental Biology and Genetics Ph.D.
Genetics, Cell Biology, and Development TCBS, Genetics, Cell Biology, and Development TMED
Graduate School

Link to a list of faculty for this program.

Contact Information:
MCDB&G Graduate Program, 6-160 Jackson Hall, 321 Church Street S.E., University of Minnesota, Minneapolis, MN  55455 (612-624-7470, fax: 612-626-6140)
Email: mcdbg@umn.edu
Website: http://mcdbg.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, membrane transport, cell interactions, macromolecular structure, extracellular matrix, cytoskeleton, cell motility, regulation of gene expression, neuroscience, developmental mechanisms, human genetics, plant cell and molecular biology, genetic mechanisms, and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences, the Medical School, and the College of Food, Agricultural and Natural Resource Sciences. Institutes for human genetics, plant molecular genetics, biological process technology, Genome Engineering, Stem Cell research and a center for developmental biology provide opportunities for graduate study.

Ph.D. students are admitted to MCDB&G under the auspices of Molecular, Cellular and Structural Biology (MCSB), a first year program administered by the MCDB&G and the Biochemistry, Molecular Biology and Biophysics (BMBB) Graduate Programs. After the first year, students select either MCDB&G or BMBB to complete their degree. MCDB&G does not have a freestanding master's program.

The MCDB&G Ph.D. is also part of two joint degree programs: The Joint Degree Program in Law, Health and Life Sciences; and the M.D./Ph.D. program.

The Joint Degree Program in Law, Health and Life Sciences is unique in the nation and enables students to combine a J.D. degree with a Ph.D. or M.S. degree. Students entering this program must be admitted to both the MCDB&G program and the Law School. Admission qualifications for M.S. and Ph.D. students are identical; only the student's career objectives distinguish the degree that they pursue.

The M.D./Ph.D. program emphasizes integration of the two major components of training—medicine and research—to ensure excellence in both. The program features a special curriculum that facilitates the transition from Medical School to the first year of formal graduate training, and the transition from graduate training back to Medical School.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applications from students with an undergraduate or master's degree in the biological, chemical, or physical sciences are preferred.

Recommended academic preparation includes coursework in molecular biology, genetics, biology, and biochemistry.

Successful applicants must have previous research experience in an academic or industrial setting in addition to any course-related laboratory experiences. It is important to demonstrate familiarity with and aptitude for basic science research prior to embarking on a graduate career in this program.
Special Application Requirements:
Applicants must also submit three letters of recommendation from persons familiar with their academic and research capabilities. A statement of interests and goals, a complete set of transcripts, and official scores from the General Test of the GRE are required. The GRE Subject Test in biochemistry, cell and molecular biology, biology, or chemistry is strongly recommended, but not required. The deadline for receipt of completed applications is December 15. Graduate studies begin fall semester only.

Entry into the J.D./Ph.D. program requires separate admittance to both the Law School and the MCDB&G Graduate Program. Entry into the M.D./Ph.D. program requires separate admittance to both the Medical School and the MCDB&G Graduate Program.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 90
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550

Key to test abbreviations (GRE, TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
12 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.8 is required for students to remain in good standing.

The Ph.D. program is designed by the student and the adviser to meet individual interests and goals. Advanced courses in genetics, molecular biology, cell biology, developmental biology, and biochemistry are required, in addition to special courses, topical seminar courses, laboratory research rotations, thesis research, student research seminars, departmental seminars, and journal clubs. The student's core curriculum is multidisciplinary and contributes to both major and minor field requirements. Ph.D. students serve as TAs for two semesters during their graduate career. Students in one of the joint degree programs serve as a TA for one semester.

This program is part of Joint Degree Program in Law, Health and the Life Sciences offering a J.D./Ph.D. and a J.D./M.S. track. Selected courses must be approved by the DGS. Students pursuing the J.D./Ph.D. start by completing the first year of Law School, then enter the Ph.D. portion of the program and complete this degree before returning to finish Law School.

This program also offers a joint M.D./Ph.D. degree program; 12 credits of Medical School courses can be used to fulfill credit requirements for the Ph.D. program with approval of the DGS. Students pursuing the M.D./Ph.D. start the program by completing the first two years of Medical School during which time they do laboratory rotations. After selecting a laboratory, they then enter the Ph.D. portion of the program and complete this degree before returning to finish Medical School.

Joint- or Dual-degree Coursework: The Joint Degree Program in Law, Health and the Life Sciences; and the M.D./Ph.D. program. Student may take a total of 12 credits in common among the academic programs.
Twin Cities Campus
Toxicology M.S.
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Toxicology Graduate Program, Medical School Duluth, 162 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-6354; fax: 218-726-8014)
Email: toxgrad@d.umn.edu
Website: http://www.ahc.umn.edu/toxicology

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 36 to 38
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This University-wide program provides comprehensive training in the broad scope of toxicology. Toxicology, the science of poisons, is devoted to identifying and quantifying potential noxious agents in our environment. Although most chemical agents at sufficiently large doses may be toxic, not all present a significant risk to human health or to environmental organisms or ecosystems. Accordingly, the essence of the science of toxicology is defining the fine line that distinguishes a risk from a residue. To accomplish this requires scientific expertise in such areas as analytical and environmental chemistry, biology, and mathematics. Advanced courses and research are also available in such subdisciplines as human health risk assessment, epidemiology, environmental chemistry and engineering ecotoxicology, food additives and nutritional toxicology, biochemical and physiological mechanisms, histopathology, diagnostic and analytical toxicology, drug metabolism, chemical carcinogenesis, behavioral toxicology, and the toxicity of noxious agents to various organ systems (e.g., nervous, heart, liver, kidneys).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree or its foreign equivalent from a recognized college or university with a full year each of biology, organic chemistry, and physics, as well as mathematics.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 22 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 30 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The master of science degree is offered under Plan A and Plan B. Plan A requires 22 course credits and 10 thesis credits; Plan B requires 30 course credits. A core curriculum of 8 credits in toxicology (TXCL 8012, 8013, and 8100) is required for both plans. Additional courses are arranged on an individual basis.
Twin Cities Campus
Toxicology Minor
Medical School - Adm
Graduate School

Link to a list of faculty for this program.

Contact Information:
Toxicology Graduate Program, Medical School Duluth, 162 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-6354; fax: 218-726-8014)
Email: toxgrad@d.umn.edu
Website: http://www.ahc.umn.edu/toxicology

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This University-wide program provides comprehensive training in the broad scope of toxicology. Toxicology, the science of poisons, is devoted to identifying and quantifying potential noxious agents in our environment. Although most chemical agents at sufficiently large doses may be toxic, not all present a significant risk to human health or to environmental organisms or ecosystems. Accordingly, the essence of the science of toxicology is defining the fine line that distinguishes a risk from a residue. To accomplish this requires scientific expertise in such areas as analytical and environmental chemistry, biology, and mathematics. Advanced courses and research are also available in such subdisciplines as human health risk assessment, epidemiology, environmental chemistry and engineering, ecotoxicology, food additives and nutritional toxicology, biochemical and physiological mechanisms, histopathology, diagnostic and analytical toxicology, drug metabolism, chemical carcinogenesis, behavioral toxicology, and the toxicity of noxious agents to various organ systems (e.g., nervous, heart, liver, kidneys).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minor is available at the doctoral level and requires 12 credits: 8 credits of core courses and 4 credits of advanced toxicology courses.
**Twin Cities Campus**

**Toxicology Ph.D.**  
*Medical School - Adm*  
*Graduate School*

Link to a [list of faculty](#) for this program.

**Contact Information:**  
Toxicology Graduate Program, Medical School Duluth, 162 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-6354; fax: 218-726-8014)  
Email: toxgrad@d.umn.edu  
Website: [http://www.ahc.umn.edu/toxicology](http://www.ahc.umn.edu/toxicology)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 54
- This program requires summer semesters for timely completion.
- The Toxicology Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Toxicology Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

This University-wide program provides comprehensive training in the broad scope of toxicology. Toxicology, the science of poisons, is devoted to identifying and quantifying potential noxious agents in our environment. Although most chemical agents at sufficiently large doses may be toxic, not all present a significant risk to human health or to environmental organisms or ecosystems. Accordingly, the essence of the science of toxicology is defining the fine line that distinguishes a risk from a residue. To accomplish this requires scientific expertise in such areas as analytical and environmental chemistry, biology, and mathematics. Advanced courses and research are also available in such subdisciplines as human health risk assessment, epidemiology, environmental chemistry and engineering, ecotoxicology, food additives and nutritional toxicology, biochemical and physiological mechanisms, histopathology, diagnostic and analytical toxicology, drug metabolism, chemical carcinogenesis, behavioral toxicology, and the toxicity of noxious agents to various organ systems (e.g., nervous, heart, liver, kidneys).

**Program Delivery**  
This program is available:  
• via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must have a bachelor's degree or its foreign equivalent from a recognized college/university. At least a full year each of biology, organic chemistry, and physics, as well as mathematics.

Applicants must submit their test score(s) from the following:  
• GRE

International applicants must submit score(s) from one of the following tests:  
• TOEFL  
  - Internet Based - Total Score: 79  
  - Internet Based - Writing Score: 21  
  - Internet Based - Reading Score: 19  
  - Paper Based - Total Score: 550  
• IELTS  
  - Total Score: 6.5  
The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](#) (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.
Program Requirements
22 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The doctor of philosophy degree requires core courses in physiology (4 credits), biochemistry (6 credits), statistics (2 credits), and toxicology (10 credits). Students must also complete 12 credits in a minor or supporting program and 24 thesis credits. Because the program spans the Duluth and Twin Cities campuses, the required courses differ on each campus.

Additional advanced courses in toxicology or related fields may be specified by the adviser. Students must complete and defend an original research project.
Twin Cities Campus
Water Resources Science M.S.
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, University of Minnesota, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- University of Minnesota, Duluth
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the M.S. level: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Microbiology; Plant Biology; Soil, Water, and Climate; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; Physics; and Political Science; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a bachelor's degree in physical or biological science or engineering.

Recommended academic preparation includes one year (or two semesters) each of calculus, physics, and chemistry, and one biology course.

Availability of funding and willingness of a member of the graduate faculty to serve as an adviser are important criteria for admission to the program.
Special Application Requirements:
Applicants must submit three letters of recommendation via the Graduate School ApplyYourself website. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE General Test. Students may be admitted any semester but are strongly encouraged to submit their application by December 15 for fall semester admission. More specific application instruction can be found on the program website: wrs.umn.edu/prospectivestudents/apply/index.htm.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: The Plan B project is defined by the faculty adviser. The Plan B option is well suited to students who have little undergraduate course work in water resources science and thus need more coursework to gain the combination of depth and breadth needed in this field. Plan B projects involve field, laboratory or computer work and the analysis, synthesis, or interpretation of data.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students may choose Plan A, which requires a thesis, or Plan B, which requires additional coursework and a major project. Both plans incorporate courses offered on the Twin Cities and Duluth campuses.

Students must complete courses in four core areas: 1) hydrology (surface and/or hydrogeology); 2) environmental/water chemistry; 3) limnology; and 4) water resources policy, economics, and management, and two electives in such areas of emphasis as aquatic biology, hydrologic science, watershed science and management, and water management technology. One elective must be from an approved list of technical courses dealing with water quality science/management. A minimum of two related field courses (at least 6 credits) outside of aquatic science are required. Registration for the WRS Seminar during the first semester in residence and training in responsible conduct of research and ethics are also required.

Approved core and area of emphasis courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/index.htm.

A minimum of 20 course credits (plus 10 thesis credits) are required for Plan A and a minimum of 30 credits are required for Plan B (up to 3 credits may be used for the Plan B project). Students who had classes equivalent to those in the WRS core as undergraduates may substitute other classes to meet minimum credit requirements.
Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Limnology and Oceanography
The science of inland waters, or “limnology,” includes the study of streams, lakes, ponds, and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology. A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical and chemical sciences. Such interdisciplinary fields in the modern research university require mechanisms to insure cross-fertilization of ideas, approaches, methods, techniques, and knowledge. The limnology and oceanography track in WRS provides just such a much-needed mechanism.

The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography.

Students may choose Plan A, which requires a thesis, or Plan B, which requires additional coursework and a major project. Specific curriculum for the limnology and oceanography track follows WRS course requirements. Both plans incorporate courses offered on the Twin Cities and Duluth campuses.

Students must complete courses in four limnology and oceanography track core areas: 1) hydrology (surface and/or hydrogeology); 2) environmental/water chemistry; 3) limnology; and 4) water resources policy, economics, and management; and one elective must be from an approved list of technical courses dealing with water quality science/management. An additional one or two electives in limnology and oceanography are also required. A minimum of two related field courses (at least 6 credits) outside of aquatic science are required. Registration for the WRS Seminar during the first semester in residence and training in responsible conduct of research and ethics are also required.

A minimum of 20 course credits (plus 10 thesis credits) are required for Plan A and a minimum of 30 credits are required for Plan B (up to 3 credits may be used for the Plan B project). Students who had classes equivalent to those in the WRS core as undergraduates may substitute other classes to meet minimum credit requirements.

The faculty adviser must be a member of the limnology and oceanography track faculty.

Approved limnology and oceanography track core and elective courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/landotrack/index.htm.
Twin Cities Campus

Water Resources Science Minor

Water Resources Center

Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.
- University of Minnesota Duluth

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the M.S. and Ph.D. levels: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Microbiology; Plant Biology; Soil, Water, and Climate; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering; Geography; Geological Sciences; Physics; and Political Science; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires 9 credits, including WRS 5101 (3 credits) and two of the other core courses described under M.S. degree requirements. Doctoral students must complete 12 credits, including WRS 5101 (3 credits), a core courses described under the M.S. degree requirements, and two electives from one of the areas of emphasis.
Twin Cities Campus
Water Resources Science Ph.D.
Water Resources Center
Graduate School

Link to a list of faculty for this program.

Contact Information:
Water Resources Science, 173 McNeal Hall, 1985 Buford Avenue, St. Paul MN 55108 (612-624-7456; fax: 612-625-1263)
Email: wrs@umn.edu
Website: http://wrs.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 64
- This program does not require summer semesters for timely completion.
- The Water Resources Science Ph.D. is an All-University program delivered on the Twin Cities and Duluth Campuses. The University of Minnesota Twin Cities is the degree granting authority for the Water Resources Science Ph.D. program in Duluth.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This cross-campus interdisciplinary program provides comprehensive training in water resources science, with integration across scientific disciplines. A structured interdisciplinary graduate curriculum is offered. The program includes a set of core courses plus electives in the following areas of emphasis at the Ph.D. level: aquatic biology, environmental chemistry, hydrologic science, limnology, water management technology, water policy, water quality, and watershed science and management. Approximately 80 courses offered within 15 other graduate programs are available to students majoring in water resources science.

The goal of the program is to produce scientists with strong technical skills in disciplines relevant to water resources and a broad understanding of 1) the hydrologic cycle and associated ecosystems, 2) the interconnectedness of the sciences involved in managing aquatic resources, and 3) the interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

Students in the program develop the breadth of scientific knowledge appropriate to understand the complicated aquatic ecosystems and watersheds on which they will work, as well as social dimensions of the topic, including the public policy and legal frameworks in which water resources are protected and managed.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Earth Sciences; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Forest Resources; Geography; Horticultural Science; Microbiology; Plant Biology; Soil, Water, and Climate; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biology; Chemical Engineering; Chemistry; Civil Engineering Geography; Geological Sciences; Physics; Political Science; as well as the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The program is flexible enough to accommodate students from a variety of backgrounds. Normally students have a bachelor's or master's degree in physical or biological science or engineering.

Recommended academic preparation includes one year (or two semesters) each of calculus, physics, and chemistry, and one biology course at the undergraduate level.

Availability of funding and willingness of a member of the graduate faculty to serve as an adviser are important criteria for admission to the Ph.D. program.
Special Application Requirements:
Applicants must submit three letters of recommendation via the Graduate School ApplyYourself website. These letters should be from professors qualified to estimate applicant's class rank and evaluate their ability to complete a program of graduate study, or from persons who can assess their professional or research potential.

Applicants must also submit a résumé of their academic history and professional experience and a statement of purpose, including the proposed area of emphasis. Applicants should submit results of the GRE. Students may be admitted any semester but are strongly encouraged to submit their application by December 15 for fall semester admission. More specific application instruction can be found on the program website: wrs.umn.edu/prospectivestudents/apply/index.htm.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

Program Requirements
28 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Coursework is tailored to student interests, and many areas of emphasis are possible. Core courses are offered on both the Twin Cities and Duluth campuses.

Students complete coursework equivalent to that of an M.S. in water resources science, with additional coursework in an area of emphasis. There are no specific credit requirements in the major, but Ph.D. programs normally include at least 40 course credits beyond the B.S. level, including relevant coursework taken for a master's degree and a required minimum of 12 credits in a supporting or minor program.

Approved core and area of emphasis courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/index.htm.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Limnology and Oceanography
The science of inland waters, or "limnology," includes the study of streams, lakes, ponds and wetlands. While Lake Superior falls into this category, the style of research, particularly the nature of sampling and the scale of the processes investigated, makes study of Lake Superior and other Great Lakes more akin to oceanography than to classical limnology. A program that focuses on the study of both limnology and oceanography strengthens understanding of both systems, through comparative studies and by fostering interaction between groups that focus more strongly on one or the other system. Limnology and oceanography are by necessity interdisciplinary fields, with major components contributed by biological, geological, physical, and chemical sciences.

This track within the cross-campus interdisciplinary WRS program provides comprehensive training in limnology and oceanography. As is the case for the WRS graduate program as a whole, the L&O program includes a set of core courses plus electives in the subfield of limnology and oceanography.

The goal of the program is to produce scientists with strong technical skills in aquatic science and a broad understanding of limnology and oceanography. Faculty on both Twin Cities and Duluth campuses participate in the limnology and oceanography track. WRS limnology and oceanography faculty list: http://wrs.umn.edu/faculty/landotracklist/index.htm.

Specific curriculum for the limnology and oceanography track follows WRS course requirements. Core courses are offered on both the Twin Cities and Duluth campuses.

Students must complete coursework equivalent to that of an M.S. in the water resources science limnology and oceanography track, with additional coursework in an area of limnology and oceanography. There are no specific credit requirements in the major, but Ph.D. programs normally include at least 40 course credits beyond the B.S. level, including relevant coursework taken for a master's degree and a required minimum of 12 credits in a supporting or minor program.

Ph.D. students pursuing this track must have at least two members of the limnology and oceanography track faculty on their committee including the adviser.

Approved limnology and oceanography track core and elective courses as well as a list of faculty are listed on the program website: wrs.umn.edu/degreesandcourses/landotrack/index.htm.
**Twin Cities Campus**

**Development Practice M.D.P.**

**HHH Administration**

Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

**Contact Information:**

Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)

Email: hhhadm@umn.edu

Website: [http://www.hhh.umn.edu](http://www.hhh.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 50
- This program requires summer semesters for timely completion.
- Degree: Master of Development Practice

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of development practice (M.D.P.) prepares students for careers in international development. The degree provides rigorous interdisciplinary training and equips students with the skills needed to address the problems of poverty and sustainable development in the developing world.

The M.D.P. program is jointly administered by the Humphrey School of Public Affairs and the Interdisciplinary Center for the Study of Global Change (ICGC) and spans several academic units across the University of Minnesota. The degree provides training in policy analysis and management, health and education, natural sciences, social sciences, and interdisciplinary research methods. An international field experience and capstone workshop in development practice also are required.

The M.D.P. degree is part of a global consortium of international development programs.

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor’s degree from an accredited U.S. university or foreign equivalent at time of enrollment.

A grade of B or better in an introductory microeconomics or general economics course that includes introductory microeconomics is required. A macroeconomic course will not satisfy this requirement. Competence in college-level algebra (including facility with functional notations; algebraic manipulation of polynomials, logs, and exponentials; and graphic representation of equations) is required for M.D.P. students. A grade of B or better in a college-level course in biology, chemistry, or ecology. At least one course in political science (that analyzes political institutions) is strongly recommended.

Competence in MS Excel and Word is strongly recommended. International professional experience and foreign language competency are strongly preferred.

**Special Application Requirements:**

A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores, at least three letters of recommendation, and a diversity statement.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 100
- Paper Based - Total Score: 600
- IELTS - Total Score: 7

The preferred English language test is Test of English as Foreign Language (TOEFL).

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 50 major credits and null credits outside the major. The is no final exam. A capstone project is required.

**Capstone Project:** The capstone project is an opportunity for M.D.P. students in their second year to apply their knowledge through a client-based team project. Each student team and the workshop instructor will work with an NGO or public sector client engaged in some dimension of international development, preferably situated in a developing country, to identify a suitable project. While the specifics of each project will vary, all will include in-depth research, analysis, and the creation of a professional written report. Student teams will be expected to develop an appropriate presentation of this product to the relevant stakeholders. The projects will be done by small groups and can have multiple dimensions. Students will have the opportunity to integrate various aspects of development such as economic development, public health, environmental sustainability, education and skills development, and citizen participation.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

**Required Core Courses**

- AGRO 5321 - Ecology of Agricultural Systems (3.0 cr)
- MDP 5001 - Ways of Knowing and Sustainable Livelihoods (2.0 cr)
- MDP 5002 - Research Methods for Sustainable Livelihoods (2.0 cr)
- MDP 5003 - Field Study Pre-Departure Seminar (1.0 cr)
- MDP 5100 - International Field Seminar (1.0 cr)
- MDP 5200 - Capstone Workshop in Development Practice (3.0 cr)
- PA 5501 - Theories and Policies of Development (3.0 cr)
- PA 5521 - Development Planning and Policy Analysis (4.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5941 - Leadership for the Common Good (4.0 cr)

**Education Policy**

- OLPD 5121 - Educational Reform in International Context (3.0 cr)
- or OLPD 5080 - Special Topics: Educational Policy and Administration (1.0 - 3.0 cr)

**Environmental Science**

- EEB 5146 - Science and Policy of Global Environmental Change (3.0 cr)
- or GEOG 5401 - Geography of Environmental Systems and Global Change (4.0 cr)

**Qualitative Analysis**

- OLPD 5056 - Case Studies for Policy Research (3.0 cr)
- or PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)

**Public Health**

- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6100 - Topics: Environmental Health (0.5 - 4.0 cr)

**Electives**

Electives (to bring total degree credits to at least 50) can be chosen from the four main areas listed below. Take 3 or more credits(s) from the following:

**Natural Sciences**

- ESPM 5061 - Water Quality and Natural Resources (3.0 cr)
- or ESPM 5101 - Conservation of Plant Biodiversity (3.0 cr)
- or ESPM 5108 - Ecology of Managed Systems (4.0 cr)
- or ESPM 5202 - Environmental Conflict Management, Leadership, and Planning (3.0 cr)
- or ESPM 5251 - Natural Resources in Sustainable International Development (3.0 cr)
- or ESPM 5604 - Environmental Management Systems and Strategy (3.0 cr)
or FR 5104 - Forest Ecology (4.0 cr)
or FR 5153 - Forest and Wetland Hydrology (3.0 cr)
or HORT 5071 - Ecological Restoration (4.0 cr)
or PA 5721 - Energy and Environmental Policy (3.0 cr)
or WRS 5241 - Ecological Risk Assessment (3.0 cr)
• Health and Education
  • OLPD 5104 - Strategies for International Development of Education Systems (3.0 cr)
or PA 5414 - Child Human Rights: Work and Education (3.0 cr)
or PUBH 6080 - Seminar: Policy, Politics, and Ethics of Public Health Decision Making (2.0 cr)
or PUBH 6133 - Global Health Seminar (1.0 cr)
or PUBH 6807 - Global Health Relief, Development, and Religious and Non-Religious NGOs (3.0 cr)
or PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
or PUBH 6933 - Nutrition and Chronic Diseases (2.0 cr)
or PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
or PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
• Management and Policy Analysis
  • PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
or PA 5111 - Financial Management in Public and Nonprofit Organizations (3.0 cr)
or PA 5301 - Population Methods and Issues for the United States and Third World (3.0 cr)
or PA 5522 - International Development Policy, Families, and Health (3.0 cr)
or OLPD 5011 - Leading Organizational Change: Theory and Practice (3.0 cr)
or OLPD 5048 - Cross-Cultural Perspectives on Leadership (3.0 cr)
or OLPD 5851 - Methods for Change in Developing Countries (3.0 cr)
• Social Science
  • ANTH 5041 - Ecological Anthropology (3.0 cr)
or ANTH 5122 - Problems in Culture Change and Applied Anthropology (3.0 - 6.0 cr)
or APEC 5152 - Applied Macroeconomics: Income and Employment (3.0 cr)
or APEC 5651 - Economics of Natural Resource and Environmental Policy (3.0 cr)
or GEOG 8007 - Proseminar: Theories of Development and Change (3.0 cr)
or GEOG 5385 - Globalization and Development: Political Economy (4.0 cr)
or GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
or GEOG 5565 - Geographical Analysis of Human-Environment Systems (3.0 cr)
or PA 5801 - Global Public Policy (3.0 cr)
or POL 5485 - Human Rights and Democracy in the World (3.0 cr)
or POL 5889 - Governments and Global Trade and Money (3.0 cr)
or SOC 5090 - Topics in Sociology (1.0 - 3.0 cr)
Twin Cities Campus
Nonprofit Management Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 16
- This program does not require summer semesters for timely completion.
- Degree: Nonprofit Management PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The nonprofit management certificate program is designed for professionals who are employed in nonprofit organizations, especially persons who do not have a formal educational background in managing and leading a nonprofit organization. Students acquire knowledge and skills in effective leadership and management, organizational development, nonprofit governance, strategic planning, policy analysis, human resource development, finance, and fundraising. Jointly sponsored by the Humphrey School of Public Affairs, the School of Social Work, the School of Public Health, and the College of Education and Human Development, this program offers a wide array of elective courses appropriate to a broad range of nonprofit settings.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A bachelor's degree from an accredited institution. Mathematics courses through algebra. A one-semester course in microeconomics.

Special Application Requirements:
A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, and nonprofit experience form.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.
16 credits of coursework are required, including 7.5 credits of required courses. Required courses must be taken for a letter grade.

In consultation with the faculty adviser, a minimum of 8.5 elective credits are chosen to meet the student's individual goals and interests.

**Required Core Courses (7.5 credits)**
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)
- PA 5251 - Strategic Planning and Management (3.0 cr)
- PA 5101 - Management and Governance of Nonprofit Organizations (3.0 cr)
Twin Cities Campus
Policy Issues on Work and Pay Postbaccalaureate Certificate
HHH Administration
Hubert H. Humphrey School of Public Affairs

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Policy Issues on Work and Pay PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The policy issues in work and pay certificate provides an understanding of, and the ability to evaluate and develop, federal, state, and local policies that affect the employment relationship. Students learn about the role of government in the employment relationship, including statutes and how employers, unions, and the government interpret and utilize policies. Core courses are drawn from the Humphrey School of Public Affairs as well as the Center for Human Resources and Labor Studies in the Carlson School of Management, with auxiliary courses in law, history, sociology, and applied economics.

The certificate consists of at least 15 credits. Students complete 10 elective credits that allow them to focus on the area of public policy that is most relevant to their professional and educational goals and needs. Some elective courses require prerequisites, which do not count toward the certificate.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Mathematics courses at least through algebra; a one-semester course in microeconomics.

Special Application Requirements:
A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Core Courses (5 credits)
- PA 5431 - Public Policies on Work and Pay (3.0 cr)
  - Note: Only the section of PA 5022 specifically titled Economics of Social Insurance Programs (3 cr) will count toward the certificate.
  - HRIR 5054 - Public Policies on Employee Benefits: Social Safety Nets (2.0 cr)
  - or PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)

Elective Courses (minimum of 10 credits)
  - Note: HRIR 5000: Topic of section must cover public policies. PA 8390 topic is Research Methods in Public Policy.
  - Take 3 - 5 course(s) totaling 10 or more credits(s) from the following:
    - HRIR 5000 - Topics in Human Resources and Industrial Relations (2.0 cr)
    - HRIR 5022 - Managing Diversity (2.0 cr)
    - HRIR 5023 - Employment and Labor Law for the HRIR Professional (2.0 cr)
    - HRIR 5026 - Comparative and International Human Resources and Industrial Relations (2.0 cr)
    - HRIR 8071 - Labor Relations and Collective Bargaining (4.0 cr)
    - PA 5401 - Poverty, Inequality, and Public Policy (3.0 cr)
    - PA 8390 - Advanced Topics in Advanced Policy Analysis Methods (1.0 - 3.0 cr)
    - HIST 5844 - U.S. Labor History (3.0 cr)
    - LAW 6203 - Labor Law (2.0 - 3.0 cr)
    - LAW 6631 - Employment Discrimination (3.0 - 4.0 cr)
    - LAW 6625 - Disability Law (3.0 cr)
    - LAW 6632 - Employment Law (2.0 - 3.0 cr)
    - LAW 6833 - Alternative Dispute Resolution (2.0 - 3.0 cr)
    - APEC 5511 - Labor Economics (3.0 cr)
    - SOC 8421 - Work and Occupations (3.0 cr)
Twin Cities Campus
Public Affairs Leadership Postbaccalaureate Certificate

HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program does not require summer semesters for timely completion.
- Degree: Public Affairs Leadership PBac Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Certificate in Public Affairs Leadership offers mid-career professionals specific knowledge and skills in leadership, management, public policy, and analysis to succeed in today’s challenging environment. Intended for working professionals, the program allows students to complete a professional certificate in an integrative cohort format in nine months. The certificate stands on its own or can be a stepping stone to the mid-career Master of Public Affairs degree. The Certificate in Public Affairs Leadership is offered in a unique combination of on campus and online sessions, making it convenient for students from outside of the Twin Cities area to participate. The program starts with an intensive, introductory week in August, followed by monthly Friday-Saturday meetings from September to April. This cohort approach combines the intensity and depth of in-person instruction paired with the convenience of online coursework. (Students also may pursue the certificate by taking courses in a weekly classroom format.)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment.

Students must have 10 years of professional experience and a demonstrated interest in public affairs.

A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, TOEFL scores (when applicable), at least three letters of recommendation, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

Course Group 0

Curriculum

**Cohort Option**
- PA 5051 - Cohort Leadership I (2.0 cr)
- PA 5052 - Cohort Leadership II (2.0 cr)
- PA 5053 - Cohort Policy Analysis I (2.0 cr)
- PA 5054 - Cohort Policy Analysis II (2.0 cr)
- PA 5055 - Cohort Quantitative Analytics I (2.0 cr)
- PA 5056 - Cohort Quantitative Analytics II (2.0 cr)

-OR-

**Weekly Classroom Option**
- PA 5941 - Leadership for the Common Good (4.0 cr)
- PA 5038 - Analytics for Leaders I (2.0 cr)
- PA 5039 - Analytics for Leaders II (2.0 cr)
- PA 8001 - Transforming Public Policy (4.0 cr)
**Twin Cities Campus**

**Public Affairs M.P.A.**

*HHH Administration*

Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

**Contact Information:**
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: [http://www.hhh.umn.edu](http://www.hhh.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Affairs

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of public affairs (M.P.A.) is intended for mid-career professionals, and prepares them for public leadership and policy making. The program is typically completed in two to three years of part-time enrollment. The program can be completed in one calendar year (fall, spring, summer semesters, in that order) by attending full-time. Self-designed concentrations include advanced policy analysis methods; economic and community development; global public policy; public and nonprofit leadership and management; science, technology, and environmental policy; social policy; women and public policy; land use/urban design planning; economic and workforce development; housing and community development; environmental planning; and transportation planning. Required courses in this degree may be taken in a traditional weekly on-campus classroom setting or through a cohort format which requires monthly on-campus meetings combined with an online learning environment between the monthly meetings.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment.

**Special Application Requirements:**
Ten years or more of postbaccalaureate professional career or public affairs experience. Demonstrated basic competency in MS Excel and Word. A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, TOEFL scores (if applicable), at least three letters of recommendation, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**
Plan C: Plan C requires 30 major credits and null credits outside the major. There is no final exam. A capstone project is required.

Capstone Project: The capstone project is designed to provide a learning opportunity for students to apply their knowledge through a client-based team project. The workshop includes a written report for the client, an oral presentation to the client that summarizes the major findings of the report, and reflection paper on the workshop experience.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Core Courses (12 credits)

Weekly Class Option
PA 5941 - Leadership for the Common Good (4.0 cr)
PA 5038 - Analytics for Leaders I (2.0 cr)
PA 5039 - Analytics for Leaders II (2.0 cr)
PA 8001 - Transforming Public Policy (4.0 cr)

or Cohort Option
PA 5051 - Cohort Leadership I (2.0 cr)
PA 5052 - Cohort Leadership II (2.0 cr)
PA 5053 - Cohort Policy Analysis I (2.0 cr)
PA 5054 - Cohort Policy Analysis II (2.0 cr)
PA 5055 - Cohort Quantitative Analytics I (2.0 cr)
PA 5056 - Cohort Quantitative Analytics II (2.0 cr)

Capstone Project
PA 5080 - Capstone Preparation Workshop (1.0 cr)
PA 8081 - Capstone Workshop (3.0 cr)

Remaining Credits (14)
M.P.A. students self-design their courses of study, choosing from a wide variety of classes, including skills courses in management, analysis, and planning; and concentration courses in such areas as global policy; social policy; economic and community development; science, technology, and environmental policy; and urban and regional policy and planning. For a list of ideas on how to formulate their concentrations, students should read the program planning worksheet for M.P.A.s.
Twin Cities Campus
Public Affairs Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public affairs minor prepares students for public leadership and policy making. Completion of requirements is possible within a semester, although it is also possible to spread the classes over a longer period of time. Areas of study include advanced policy analysis methods; economic and community development; global public policy; public and nonprofit leadership and management; science, technology, and environmental policy; social policy; women and public policy; land use/urban design planning; economic and workforce development; housing and community development; environmental planning; and transportation planning.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor in public affairs consists of graduate-level public affairs (PA) courses, all completed with grades of B or better. Specific coursework is chosen in consultation with the student's minor adviser or director of graduate studies. Students are required to take a minimum of one course from those required for the master of public affairs degree program.
Twin Cities Campus
Public Policy M.P.P.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadm@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 45
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Policy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of public policy (M.P.P.) curriculum is built upon a core of required theoretical and methodological courses. In remaining courses, students choose either to emphasize more advanced study of analysis or management, or to focus on a particular substantive area of public policy. Structured concentrations include advanced policy analysis methods; economic and community development; global public policy; public and nonprofit leadership and management; science, technology, and environmental policy; social policy; and women and public policy. Students have multiple opportunities to apply the concepts learned in their coursework to real-life policy problems, including cases presented in courses, their internships, and workshops. Dual degrees include M.P.P./master of business administration; M.P.P./juris doctor; M.P.P./master of science in health services research, policy, and administration; and M.P.P./master of social work.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment.

Competence in college-level algebra (including facility with functional notations; algebraic manipulation of polynomials, logs, and exponentials; and graphic representation of equations) is required. A grade of B or better in an introductory course in microeconomics is required. At least one course in political science (that analyzes political institutions) is strongly recommended.

Competence in MS Excel and Word is strongly recommended.

Special Application Requirements:
A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and a diversity statement.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan C: Plan C requires 45 major credits and null credits outside the major. There is no final exam.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

This program offers options for four dual degrees. Each dual degree option within the M.P.P. allows for a different number of credits in common between the two programs:

M.P.P./J.D.: 29 credits in common allowed
M.P.P./M.S.-H.S.R.P.A.: 16 credits in common allowed
M.P.P./M.S.W.: 21 credits in common allowed for full program, 15 for advanced standing, 11 for Direct Practice
M.P.P./M.B.A.: 24 credits in common allowed

Core Courses
- PA 5011 - Management of Organizations (3.0 cr)
- PA 5012 - The Politics of Public Affairs (3.0 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5003 - Introduction to Financial Analysis and Management (1.5 cr)

PA 5022
Take 3 or more credits from the following:
• PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)

Methods Courses
Take 2 or more course(s) from the following:
• PA 5032 - Intermediate Regression Analysis (2.0 cr)
• PA 5033 - Multivariate Techniques (2.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5036 - Regional Economic Analysis (2.0 cr)
• PA 5037 - Regional Demographic Analysis (2.0 cr)

Concentration: 9 credits

Professional Paper
Professional paper through a Capstone Workshop, Working Group, or Master's: Professional Paper (Individual Option).
- PA 8081 - Capstone Workshop (3.0 cr)
or PA 8082 - Working Group (3.0 cr)
or PA 8921 - Master's: Professional Paper (Individual Option) (1.0 - 3.0 cr)

Electives
Electives to bring total credits to 45.
Twin Cities Campus
Public Policy Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

The public policy curriculum is built upon a core of required theoretical and methodological courses. In coursework, students study policy analysis or management or focus on a substantive area of public policy. Substantive areas include advanced policy analysis methods; economic and community development; global public policy; public and nonprofit leadership and management; science, technology, and environmental policy; social policy; and women and public policy. Students have multiple opportunities to apply the concepts learned to real-life policy problems.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor in public policy consists of graduate-level public affairs (PA) courses, all completed with grades of B or better. Specific coursework is chosen in consultation with the student's minor adviser or director of graduate studies. Students are required to take a minimum of one course from those required for the master of public policy degree program.
Twin Cities Campus

Science, Technology, and Environmental Policy M.S.

HHH Administration

Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 40
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The M.S. in science, technology, and environmental policy (STEP) provides students with an understanding of the role of science and technology in society, including food and agriculture, the economy, energy and the environment, security, health, and education; the impact of science and technology on the political and economic relationships within and among nations; and the analysis and design of policies for appropriate promotion and regulation of science and technology regionally, nationally, and internationally. The program educates students with natural and social science backgrounds to assume roles in public policy development.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment.

A grade of B or better in introductory microeconomics is required. At least one course in political science (that analyzes political institutions) is strongly recommended. At least one semester of calculus is required. A degree or advanced-level coursework in the natural or engineering sciences is expected. Students who have not taken introductory statistics prior to admission must take PA 5031, above the 40 credits required for the degree.

Competence in MS Excel and Word is strongly recommended.

Special Application Requirements:
A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and a diversity statement.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 700
- IELTS
  - Total Score: 7

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 24 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 34 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students should take 6 credits to complement their previous training: appropriate courses in natural or engineering science or its history or philosophy for those with social science backgrounds; appropriate courses in the social sciences for those with natural or engineering science backgrounds.

Elective credits are chosen in consultation with the student's adviser.

Students who have not taken prior coursework in statistics must demonstrate to their advisers that they have adequate preparation in statistics or must take Empirical Analysis I (PA 5031). PA 5031 does not count toward fulfilling the 40-credit minimum requirement.

Required Core Courses

- PA 5012 - The Politics of Public Affairs (3.0 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5711 - Science and Technology Policy (3.0 cr)
- PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
- PA 5715 - Survey of Current Issues in Science, Technology, and Environmental Policy (1.5 cr)
- PA 5790 - Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)

At least one of the following:

- PA 5723 - Water Policy (3.0 cr)
- or PA 5721 - Energy and Environmental Policy (3.0 cr)
- or PA 5731 - Emerging Technologies and Society (3.0 cr)
- or PA 5741 - Risk Analysis and Policy (3.0 cr)

Methods Courses

Take 2 or more course(s) from the following:

- PA 5032 - Intermediate Regression Analysis (2.0 cr)
- PA 5033 - Multivariate Techniques (2.0 cr)
- PA 5035 - Survey Research and Data Collection (1.5 cr)
- PA 5036 - Regional Economic Analysis (2.0 cr)
- PA 5037 - Regional Demographic Analysis (2.0 cr)
- PA 5041 - Qualitative Methods for Policy Analysts (4.0 cr)

Plan B Paper or Plan A Thesis

Electives

Electives to bring total credits to at least 40.

Joint- or Dual-degree Coursework: Joint Degree Program in Law, Health, and the Life Sciences (M.S.-S.T.E.P./J.D.) Student may take a total of 24 credits in common among the academic programs.
Twin Cities Campus

Science, Technology, and Environmental Policy Minor

HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in science, technology, and environmental policy provides students with an understanding of the role of science and technology in society, including food and agriculture, the economy, energy and the environment, security, health, and education; the impact of science and technology on the political and economic relationships within and among nations; and the analysis and design of policies for appropriate promotion and regulation of science and technology regionally, nationally, and internationally.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The science, technology, and environmental policy minor consists of graduate-level public affairs courses, all completed with grades of B or better. Specific coursework is chosen in consultation with the student's minor adviser or director of graduate studies. Students are required to take a minimum of one required course in the M.S.-STEP degree program.
Twin Cities Campus
Urban and Regional Planning M.U.R.P.
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Urban and Regional Planning

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of urban and regional planning (M.U.R.P.) degree is an interdisciplinary program that prepares students to analyze, forecast, design, and implement plans for regions, communities, and neighborhoods. Students develop a comprehensive understanding of the built environment (land use, transportation, housing, regional economies) and the ability to mediate among competing interests. They are prepared for jobs in public, nonprofit, and private sectors. Students can generally complete the M.U.R.P. degree in two years of full-time study.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A four-year bachelor's degree from an accredited U.S. university or foreign equivalent at time of enrollment.

Competence in college-level algebra (including facility with functional notations; algebraic manipulation of polynomials, logs, and exponentials; and graphic representation of equations) is required. A grade of B or better in an introductory course in microeconomics is strongly recommended. (A macroeconomics or single-semester general economics course will not satisfy this requirement.) At least one course in political science (that analyzes political institutions) is strongly recommended.

Competence in MS Excel and Word is strongly recommended. M.U.R.P. students must demonstrate competence with GIS through coursework or work experience. (Students not competent in GIS must take a GIS course as part of their 48 credits).

Special Application Requirements:
A complete application will include a Graduate School application, personal statement, resume or C.V., transcripts, GRE scores, TOEFL scores (if applicable), at least three letters of recommendation, and a diversity statement.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 32 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan C: Plan C requires 48 major credits and null credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

A 400-hour professional internship is required.

This program offers options for two dual degrees. Each dual degree option allows a different number of credits in common between the two degrees:

- M.U.R.P./J.D.: 29 credits in common allowed
- M.U.R.P./M.S.C.E.: 18 credits in common allowed
- M.U.R.P./M.S.W.: 21 credits in common allowed for the full program; 15 for advanced standing; and 11 for M.S.W. Direct Practice

Required Core Courses

PA 5004 - Introduction to Planning (3.0 cr)
PA 5013 - Law and Urban Land Use (1.5 cr)
PA 5031 - Empirical Analysis I (4.0 cr)
PA 5036 - Regional Economic Analysis (2.0 cr)
PA 5037 - Regional Demographic Analysis (2.0 cr)
PA 5253 - Designing Planning and Participation Processes (3.0 cr)
PA 8081 - Capstone Workshop (3.0 cr)

One of the Following:

PA 5204 - Urban Spatial and Social Dynamics (3.0 cr)
or PA 5521 - Development Planning and Policy Analysis (4.0 cr)

Domain Courses

Take 2 or more course(s) from the following:

- PA 8201 - Environment and Infrastructure Planning (4.0 cr)
- PA 8202 - Networks and Places: Transportation, Land Use, and Design (4.0 cr)
- PA 8203 - Neighborhood Revitalization Strategies and Theories (4.0 cr)
- PA 8204 - Creating Good Work: Economic and Workforce Development (4.0 cr)

Concentration

9-credit concentration (Plan C) or 6-credit concentration (Plan A)

Electives or Thesis Credits

Electives or Optional Plan A thesis credits (to bring total degree credits to at least 48)
Twin Cities Campus
Urban and Regional Planning Minor
HHH Administration
Hubert H. Humphrey School of Public Affairs

Link to a list of faculty for this program.

Contact Information:
Graduate Student Services, Hubert H. Humphrey School of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax: 612-626-0002)
Email: hhhadmit@umn.edu
Website: http://www.hhh.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Planners bring together knowledge and expertise from many diverse disciplines to shape neighborhoods, cities, and regions. The urban and regional planning minor helps students to think across those fields of expertise and act upon links among environmental systems, infrastructure development, and housing and community development. The program teaches technical and analytical skills needed to think strategically about developing and implementing plans at the neighborhood, city, and regional level.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor in urban and regional planning consists of graduate-level public affairs (PA) courses, all completed with grades of B or better. Specific coursework is chosen in consultation with the student's minor adviser or director of graduate studies. Students are required to take a minimum of one course from those required for the master of urban and regional planning degree program.
Twin Cities Campus

Law Minor

Law School

Link to a list of faculty for this program.

Contact Information:
Law School, Walter F. Mondale Hall, 229 19th Avenue South, Minneapolis, MN 55406 (612-625-1000; fax: 612-625-2011)
Email: law@umn.edu
Website: http://www.law.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

A law minor is available to both master's (M.A. and M.S.) and doctoral students and is individually tailored to their academic interests.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires at least 6 graduate credits; a doctoral minor requires at least 12 graduate credits.
Experimental Surgery M.S. Exp.Surg.

Contact Information:
Department of Surgery, MMC 328, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-2590)
Email: surgwww@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g167.html

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

Program Requirements
Plan A: Plan A requires 26 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Experimental Surgery Minor
Surgery
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Surgery, MMC 326, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-2590)
Email: surgwww@umn.edu
Website: http://www.catalogs.umn.edu/grad/programs/g167.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The general surgery program trains medical doctors for the practice of surgery and for academic positions. See the Medical School Catalog for professional degree requirements; see below for academic degree requirements. Trainees spend two to three years in laboratory research, either in a basic science or in surgery, after which they begin their senior residency and chief residency training. The Medical School's laboratory departments offer many graduate courses closely related to surgery (see the graduate programs in biochemistry, molecular biology, and biophysics; cellular and integrative physiology; microbiology, immunology, and molecular pathobiology; and pharmacology). These fields also offer opportunities for research work. The Department of Surgery offers supervised work in its experimental research laboratories, as well as in its hospital and outpatient departments in the areas of surgical diagnosis and operative surgery and in some surgical specialties (such as colon and rectal surgery, transplantation, thoracic and cardiovascular surgery, and pediatric surgery).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Human Genetics Minor
Genetics, Cell Biology, and Development TCBS
Medical School

Link to a list of faculty for this program.

Contact Information:
Institute of Human Genetics, 420 Delaware Street S.E., MMC 206, Minneapolis, MN 55455

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Institute of Human Genetics mission is to function both as a research center and resource for scientists within the Medical School and throughout the University of Minnesota. In this capacity it will develop and foster excellence in human genetic research and education, and provide a bridge between the basic and clinical sciences particularly as they relate to understanding and treating human diseases.

The courses for the human genetics minor require a basic understanding of human and molecular genetics and some statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

All students in the minor must take a basic graduate level human genetics course (such as GCD8073 - Advanced Human Genetics). Additional courses to fulfill the requirements for the minor are selected from courses that are appropriate for advanced study in human genetics. Representative courses are listed in genetics, epidemiology/public health, psychology, and law. All courses for the minor cannot be from the same department/program, and students are encouraged to take at least one course that is outside of their major course area (such as taking a non-GCD course for a MCDBG student). Contact the program for specific courses for the minor program.
**Twin Cities Campus**

**Integrative Biology and Physiology M.S.**

*Integrative Biology and Physiology*

**Medical School**

Link to a [list of faculty](#) for this program.

**Contact Information:**
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5902; fax: 612-625-5149)
Email: ibpdept@umn.edu
Website: [http://physiology.med.umn.edu/index.html](http://physiology.med.umn.edu/index.html)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

Note: Students enter the Twin Cities M.S. program in integrative biology and physiology only for exceptional reasons. Most Twin Cities graduate work is performed at the Ph.D. level. See the Integrative Biology and Physiology Ph.D. program for more information.

The graduate programs in the Twin Cities have a cardiovascular emphasis, although other areas of specialization are represented.

On the Duluth campus, students can enroll in coursework and participate in research in several basic areas.

The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the [General Information](#) section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The Plan B project focuses on some aspect of Physiology. Plan B students complete a project under the direction of a faculty member and present their work to their faculty committee in an oral exam.
This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Duluth campus: All course requirements for the M.S. degree can be completed on the Duluth campus. Students are expected to fulfill all degree requirements over a period of two to three calendar years. The program includes at least 20 credits in physiology and 6 credits in a minor or related field of study. Incoming students are encouraged to undertake at least two laboratory rotations in faculty research laboratories of their choice. Fulfillment of degree requirements also includes the presentation and defense of a thesis (Plan A). The final written examination and oral defense of the thesis takes place with participation of faculty from both campuses.

Twin Cities campus: Plan A or B degrees are awarded only in exceptional circumstances. A Plan A M.S. degree requires 14 credits in physiology and 6 credits outside of physiology. The degree is based on laboratory research off or on campus, and requires a written thesis or written project and an oral presentation of the work for the final exam. The M.S. degree is Plan A, unless there are special circumstances requiring a Plan B. For Plan B, the final exam is oral.
Twin Cities Campus
Integrative Biology and Physiology Minor

Contact Information:
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5902; fax: 612-625-5149)
Email: ibpdept@umn.edu
Website: http://physiology.med.umn.edu/grad/index.html

Program Type: Graduate minor related to major
Requirements for this program are current for Fall 2011
Length of program in credits (Masters): 6
Length of program in credits (Doctorate): 12
This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a "hybrid" field in which expertise from many other disciplines is ordinarily required and combined. The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals.

The graduate program in the Twin Cities has a cardiovascular emphasis, although many other areas of specialization are represented.

The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of 6 graduate credits in physiology is required (with approval by the director of graduate studies) for the master's minor. Ph.D. students seeking a doctoral minor are expected to take PHSL 5101 or the equivalent, plus additional courses for a total of 12 credits. Approval is required by the director of graduate studies.
Twin Cities Campus

Integrative Biology and Physiology Ph.D.

Integrative Biology and Physiology

Medical School

Link to a list of faculty for this program.

**Contact Information:**
Department of Integrative Biology and Physiology, Jackson Hall 6-125, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5902; fax: 612-625-5149)
Email: ibpdept@umn.edu
Website: [http://www.umnphysiology.com/grad/home](http://www.umnphysiology.com/grad/home)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 53
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Physiology may be defined as the application of mathematics, physics, and chemistry to the study of structure and function in living systems. As such, physiology is a “hybrid” field in which expertise from many other disciplines is ordinarily required and combined.

The program emphasizes a quantitative approach to understanding the functions of cells, organs, and systems in living animals. Ph.D. students take a core concentration that provides a broad background in the physiology of membranes, cells, transport, and organ systems. Individualized programs are structured to build on the student’s strengths and to fill in gaps that would otherwise be an impediment to specific problem solving. Teaching experience is also available to all students.

The graduate program in the Twin Cities has a cardiovascular emphasis, although many other areas of specialization are represented.

Students can enter the Ph.D. program from the Twin Cities or Duluth campus. Highly qualified individuals with solid quantitative backgrounds are encouraged to apply. In the Twin Cities, prospective students also include people with previous medical training who are already at the University of Minnesota or are considering the University of Minnesota Medical School for residency or fellowship training.

Entering Ph.D. students are expected to take a series of laboratory rotations to familiarize themselves with active areas of research within the degree program. The program includes faculty and corresponding research laboratories from the Department of Integrative Biology and Physiology and also the Departments of Medicine; Surgery; Neuroscience; Neurosurgery; Biochemistry, Molecular Biology, and Biophysics; Pharmacology; Physical Medicine and Rehabilitation; Kinesiology; and Animal Science.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.50.

An undergraduate degree with at least one year (three quarters or two semesters) of calculus, one year of physics, one year of biology, and two years of chemistry is required. For the minor, a background in mathematics, physics, chemistry and biology acceptable to the graduate faculty is required.

**Special Application Requirements:**
For the Ph.D., applicants must take either the General Test of the GRE or the Medical College Admission Test. In addition, all applicants need three letters of recommendation. Admission can be in either fall (preferable) or spring semester.

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 79
- Internet Based - Writing Score: 21
- Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
17 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The Ph.D. program requires courses in cellular physiology and medical physiology. Coursework is tailored to the student's interests with input from the director of graduate studies and the student's adviser. During the first year, students rotate through three laboratories, attend weekly seminars, choose an adviser, and begin a research project. A preliminary written exam in physiology is given after the first year and examines the ability of the student to apply concepts learned in core courses. By the end of the second year, students have completed their coursework including a grant-writing class, and selected a laboratory for their thesis research. A preliminary oral exam is given at the end of the second year and tests the student's ability to apply principles of both physiology and the minor or supporting program to a proposed research-based thesis. A minimum of 12 credits must be completed in the minor field or supporting program.

Minor Requirements for Students Majoring in Other Fields: Ph.D. students are expected to take PHSL 5101 or the equivalent plus additional courses for a total of 12 credits.
Twin Cities Campus
Microbiology, Immunology, and Cancer Biology M.S.
Medical School - Adm
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Microbiology, 1460 Mayo Building, 420 Delaware Street S.E., Minneapolis MN 55455 (612-624-5947; fax: 612-626-0623)
Email: micab@umn.edu
Website: http://micab.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly into the master's program; it is available only by special arrangement with the program.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a bachelor's degree (B.S. preferred).

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 85

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 12 to 18 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students are not admitted directly into the master's program; it is available only by special arrangement with the program. Students complete 14 MICA course credits, 6 credits in the minor or related field, and 10 thesis credits. Students must write and defend a thesis based on original research.
Twin Cities Campus
Microbiology, Immunology, and Cancer Biology Minor

Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Microbiology, 1460 Mayo Building, 420 Delaware Street S.E., Minneapolis MN 55455 (612-624-5947; fax: 612-626-0623)
Email: micab@umn.edu
Website: http://micab.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 18
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A master's minor requires approval of the director of graduate studies in the MiCaB Program, followed by completion of two of the following courses: MICA 8002, MICA 8003, MICA 8004.

A doctoral minor requires two of the following: MICA 8002, MICA 8003, MICA 8004; and any other 3- or 4-credit MICA 8xxx course to total 12-18 credits.
Twin Cities Campus
Microbiology, Immunology, and Cancer Biology Ph.D.
Medical School - Adm
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Microbiology, 1460 Mayo Building, 420 Delaware Street S.E., Minneapolis MN 55455 (612-624-5947; fax: 612-626-0623)
Email: micab@umn.edu
Website: http://micab.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48 to 72
- This program does not require summer semesters for timely completion.
- NA
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, tumor immunology, vaccine development, and vascular biology and inflammation.

Accreditation
This program is accredited by NA

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Applicants must have a bachelor's degree (B.S. preferred).

Required courses include calculus, general chemistry, organic chemistry, and physics. A minimum of two upper-level biology courses, which may include biochemistry, genetics, cell biology, molecular biology, microbiology, or immunology, etc. are also required.

Research experience is required. Relevant undergraduate experience includes honors thesis work, paid or volunteer work in a research laboratory and summer internships. It does not include laboratory courses that accompany science courses such as biology. Postbaccalaureate research experience is preferred but not required.

Special Application Requirements:
The program evaluates applications based on four equally weighted criteria: academics (GPA and GRE scores), letters (3) of recommendation, a personal statement, and research experience. The average GPA and GRE scores of accepted applicants are typically 3.50 and 80th percentile, respectively (no GRE Subject Test is required). Letters of recommendation from research advisers or mentors are preferred as these individuals can comment knowlegably on the student's potential in biomedical research. Applicants' personal statements should describe their research in general and their specific contribution to it, their rationale for seeking a doctoral degree, and any information they wish to share regarding their backgrounds and interest in the MICaB Program. Finally, applicants should provide specific details of their research experiences (project titles, mentors, dates, locations, etc.), along with a list of relevant abstracts, publications, etc.

Applicants must submit their test score(s) from the following:
• GRE
International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 96
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

11 to 12 credits are required in the major.
12 to 13 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Beginning study in the fall, students spend their first year on major coursework, identifying an adviser by doing laboratory rotations, selecting a concentration, and initiating their thesis research project. The program encourages students to take at least two of the three MICaB track core courses, but only requires one. In the fall semester of their second year, all students take MICA 8012, which highlights the integrated nature of the three tracks and helps prepare the students for their written and oral qualifying examinations (taken in the spring semester of the second year). Students also take courses that support studies in their focus area during their first two years.

In addition to coursework and research, students have opportunities to participate in laboratory meetings, journal clubs, and student research seminars, and to assist in laboratory courses. Most students complete the Ph.D. in four to five years.
Twin Cities Campus
Neuroscience M.S.
Neuroscience
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 26 major credits, 12 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The course requirements for a master's degree are the same as those for a Ph.D. degree. See the Program Requirements of the Neuroscience Ph.D.
Twin Cities Campus

Neuroscience Minor

Neuroscience

Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Doctorate): 16
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A doctoral minor program is developed in consultation with the director of graduate studies for neuroscience. Students are required to take one of the following core courses.

Function/Structure: NSC 5561 - Systems Neuroscience (4 cr) or
Cellular/Molecular: NSC 5461 - Cellular and Molecular Neuroscience (4 cr)

In addition, students are required to take elective neuroscience courses for a total minimum of 12 credits (including the core courses).
Twin Cities Campus
Neuroscience Ph.D.
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Neuroscience, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-6474; fax: 612-626-6460)
Email: neurosci@umn.edu
Website: http://www.neuroscience.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 62
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cell biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Applicants are required to take the GRE General Test. Students whose native language is not English are required to take the TOEFL and obtain a minimum score of 625 (paper), 263 (computer), or 107 (Internet); or obtain 6.5 on the IELTS examination. There are no minimum GPA or GRE score requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
26 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

The neuroscience Ph.D. curriculum begins in the summer session with the intensive laboratory course in cellular and molecular neurobiology (NSC 5551), held at the Itasca Biological Station and Laboratories.

The core curriculum continues on the Twin Cities campus with NSC 5461, 5561, 5661, and 8211. While taking these courses, students explore research opportunities in the faculty's laboratories (NSC 8334) and thereby select a thesis adviser.

Elective courses and at least 12 credits in a minor or supporting program are selected in consultation with the adviser (typical minors include cell biology, physiology, statistics, psychology, and medicine; medicine is primarily for students in the M.D./Ph.D. program). Students with sufficient background and previous course experience may apply for a waiver of specific requirements.

Students are also expected to participate in teaching neuroscience and to attend the weekly colloquium as well as neuroscience seminars and sessions devoted to professional development. Students are strongly encouraged to attend seminars in other areas and departments that may interest them.
Twin Cities Campus  
Otolaryngology M.S. Otol.
Otolaryngology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Otolaryngology, MMC 396, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-3200; fax: 612-625-2101)
Website: http://www.ent.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 35
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Otolaryngology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students in both clinical and experimental aspects of otolaryngology. The M.S.Otol. degree requires a publishable thesis. Rotations at University of Minnesota Medical Center-Fairview, Minneapolis Veterans Administration Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Hennepin County Medical Center provide a wide range of opportunity for clinical education and surgical experience.

Opportunities for independent research are provided in the laboratories of audiology, auditory electrophysiology, auditory neurophysiology, biochemistry, cancer biology, cell biology and genetics, electron microscopy, electrophysiology, histochemistry, morphometry, psychoacoustics, temporal bone pathology, tumor immunology, skin-flap physiology, laryngeal physiology, mandibular bone physiology, microvascular tissue transfer, and vestibular physiology. Graduates of the program have careers in teaching, research, and professional practice.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Requires an M.D. degree and is usually pursued in conjunction with a residency in otolaryngology.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 19 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The M.S.Otol. (Plan A only) requires a minimum of 35 credits, including 25 course credits (19 in the major and 6 in the minor or related fields) and 10 thesis credits. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies. Some courses for the M.S.Otol. are more clinical than those for the M.S., and four years of academic preparation are expected.

Students are expected to complete and publish a research paper in a peer-reviewed journal or a presentation/poster at a national scientific meeting.
Twin Cities Campus
Otolaryngology M.S.
Otolaryngology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Otolaryngology, MMC 396, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-3200; fax: 612-625-2101)
Website: http://www.ent.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students in both clinical and experimental aspects of otolaryngology. The M.S. degree requires a publishable thesis. Rotations at University of Minnesota Medical Center-Fairview, Minneapolis Veterans Administration Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Hennepin County Medical Center provide a wide range of opportunity for clinical education and surgical experience.

Opportunities for independent research are provided in the laboratories of audiology, auditory electrophysiology, auditory neurophysiology, biochemistry, cancer biology, cell biology and genetics, electron microscopy, electrophysiology, histochemistry, morphometry, psychoacoustics, temporal bone pathology, tumor immunology, skin-flap physiology, laryngeal physiology, mandibular bone physiology, microvascular tissue transfer, and vestibular physiology. Graduates of the program have careers in teaching, research, and professional practice.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Requires a bachelor's degree from an accredited university or equivalent.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

The M.S. (Plan A only) requires a minimum of 30 credits: 20 course credits (14 in the major and 6 in the minor or related fields) and 10 thesis credits. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies. Students are expected to complete and publish a research paper in a peer-reviewed journal or a presentation/poster at a national scientific meeting.
Twin Cities Campus
Otolaryngology Ph.D. Otol.

Otolaryngology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Otolaryngology, MMC 396, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-3200; fax: 612-625-2101)
Website: http://www.ent.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 55
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy in Otolaryngology

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This program prepares students in both clinical and experimental aspects of otolaryngology. The Ph.D.Otol. degree requires a publishable thesis. Rotations at University of Minnesota Medical Center-Fairview, Minneapolis Veterans Administration Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Hennepin County Medical Center provide a wide range of opportunity for clinical education and surgical experience.

Opportunities for independent research are provided in the laboratories of audiology, auditory electrophysiology, auditory neurophysiology, biochemistry, cancer biology, cell biology and genetics, electron microscopy, electrophysiology, histochemistry, morphometry, psychoacoustics, temporal bone pathology, tumor immunology, skin-flap physiology, laryngeal physiology, mandibular bone physiology, microvascular tissue transfer, and vestibular physiology. Graduates of the program have careers in teaching, research, and professional practice.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Requires a bachelor's or master's degree, preferably in an area related to otolaryngology or, for those pursuing the degree in conjunction with a residency in otolaryngology, an M.D. degree.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
19 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The number of credits varies depending on preparation and the research undertaken. Most students take a total of about 55 credits. A minimum of 12 credits in the minor or supporting program, plus 24 doctoral thesis credits, are required. An advisory committee, including the student, the adviser, and the director of graduate studies, determines coursework in the major. At least one seminar is selected from seminars such as OTOL 8247, 8248, 8249, and 8250. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the...
director of graduate studies.

All students are expected to publish a research paper in a peer-reviewed journal. Students concurrently in an otolaryngology residency usually take five to six years to complete research, course, and dissertation requirements.
Twin Cities Campus
Pharmacology M.S.
Pharmacology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Pharmacology, 6-120 Jackson Hall, 321 Church Street S.E., Minneapolis MN 55455 (612-625-9997; fax: 612-625-8408)
Email: phclgrad@umn.edu
Website: http://www.pharmacology.med.umn.edu/graduate.html

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A four-year B.A. or B.S. degree (or its equivalent) in a basic science program is generally required.

Candidates for admission are evaluated on the basis of undergraduate record, GRE score, previous research experience, and letters of recommendation.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives.

Applicants must submit their test score(s) from the following:
• GRE

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 14 major credits and 16 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** A research project approved by the adviser and director of graduate studies.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Plan A requires a minimum of 20 course credits (14 in pharmacology; and 6 in biochemistry, physiology and/or other related area) and 10 thesis credits. Plan B requires a minimum of 30 course credits (14 in pharmacology; and 16 in biochemistry, physiology, and/or other related areas) and a Plan B project.

Students are expected to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.
Twin Cities Campus
Pharmacology Minor
Pharmacology
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Pharmacology, 6-120 Jackson Hall, 321 Church Street S.E., Minneapolis MN 55455 (612-625-9997; fax: 612-625-8408)
Email: phclgrad@umn.edu
Website: http://www.pharmacology.med.umn.edu/graduate.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 9
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A master's minor requires a minimum of 9 credits in pharmacology approved by the director of graduate studies. A doctoral minor requires a minimum of 12 credits in pharmacology approved by the director of graduate studies. There are no special requirements (e.g., specific courses, written examination).
Twin Cities Campus
Pharmacology Ph.D.
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Pharmacology, 6-120 Jackson Hall, 321 Church Street S.E., Minneapolis MN 55455 (612-625-9997; fax: 612-625-8408)
Email: phclgrad@umn.edu
Website: http://www.pharmacology.med.umn.edu/graduate.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 55
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

A four-year B.A. or B.S. degree (or its equivalent) in a basic science program is generally required.

Candidates for admission are evaluated on the basis of undergraduate record, GRE score, previous research experience, and letters of recommendation.

Special Application Requirements:
Applicants must submit scores from the General Test of the GRE; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of official transcripts; and a clearly written statement of career interests, goals, and objectives.

Applicants must submit scores from the General Test of the GRE, with scores above the 80th percentile in all categories preferred.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7.5
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
19 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. requires a minimum of 19 course credits in the major (excluding the required 24 thesis credits).

Students are expected to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.

For more detailed information, contact the director of graduate studies in pharmacology.

Joint- or Dual-degree Coursework: Joint Degree Program in Law, Health and the Life Sciences. Student may take a total of 12 credits in common among the academic programs.
**Twin Cities Campus**

**Physical Therapy D.P.T.**

*Physical Medicine & Rehabilitation*

**Medical School**

Link to a list of faculty for this program.

**Contact Information:**
Program in Physical Therapy, MMC 388, 420 Delaware Street S.E., Minneapolis, MN 55455, (612-624-2662; fax: 612-625-4274)
Email: ptquest@umn.edu
Website: [http://physther.umn.edu](http://physther.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 141
- This program requires summer semesters for timely completion.
- Courses in this Program are taught on campus for the first 7 semesters, with numerous off-site clinic visits scheduled throughout semester 2-7. The remaining 2 semesters of the Program consist of 4 full-time clinical internships. These internships occur off-campus in physical therapy clinics.
- Degree: Doctor of Physical Therapy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Physical Therapy Program, a division within the Department of Physical Medicine and Rehabilitation, offers a professional doctoral degree in physical therapy (D.P.T.). Physical therapy is a health care discipline involved with the study and rehabilitation of movement impairments such as muscular weakness, impaired coordination, joint stiffness, and pain, which can lead to functional problems affecting self care, employment, ambulation, etc. Graduates are prepared to promote proper health care and quality of living by maximizing human movement following disease or injury or by preventing its loss. The program requires three years of year-round, full-time graduate study. Academic coursework and research activity are completed during the first seven semesters. The final two semesters are devoted to clinical internships.

**Accreditation**
This program is accredited by Commission on Accreditation in Physical Therapy Education (CAPTE) (APTA).

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

The University of Minnesota Program in Physical Therapy has no required or preferred undergraduate major. Any baccalaureate degree or equivalent from an accredited institution is accepted.

To be eligible for admission, the student must complete a baccalaureate degree, or its foreign equivalent, from an accredited institution by June 1st of the year of admission, including the required prerequisite courses or their equivalents.

Applicant must complete at least 100 hours of volunteer or work experience in a physical therapy setting. Exposure to multiple and varied areas of practice in physical therapy and additional health care exposure are considered an important preparation. The GRE General exam only is required (see Test Information below). TOEFL is required for international students (see Test Information below). Two letters of recommendation.

**Special Application Requirements:**
Below is a list of required prerequisite coursework to be taken before entering the program. Courses must be taken A-F, unless receiving Advanced Placement (AP) credit. A minimum grade of C is required in all prerequisite coursework. It is recommended that these courses be taken within the previous five years. Courses may be taken at any accredited college. Students are expected to be skillful with computer applications for word processing and creating spreadsheets.
- General biology, with lab
- A second biology course of the student's choice, with lab
- Human anatomy

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
- Human physiology
- General chemistry or inorganic chemistry - minimum two courses, with lab
- General physics, which includes mechanics and electricity - minimum two courses, with lab
- General psychology
- Abnormal psychology
- Statistics - ANOVA and regression analysis content strongly recommended
- Introductory calculus (pre-calculus not acceptable; Intro to Calculus or Short Calculus acceptable)
- Medical terminology

For all AP courses on the transcript, a score must be entered. This will be the score issued by the College Board. Students must also forward a copy of the College Board Report to the admissions coordinator to keep on file.

If distance learning courses are taken from an accredited college or university for college credit, there is no limit to the number that may be taken through distance education.

All prerequisite courses and an undergraduate degree must be completed before the student enrolls in the professional program. Students may apply with two remaining prerequisites in progress. Past students have found that biochemistry, and human/animal biology classes have been helpful preparation for the D.P.T. curriculum.

Applicants must submit their test score(s) from the following:

- GRE

International applicants must submit score(s) from one of the following tests:

- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550

- IELTS
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

95 credits are required in the major.
9 credits are required outside the major.
46 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The program requires 141 major field credits, of which 95 are core academic credits and 46 are clinical internship credits; 9 credits of research are included and a scientific poster presentation and written exam based on this research culminates the project. No minor or related field is required. Students must maintain a cumulative GPA of 2.80 while in the program.
**Twin Cities Campus**

**Rehabilitation Science M.S.**

*Physical Medicine & Rehabilitation*

**Medical School**

Link to a list of faculty for this program.

**Contact Information:**
Department of Physical Medicine and Rehabilitation, MMC 388, 420 Delaware Street S.E., Minneapolis, MN, 55455 (612-625-3966; fax: 612-625-4274)
Email: adamc002@umn.edu
Website: [http://www.med.umn.edu/rehabscience](http://www.med.umn.edu/rehabscience)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The Rehabilitation Science Program prefers Ph.D. applicants over M.S. applicants. The M.S. track often applies to students who are in need of a trial program to determine whether or not the Ph.D. track is a good fit. In addition, the M.S. track is used for students who initially begin the Ph.D., but find that the Ph.D. is not the best fit and subsequently switch to the M.S.

The graduate program in rehabilitation science is a post-professional program designed to train researchers and academicians. The rehabilitation science M.S. and Ph.D. degrees are geared to occupational and physical therapists and students with related interests. The program's philosophy provides students with 1) a strong foundation in research methodology, 2) a concentrated educational experience specifically tailored toward a student's specific research question in rehabilitation science, and 3) a working knowledge of the importance of a collaborative, interdisciplinary approach to the scientific process.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must hold a bachelor's degree or graduate degree in a discipline related to rehabilitation such as biomedical engineering, medicine, occupational therapy, physical therapy, or speech/audiology. International students must hold a comparable foreign degree from an accredited program. Depending on the educational background of the applicant, admission may be contingent upon completion of selected prerequisite coursework.

**Special Application Requirements:**
In addition to the Graduate School's application (including personal statement and fee), applicants must submit the following materials:
- GRE General Test scores; official transcripts; three letters of reference; and TOEFL score for international students. Student must also have an agreed-upon faculty adviser at the time of applying. Compatibility of research interests is a major determinant in the student/adviser relationship.

The Rehabilitation Science Program prefers Ph.D. applicants over M.S. applicants. The M.S. track often applies to students who are in need of a trial program to determine whether or not the Ph.D. track is a good fit. In addition, the M.S. track is used for students who initially begin the Ph.D., but find that the Ph.D. is not the best fit and subsequently switch to the M.S.

GRE score is mandatory. Scores in the 50th percentile or higher are preferred.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 14 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B project is a demonstration of the student's familiarity with the tools of research or scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively, by completing at least one Plan B project. The graduate faculty in each major field may require as many as three such projects. The Plan B project(s) should involve a combined total of approximately 120 hours (the equivalent of three full-time weeks) of work. The graduate faculty in each major field specifies both the nature and extent of the options available to satisfy this requirement, and whether the requirement is to be satisfied in conjunction with, or independent of, the courses in the student's program.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

M.S. students must complete a minimum of 30 graduate credits. The minimum of 30 graduate credits is broken down as follows: 14 credits or more including 4 credits of seminars in rehabilitation science (RSC 8100) and a research design course (PT 6293 or RSC 8192); 6 or more credits in a minor or supporting field (sample minors and supporting areas of past students include gerontology, kinesiology, neuroscience, and public health. If a student chooses to declare a minor, the student must follow the minor requirements of the program offering the minor); and 3 credits of statistics coursework (acceptable courses include, but are not limited to PUBH 6450 - Biostatistics I, PUBH 6451 - Biostatistics II, EPSY 8261 - Statistical Methods I, EPSY 8262 - Statistical Methods II). The balance of courses to comprise the overall 30 credit minimum is chosen by agreement between the student and adviser. The student's adviser may require additional courses. Students pursuing Plan A (with thesis) have the additional requirement of thesis credits.
Twin Cities Campus

Rehabilitation Science Minor
Physical Medicine & Rehabilitation
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Physical Medicine and Rehabilitation, MMC 388, 420 Delaware Street S.E., Minneapolis, MN, 55455 (612-625-3966; fax: 612-625-4274)
Email: adamc002@umn.edu
Website: http://www.med.umn.edu/rehabscience

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The graduate program in rehabilitation science is a post-professional program designed to train researchers and academicians. The rehabilitation science M.S. and Ph.D. degrees are geared to occupational and physical therapists and students with related interests. The program's philosophy provides students with 1) a strong foundation in research methodology, 2) a concentrated educational experience specifically tailored toward a student's specific research question in rehabilitation science, and 3) a working knowledge of the importance of a collaborative, interdisciplinary approach to the scientific process.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The student must complete a minimum of 12 rehabilitation science credits (RSC courses) for a letter grade (A-F only), and maintain at least a 3.0 GPA in all rehabilitation science courses taken. Only 4 credits of independent study coursework will be allowed.

Below is a list of eligible rehabilitation science courses. Independent courses are indicated with an asterisk (*).
RSC 5135 - Advanced Biomechanics I: Kinematics (3 cr)
*RSC 5294 - Independent Study in Rehabilitation Science (credits arranged)
RSC 5814 - Age, Exercise, and Rehabilitation (2 cr)
RSC 5841 - Rehabilitation Science Instrumentation and Methodology (4 cr)
RSC 8100 - Rehabilitation Science Seminar (1 cr)
*RSC 8130 - Current Literature (credits arranged)
RSC 8135 - Advanced Kinesiology (3 cr)
*RSC 8170 - Special Topics in Rehabilitation Science (credits arranged)
*RSC 8185 - Problems in Rehabilitation Science (credits arranged)
RSC 8192 - Research Design in Rehabilitation Science (3 cre)
RSC 8282 - Problems in Human Movement (4 cr)
Twin Cities Campus
Rehabilitation Science Ph.D.
Physical Medicine & Rehabilitation
Medical School

Link to a [list of faculty] for this program.

Contact Information:
Department of Physical Medicine and Rehabilitation, MMC 388, 420 Delaware Street S.E., Minneapolis, MN, 55455 (612-625-3966; fax: 612-625-4274)
Email: adamc002@umn.edu
Website: [http://www.med.umn.edu/rehabscience](http://www.med.umn.edu/rehabscience)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 72
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](http://www.med.umn.edu/rehabscience) section of the catalog website for requirements that apply to all major fields.

The graduate program in rehabilitation science is a post-professional program designed to train researchers and academicians. The rehabilitation science M.S. and Ph.D. degrees are geared to occupational and physical therapists and students with related interests. The program's philosophy provides students with 1) a strong foundation in research methodology, 2) a concentrated educational experience specifically tailored toward a student's specific research question in rehabilitation science, and 3) a working knowledge of the importance of a collaborative, interdisciplinary approach to the scientific process.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must hold a bachelor's degree or graduate degree in a discipline related to rehabilitation such as biomedical engineering, medicine, occupational therapy, physical therapy, or speech/audiology. International students must hold a comparable foreign degree from an accredited program. Depending on the educational background of the applicant, admission may be contingent upon completion of selected prerequisite coursework.

Special Application Requirements:
In addition to the Graduate School's application (including personal statement and fee), applicants must submit the following materials: GRE General Test scores; official transcripts; three letters of reference; and TOEFL score for international students. Student must also have an agreed-upon faculty adviser at the time applying. Compatibility of research interests is a major determinant in the student/adviser relationship.

Scores in the 50th percentile or higher are preferred. Scores for recent admits have averaged 480 verbal, 660 quantitative, and 4.5 analytical.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
- Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Ph.D. degree requires a minimum of 36 graduate credits, not including dissertation credits (thesis credits). The minimum of 36 graduate credits is broken down as follows: 16 credits of rehabilitation science (RSC) credits, which include 6 credits of departmental seminars (RSC 8100); 12 graduate credits toward a minor or supporting program (non-RSC courses); and 8 graduate credits of statistics coursework. Sample minors and supporting areas of past students include gerontology, kinesiology, neuroscience, and public health. If a student chooses to declare a minor, the student must follow the minor requirements of the program offering the minor. RSC courses and statistics courses cannot be applied to the credits needed for the minor or supporting program. Acceptable statistics courses include, but are not limited to, PUBH 6450 - Biostatistics I, PUBH 6451 - Biostatistics II, EPSY 8261 - Statistical Methods I, and EPSY 8262 - Statistical Methods II. To fulfill the requirement students need to take both courses in the respective series (Biostats I and Biostats II, Stat Methods I and Stat Methods II). Students cannot fulfill the statistics requirement by taking only PUBH 6450 - Biostatistics I and EPSY 8261 - Statistical Methods I. In addition to these minimum requirements, the adviser may require additional courses. Students should meet with their advisers prior to each semester to plan their courses of study. 24 thesis credits are required.
Twin Cities Campus
Stem Cell Biology M.S.
Stem Cell Institute
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Stem Cell Biology Institute, 2001 6th Street S.E., Mail Code 2873, Minneapolis, MN 55455-3007 (612-625-0602; fax: 612-624-2436)
Email: ander607@umn.edu
Website: http://www.stemcell.umn.edu/graduate_programs/master_of_science/home.htm

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This degree program offers training in stem cell biology, a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture, lab, and seminar courses in these various disciplines, in addition to stem cell biology. They will interact with members of the Stem Cell Institute through participation in research seminars and journal clubs, and will spend a full calendar year conducting stem cell research in the laboratory of a stem cell biology graduate program faculty member. This research will form the basis of the master's thesis.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.20.

A bachelor's degree or foreign equivalent in biological science or a related field.

Special Application Requirements:
Applicants must upload 1) a personal statement (500 words or less) outlining previous research experience, research interests, and long- and short-term goals; 2) a curriculum vitae or resume; 3) the names of three individuals whom the student has asked to write letters of recommendation; and 4) unofficial transcripts to the Apply Yourself on-line application web site.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 94
  - Internet Based - Listening Score: 22
  - Internet Based - Writing Score: 24
  - Internet Based - Reading Score: 22
  - Internet Based - Speaking Score: 26
  - Paper Based - Total Score: 580
- IELTS
  - Total Score: 7
  - Listening Score: 6.2
  - Reading Score: 6.2
  - Writing Score: 6.2
  - Speaking Score: 6.2
- MELAB
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 to 16 major credits, 4 to 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 2.80 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Students must demonstrate familiarity with the tools of research and scholarship in their major field, the ability to work independently, and the ability to present the results of their investigation effectively, by completing a master's thesis and taking an oral exam.

The M.S. is a multidisciplinary program that prepares the basic science undergraduate for a career in research, teaching, or industry within the field of stem cell biology. In addition to taking courses in two or three semesters, students will concurrently conduct research for a full calendar year; this research will form the basis for the thesis.

Required Courses
Twin Cities Campus
Stem Cell Biology Minor
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Stem Cell Biology Institute, 2001 6th Street S.E., Mail Code 2873, Minneapolis, MN 55455-3007 (612-625-0602; fax: 612-624-2436)
Email: SCBgrad@umn.edu
Website: http://www.stemcell.umn.edu/graduate_programs/master_of_science/home.htm

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 12
- Length of program in credits (Doctorate): 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

This degree program offers training in stem cell biology, which is a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture, lab, and seminar courses in these various disciplines, in addition to stem cell biology. They will interact with members of the Stem Cell Institute through participation in research seminars and journal clubs, and will spend a full calendar year conducting stem cell research in the laboratory of a stem cell biology graduate program faculty member. This research will form the basis of the master's thesis.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

In addition to the major requirement appropriate to the student's specific program, the stem cell biology minor will require 12 credits from designated courses with a minimum GPA 3.00.

The main research project must be done in the lab of a member of the stem cell biology graduate faculty.
Twin Cities Campus
Surgery M.S. Surg.

Surgery Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Surgery, University of Minnesota, 420 Delaware Street S.E., MMC 195, Minneapolis, MN 55455 (612-626-2590)
Email: surgwww@umn.edu
Website: http://www.surg.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 63
- This program requires summer semesters for timely completion.
- Degree: Master of Science in Surgery

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The general surgery program trains medical doctors for the practice of surgery and for academic positions. See the Medical School Catalog for professional degree requirements; see below for academic degree requirements. Trainees spend two to three years in laboratory research, either in a basic science or in surgery, after which they begin their senior residency and chief residency training. The Medical School's laboratory departments offer many graduate courses closely related to surgery (see the graduate programs in biochemistry, molecular biology, and biophysics; cellular and integrative physiology; microbiology, immunology, and molecular pathobiology; and pharmacology). These fields also offer opportunities for research work. The Department of Surgery offers supervised work in its experimental research laboratories, as well as in its hospital and outpatient departments in the areas of surgical diagnosis and operative surgery and in some surgical specialties (such as colon and rectal surgery, transplantation, thoracic and cardiovascular surgery, and pediatric surgery).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Prospective students must be in the general surgery training program and have two to three clinical years of training completed.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 47 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The master's degree in surgery (M.S.Surg.) is offered Plan A only. Students spend two to three years in the Medical School's general surgery program. A minimum of 53 course credits (47 in the major, plus 6 in the minor or related fields) plus 10 thesis credits are required for a total of 63 credits.
Twin Cities Campus
Surgery Ph.D. Surg.
Surgery
Medical School

Link to a list of faculty for this program.

Contact Information:
Department of Surgery, University of Minnesota, MMC 328, 420 Delaware Street S.E., Minneapolis, MN 55455
Email: surgwww@umn.edu
Website: http://www.surg.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 103
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy in Surgery

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

*Candidates are currently in our training program and we do not accept outside applications.

The general surgery program trains medical doctors for the practice of surgery and for academic positions. See the Medical School Catalog for professional degree requirements; see below for academic degree requirements. Trainees spend two to three years in laboratory research, either in a basic science or in surgery, after which they begin their senior residency and chief residency training. The Medical School's laboratory departments offer many graduate courses closely related to surgery (see the graduate programs in biochemistry, molecular biology, and biophysics; cellular and integrative physiology; microbiology, immunology, and molecular pathobiology; and pharmacology). These fields also offer opportunities for research work. The Department of Surgery offers supervised work in its experimental research laboratories, as well as in its hospital and outpatient departments in the areas of surgical diagnosis and operative surgery and in some surgical specialties (such as colon and rectal surgery, transplantation, thoracic and cardiovascular surgery, and pediatric surgery).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Prospective students must be in the general surgery training program and have two to three clinical years of training completed.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Part 1 (Composition) score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
67 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Adult Health/Gerontological Clinical Nurse Specialist Postgraduate Certificate
School of Nursing

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: A.Dult Hlth/Geron Clincial Nurse Spec Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space-available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate.

Courses may include:

- **NURS 6405** - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
- **NURS 6407** - Advanced Nursing Care of Older Adults (3.0 cr)
- **NURS 6408** - Advanced Nursing Care of Older Adults Practicum (1.0 cr)
- **NURS 6502** - Assessment and Management of Health for Advanced Practice Nurses, II (3.0 cr)
- **NURS 7505** - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- **NURS 7706** - Implementing the Role of the Clinical Nurse Specialist in Acute Care (2.0 - 3.0 cr)
- **NURS 7406** - Advanced Nursing Practicum in Adult-Gerontology Health (3.0 cr)
Twin Cities Campus
Adult Health/Gerontological Nurse Practitioner Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

• Program Type: Post-baccalaureate credit certificate/licensure/endorsement
• Requirements for this program are current for Fall 2011
• Length of program in credits: 12
• This program requires summer semesters for timely completion.
• Degree: Adult Hlth/Geron Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:  
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
• MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate.

Courses may include:

- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (3.0 cr)
- NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- NURS 6307 - Women's Health Care Practicum (1.0 cr)
- NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
- NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 cr)
Family Nurse Practitioner Postgraduate Certificate

School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Family Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework. Final coursework decisions are made by the faculty adviser.

Courses may include:
NURS 7509 - Assessment and Management of Health Practicum VI: Primary Care for the Family Nurse Practitioner (1.0 cr)
NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (3.0 cr)
NURS 7503 - Reproductive Health Care of Women Practicum for Family Nurse Practitioners (1.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
NURS 7500 - Health Care of Children for the Family Nurse Practitioner (3.0 cr)
NURS 7506 - Family Practice Practicum III: Assessment and Management of Health for the Family Nurse Practitioner (1.0 cr)
NURS 7501 - Health Care of Children for the Family Nurse Practitioner Practicum (1.0 cr)
NURS 7507 - Assessment Management of Health Practicum IV:Community Health Leadership for Family Nurse Pract (1.0 cr)
NURS 7508 - Assessment Management of Health Practicum V: Clinical Specialty Care for Family Nurse Practitioner (1.0 cr)
Twin Cities Campus
Leadership in Health Information Technology for Health Professionals
Postbaccalaureate Certificate
School of Nursing

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program requires summer semesters for timely completion.
- Degree: Ldrshp in Hlth Info Tec for Hlth Pro PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

By combining formal clinical or public health advanced preparation with course work in health information technology (HIT), individuals who earn the postbaccalaureate certificate in leadership in health information technology for health professionals will be able to lead the successful deployment and use of HIT to achieve transformational improvement in the quality, safety, outcomes, and thus in the value of health services.

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Admittance to the program requires a baccalaureate degree from an accredited institution in a clinical or public health discipline. Example degrees would be a B.S./B.A. in nursing or public health.

Preferred: Advanced degree in clinical or public health discipline from an accredited institution (nursing M.S./D.N.P./Ph.D.; public health M.P.H./M.S./Ph.D.; M.S./Ph.D. in other health-related field)

Applicants must have clinical or public health experience. A minimum of two years of management experience is required if the applicant does not hold an advanced degree.

International applicants must have clinical or public health experience. A minimum of two years of management experience is required if the applicant does not hold an advanced degree.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 587
- MELAB
  - Final score: 85

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.00 is required for students to remain in good standing.

Students may qualify for tuition support for informatics courses through the University Partnership in Health Informatics (UPHI). If students receive UPHI funding, they are required to complete certificate requirements within one year of starting the program.

Required Coursework
The certificate consists of seven courses (15 credits)

- NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)
- NURS 5116 - Consumer Health Informatics (1.0 cr)
- NURS 6105 - Systems Analysis and Design (3.0 cr)
- NURS 7105 - Knowledge Representation and Interoperability (2.0 cr)
- NURS 7108 - Population Health Informatics (2.0 cr)
- NURS 7113 - Clinical Decision Support: Theory (2.0 cr)
- HINF 5510 - Applied Health Care Databases: Database Principles and Data Evaluation (3.0 cr)
  or CSCI 5707 - Principles of Database Systems (3.0 cr)
Twin Cities Campus

Nurse Midwifery Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Nurse Midwifery Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nurse midwifery offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by American Midwifery Certification Board & Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where postsecondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework. Final coursework decisions are made by the faculty adviser.

Courses may include:
- NURS 6305 - Women's Reproductive Healthcare (2.0 - 4.0 cr)
- NURS 6306 - Women's Reproductive Healthcare Practicum (1.0 - 6.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6212 - Primary Care Practicum: for Midwives (1.0 cr)
- NURS 6210 - Midwifery Care of the Childbearing Family (3.0 cr)
- NURS 6211 - Midwifery Care of the Childbearing Family Practicum (2.0 cr)
- NURS 6213 - Reproductive Healthcare for Women at Risk (1.0 - 2.0 cr)
- NURS 6214 - Reproductive Healthcare for Women at Risk Practicum (1.0 - 2.0 cr)
- NURS 7213 - Midwifery Clinical and Professional Integration (3.0 cr)
Twin Cities Campus
Nursing M.N.
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Office of Student Career and Advancement Services, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 53
- This program requires summer semesters for timely completion.
- Degree: Master of Nursing

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of nursing degree (M.N.) is a full-time, 16-month, graduate-level program for students with a baccalaureate (or higher) degree in a non-nursing field. The program includes all the essentials of a bachelor of science in nursing (B.S.N.) program, plus additional graduate work. Upon completion of the coursework, students are eligible to take the National Council Licensure Examination for Registered Nurses (NCLEX-RN) and are also eligible for Public Health Nursing (PHN) certification in Minnesota. Traditional classroom formats are complemented by interactive components and web-based resources.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.50.

Completion of a baccalaureate degree from an accredited institution in a non-nursing area of study completed no later than June 1 prior to start of fall semester for year admitted.

There are nine prerequisite courses to complete before the start of the master of nursing (M.N.) program: General Chemistry, Human Anatomy, Human Physiology, Microbiology, Pathology, Human Nutrition, Lifespan Growth and Development, Abnormal Psychology, Inferential Statistics.

Five courses must be complete, with final grades sent to the School of Nursing, by the application deadline. Students are recommended to make three of the five courses their science courses.

Special Application Requirements:
Prior to matriculation to the program, students must complete a Minnesota background check, immunizations, submit provider-level CPR verification, and meet the School of Nursing published technical standards. Application to the Master of Nursing program is available on the School of Nursing website. After a preliminary review of submitted materials, selected applicants are invited to participate in an interview with representatives of the admissions committee.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
• MELAB
  - Final score: 85

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 53 major credits and null credits outside the major. The is no final exam. A capstone project is required.

**Capstone Project:** The capstone project is an examination of a clinical problem in the setting where students complete their final clinical rotation. It may also be a type of research experience or practicum with a School of Nursing faculty member.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students must maintain the compliance requirements (Minnesota background check, immunizations, provider-level CPR verification, and School of Nursing published technical standards) throughout the program.

**Required Coursework**

- **NURS 5029 - Introduction to Nursing Interventions (4.0 cr)**
- **NURS 5030 - Foundational Concepts of Professional Nursing (3.0 cr)**
- **NURS 5031 - Human Response to Health and Illness: Adults and Elders (6.0 cr)**
- **NURS 5032 - Human Response to Health and Illness: Children and Childbearing Families (6.0 cr)**
- **NURS 5033 - Population Response to Health and Mental Illness (5.0 cr)**
- **NURS 5034 - Clinical Seminar: Nursing Care of Clients With Complex Health Conditions (2.0 cr)**
- **NURS 5035 - Practical Nursing Care for Complex Health Conditions (4.0 cr)**
- **NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)**
- **NURS 5190 - Essentials of Holistic Health Assessment (3.0 cr)**
- **NURS 5222 - Advanced Physiology (3.0 cr)**
- **NURS 5241 - Nursing Leadership for Effective Practice (3.0 cr)**
- **PHAR 5800 - Pharmacotherapy for the Health Professions (3.0 cr)**
- **NURS 6200 - Science of Nursing Intervention (3.0 cr)**
- **NURS 7103 - Nursing Research Methods (3.0 cr)**
- **NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)**

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**MN Bridge Program**

This sub-plan is open only to graduates of the University of Minnesota School of Nursing Postbaccalaureate Certificate in Nursing.
Twin Cities Campus
Nursing M.S.
School of Nursing

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E. Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)

• Program Type: Master's
• Requirements for this program are current for Fall 2011
• Length of program in credits: 30
• This program does not require summer semesters for timely completion.
• Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The School of Nursing no longer admits students directly to the M.S. program in nursing. Students interested in pursuing graduate study in nursing may apply to the master of nursing (M.N.), doctor of nursing practice (D.N.P.) or nursing Ph.D. programs.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The School of Nursing does not accept students directly into the M.S. program.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

The program is offered under Plan A and Plan B. Plan A emphasizes research; Plan B prepares students to integrate research into advanced practice roles or leadership positions.

Plan A requires 30 credits: 14 credits in the major, including NURS 8170 - Research in Nursing (3 cr); NURS 8100 - The Discipline of Nursing (3 cr); NURS 8140 - Moral and Ethical Positions in Nursing (3 cr); 6 credits in a minor or related field; and 10 thesis credits.

Plan B requires a minimum of 30 credits with at least 9 credits of disciplinary core courses; 9 credits of advanced nursing core courses, including NURS 8194 - Problems in Nursing (3 cr); 6 credits of specialty core courses; and 6 credits in related fields. Individual areas of study vary in the number of credits required.
Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Generalist/Undesignated
Twin Cities Campus
Nursing Ph.D.
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 51
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Ph.D. program in nursing prepares scholars as scientists, leaders, innovators, and educators in nursing and health care who:
* discover new knowledge for nursing science and health care practice through ethical, innovative, theory-based research;
* integrate knowledge to influence health care delivery and policy through collaborative, interprofessional initiatives at organizational, local, state, regional, national, and global levels;
* create and evaluate strategies to improve the health and well-being of individuals, families, communities, and populations; and
* disseminate knowledge to those in nursing, other health sciences, policy makers, and the public through scholarly publication, formal teaching, and other creative venues.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 156
  - General Test - Quantitative Reasoning: 146
  - General Test - Analytical Writing: 5

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 95
• MELAB
  - Final score: 85

Key to test abbreviations (GRE, TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
27 to 36 credits are required in the major. 
24 thesis credits are required. 

This program may be completed with a minor. 

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval. 

A minimum GPA of 3.00 is required for students to remain in good standing. 

At least 2 semesters must be completed before filing a Degree Program Form. 

**Required Coursework**  
NURS 8180 - Doctoral Proseminar I: Scholarly Development (1.0 cr)  
NURS 8175 - Quantitative Research Design and Methods (3.0 cr)  
NURS 8172 - Theory and Theory Development for Research (3.0 cr)  
NURS 8152 - Scholarship in Health Care Ethics (3.0 cr)  
NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)  
NURS 8177 - Advanced Nursing Research Practicum (2.0 cr)  
NURS 8190 - Critical Review in Health Research (2.0 cr)  
NURS 8121 - Health Behaviors and Illness Responses (3.0 cr)  
NURS 8173 - Principles and Methods of Implementing Research (3.0 cr)  
NURS 8134 - Interventions and Outcomes Research (3.0 cr)
Twin Cities Campus
Nursing Practice D.N.P.
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
Office of Student Career & Advancement Services, 5-160 Weaver Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 68 to 100
- This program requires summer semesters for timely completion.
- Degree: Doctor of Nursing Practice

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Doctor of Nursing Practice (D.N.P.) Program is offered as the postbaccalaureate with specialty (14 specialties). The School of Nursing also offers the Post-Master's D.N.P. Program (35-36 credits) for students who have completed a master's degree in a nursing practice specialty.

The D.N.P. program is an innovative, practice-focused program that prepares students to be leaders in health care, develop quality improvement, and systems problem solving. It prepares nurses to create and lead new models of care delivery for communities locally, across the nation, and around the world. Students work with faculty who are leaders in their fields and on the cutting edge of nursing research and practice. These experts become mentors and guide students through the program. The unique, interdisciplinary core curriculum is divided into the following four areas.

1. D.N.P. Core - Includes science of nursing intervention, moral and ethical positions, research, statistics, program evaluation, evidence-based practice, epidemiology, informatics, leadership, health economics, health policy, and teaching and learning
2. D.N.P. Specialty Core - Prepares students for advanced clinical practice; includes physiology, pharmacology, pharmacotherapeutics, and advanced health assessment
3. DNP Specialization - Prepares graduates for certification in their chosen specialty by a national certifying body and includes:
   a. Advanced clinical practice with specialty-specific courses for each of the areas of clinical specialization
   b. Other specialty coursework in public health, organizational leadership, informatics, and integrative health and healing
4. Scholarly Leadership Project - Completed by all students in a three-semester sequence during which the project is planned, implemented, evaluated, and disseminated

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The postbaccalaureate D.N.P. and post-master's D.N.P. programs require an entry-level nursing degree (e.g. B.S.N., B.A.N., postbaccalaureate certificate in nursing, or entry-level master of nursing).

A graduate degree is not required for admission to the postbaccalaureate D.N.P. program.

Applicants for the post-master's D.N.P. must hold a master's degree in a nursing practice specialty.

The required application materials are available on the School of Nursing website at www.nursing.umn.edu. Interviews are by invitation only and are not granted to all applicants. Application deadlines for the D.N.P. program: September 1 for the nurse anesthesia
specialty. All other specialties have November 1 for priority consideration, with applications accepted on a space available basis until March 1.0

Applicants must submit their test score(s) from the following:
- **GRE**
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- **MELAB**
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to **test abbreviations** (GRE, TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

68 to 100 credits are required in the major.
This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Core Courses**

- **NURS 5115 - Interprofessional Health Care Informatics (3.0 cr)**
- **NURS 6100 - Evidence-based Practice (3.0 cr)**
- **NURS 6200 - Science of Nursing Intervention (3.0 cr)**
- **NURS 7100 - DNP Seminar I (2.0 cr)**
- **NURS 7101 - DNP Seminar II (3.0 cr)**
- **NURS 7102 - DNP Seminar III (2.0 cr)**
- **NURS 7110 - DNP Project Direction I: Planning (1.0 cr)**
- **NURS 7111 - DNP Project Direction II: Implementation (1.0 cr)**
- **NURS 7112 - DNP Project Direction III: Evaluation (1.0 cr)**
- **NURS 7200 - Economics of Health Care (3.0 cr)**
- **NURS 7300 - Program Evaluation (3.0 cr)**
- **NURS 7400 - Health Policy Leadership (3.0 cr)**
- **NURS 7610 - Health Innovations and Leadership (3.0 cr)**
- **NURS 7900 - Scholarship of Teaching and Learning in Nursing (3.0 cr)**
- **NURS 6110 - Epidemiology in Nursing (2.0 cr)**
  or **PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)**

**Program Sub-plans**

Students are required to complete one of the following sub-plans.
Students may complete the program with more than one sub-plan.

**Adult Health/Gerontological Clinical Nurse Specialist**

The D.N.P. program with a specialty in adult health and gerontological nursing as a clinical nurse specialist prepares nurses for leadership as advanced practice nurses and clinical experts to provide advanced nursing care to adults and elders in a variety of settings. The D.N.P. program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and practicum experiences as well as a final internship where the student has the opportunity focus on a sub-specialty area (e.g. oncology, cardiology, palliative care), if desired. Graduates work as expert clinicians and consultants in acute care settings, nursing homes, transitional care, and specialty practices. The adult health and gerontological specialty offers leadership preparation for nurses desiring expertise in the management of complex health conditions, working with nurses and interdisciplinary teams and organizations to provide care and services for adults and older adults. Students ground their studies in the science of nursing interventions, moral/ethical issues, and nursing research. Practicum experiences are arranged to meet the individual needs of students while also meeting...
Fall 2012 Graduate Education Catalog
School of Nursing

accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology.

Required Coursework

CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
NURS 5222 - Advanced Physiology (3.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
NURS 6405 - Advanced Practice CNS Roles Across the Lifespan (3.0 cr)
NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (3.0 cr)
NURS 7000 - DNP Proseminar (1.0 cr)
NURS 7103 - Nursing Research Methods (3.0 cr)
NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
NURS 7406 - Advanced Nursing Practicum in Adult-Gerontology Health (3.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
NURS 7705 - The Adult and Gerontological Clinical Nurse Specialist in Acute Care (2.0 cr)
NURS 7706 - Implementing the Role of the Clinical Nurse Specialist in Acute Care (2.0 - 3.0 cr)

Statistics: As approved by D.N.P. specialty

Adult/Gerontological Nurse Practitioner

The D.N.P. program with a specialty in adult health and gerontological nursing as a nurse practitioner prepares nurses for leadership as advanced practice nurses and clinical experts to provide advanced nursing care to adults and elders in a variety of settings. This D.N.P. program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and practicum experiences as well as a final internship where the student has the opportunity focus on a sub-specialty area (e.g. oncology, cardiology, palliative care), if desired. Graduates work in primary care/ambulatory care settings, hospitals, group practices of advanced practice gerontological nurses that manage care of adults and older adults in nursing homes, transitional care settings, assisted living, and specialty practices.

The adult health and gerontological specialty offers leadership preparation for nurses desiring expertise in advanced nursing assessment and management for health promotion and disease prevention, management of complex health conditions, and working with interdisciplinary teams to provide care and services for persons ranging from adolescents, adults, and older adults. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements.

Required Coursework

CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
NURS 5222 - Advanced Physiology (3.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
NURS 6305 - Women's Reproductive Healthcare (2.0 - 4.0 cr)
NURS 6307 - Women's Health Care Practicum (1.0 cr)
NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 cr)
NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (3.0 cr)
NURS 7000 - DNP Proseminar (1.0 cr)
NURS 7103 - Nursing Research Methods (3.0 cr)
NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
NURS 7406 - Advanced Nursing Practicum in Adult-Gerontology Health (3.0 cr)
NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses Practicum I (1.0 - 2.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)

Statistics: As approved by D.N.P. specialty

Adult Health/Women's Healthcare Nurse Practitioner

The D.N.P. program with a specialty in adult health and women's health prepares nurses for leadership as advanced practice nurses. This D.N.P. program is for students who hold a baccalaureate degree in nursing, and involves both coursework and clinical practicum experience with an internship in the final semester.

Clinical experience is offered in primary care, women's health, and specialty practice areas such as oncology and reproductive endocrinology. Students ground their studies in the science of nursing intervention, moral/ethical issues, and nursing research. They then focus on courses that examine the basis of assessment and intervention for adolescent and adult populations with an emphasis on adolescent and adult women. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology.
based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. A final project that is a systematic investigation of a practice problem is planned, implemented, and completed during the curriculum.

**Required Coursework**

CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
NURS 5222 - Advanced Physiology (3.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 5229 - Clinical Pharmacotheapeutics (2.0 - 4.0 cr)
NURS 6213 - Reproductive Healthcare for Women at Risk (1.0 - 2.0 cr)
NURS 6214 - Reproductive Healthcare for Women at Risk Practicum (1.0 - 2.0 cr)
NURS 6305 - Women's Reproductive Healthcare (2.0 - 4.0 cr)
NURS 6306 - Women's Reproductive Healthcare Practicum (1.0 - 6.0 cr)
NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 cr)
NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (3.0 cr)
NURS 6925 - Advanced Concepts in Women's Health for Nurse Practitioners (2.0 - 3.0 cr)
NURS 6926 - Advanced Concepts in Women's Health for ANP/WHNP Practicum (2.0 cr)
NURS 7000 - DNP Proseminar (1.0 cr)
NURS 7103 - Nursing Research Methods (3.0 cr)
NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
NURS 7301 - ANP/WHNP Clinical and Professional Integration (2.0 cr)
NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)

Statistics: As approved by D.N.P. specialty

**Nurse Anesthesia**

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The nurse anesthesia area of study prepares registered nurses to become Certified Registered Nurse Anesthetists (CRNAs) who are prepared for nurse anesthesia practice at the highest level. Graduates will possess expertise in general and regional anesthesia techniques, and will be prepared to provide leadership in the practice setting. The nurse anesthesia area of study is fully accredited by the Council on Accreditation of Nurse Anesthesia Education Programs. In January of 2009, the University of Minnesota Nurse Anesthesia Area of Study received the maximum 10-year accreditation approval from the Council on Accreditation of Nurse Anesthesia Educational Programs. The program was the first nurse anesthesia program in the U.S. to be accredited to offer the entry-level D.N.P.

With the Minneapolis VA Medical Center serving as the primary clinical site for the program, the University of Minnesota nurse anesthesia students rotate to several urban and rural clinical sites, which offer a broad spectrum of practice experiences. Some of the clinical sites are required, and some are optional. All required clinical sites are within daily driving distance of the campus.

Nurse anesthesia students complete the requirements for the D.N.P. degree, as well as the requirements to take the National Certification Exam for nurse anesthetists.

**Required Coursework**

NURS 5222 - Advanced Physiology (3.0 cr)
NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
NURS 5229 - Clinical Pharmacotheapeutics (2.0 - 4.0 cr)
NURS 6895 - Adult Acute Care Holistic Health Assessment (2.0 cr)
NURS 6900 - Introduction to Principles of Anesthesia (6.0 cr)
NURS 6901 - Basic Nurse Anesthesia Principles (3.0 cr)
NURS 6902 - Nurse Anesthesia Care: Cardiothoracic Disease (2.0 cr)
NURS 6903 - Nurse Anesthesia Care: Special Populations (2.0 cr)
NURS 6910 - Introduction to Nurse Anesthesia Practicum I (2.0 cr)
NURS 6911 - Basic Nurse Anesthesia Principles Practicum (3.0 cr)
NURS 6912 - Nurse Anesthesia Care: Cardiothoracic Disease Practicum (3.0 cr)
NURS 6913 - Nurse Anesthesia Care: Special Populations Practicum (4.0 cr)
NURS 7000 - DNP Proseminar (1.0 cr)
NURS 7004 - Nurse Anesthesia Practicum A (5.0 cr)
NURS 7005 - Nurse Anesthesia Practicum B (5.0 cr)
NURS 7006 - Nurse Anesthesia Practicum C (5.0 cr)
NURS 7103 - Nursing Research Methods (3.0 cr)
NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
PHSL 5115 - Clinical Physiology I (3.0 cr)
PHSL 5116 - Clinical Physiology II (3.0 cr)
The D.N.P. program with a specialty in the family nurse practitioner (FNP) area of study prepares nurses for leadership as advanced practice nurses. The three-year D.N.P. program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and clinical practicums.

The FNP area of study offers leadership preparation for nurses desiring expertise in the scope of practice and in the role of the family nurse practitioner. Students ground their studies in the science of nursing intervention, moral/ethical issues, and nursing research. They then focus on courses that examine the basis of assessment and intervention for families and individuals of all ages. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. A final project that is a systematic investigation of a practice problem is planned, implemented, and completed during the curriculum.

Where applicable, completion of required FNP coursework and practice hours provides eligibility to sit for the FNP Certification through the American Nurses Credentialing Center.

Required Coursework
- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Physiology (3.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6102 - Family Health Care Theory for Nursing (2.0 cr)
- NURS 6305 - Women's Reproductive Healthcare (2.0 - 4.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6502 - Assessment and Management of Health for Advanced Practice Nurses, II (3.0 cr)
- NURS 7000 - DNP Proseminar (1.0 cr)
- NURS 7103 - Nursing Research Methods (3.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7500 - Health Care of Children for the Family Nurse Practitioner (3.0 cr)
- NURS 7501 - Health Care of Children for the Family Nurse Practitioner Practicum (1.0 cr)
- NURS 7503 - Reproductive Health Care of Women Practicum for Family Nurse Practitioners (1.0 cr)
- NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
- NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- NURS 7506 - Family Practice Practicum III: Assessment and Management of Health for the Family Nurse Practitioner (1.0 cr)
- NURS 7507 - Assessment Management of Health Practicum IV:Community Health Leadership for Family Nurse Prac (1.0 cr)
- NURS 7508 - Assessment Management of Health Practicum V: Clinical Specialty Care for Family Nurse Practitioner (1.0 cr)

Statistics: As approved by D.N.P. specialty

Health Innovation and Leadership
Health care is delivered today in diverse settings, by an expanding workforce and with extraordinary opportunities for nurses to lead, whether through formal leadership positions or through personal advocacy, in traditional settings or in emerging sites. This requires an individual who can think broadly and embrace a global perspective; who embraces diversity in all its forms, including diversity of thought; who is curious and never satisfied with the status quo; who stimulates new ways of thinking and solutions which open up possibilities for action; who bases action on informed practice gained from multiple ways of knowing; who engages in critical thinking, and learns from other thought leaders; who inspires and creates needed change within a particular environment; who can work effectively with a variety of individuals and within disparate groups; and who can create healing environments within which others can do their best work.

The D.N.P. with a focus on health innovation and leadership prepares nurses to function effectively as leaders in traditional and contemporary settings. The goal is to prepare a leader who can work well in the current environment while promoting change and improvement. Students in the program utilize a combination of learning strategies, readings, reflections, and independent learning experiences. Seminars will enable students and faculty to discuss relevant issues and share expertise.

Required Coursework
- COMM 5441 - Communication in Human Organizations (3.0 cr)
- CSPH 5711 - Optimal Healing Environments (3.0 cr)
- NURS 6600 - Health Systems and Care Models (3.0 cr)
- NURS 6702 - Executive Leadership Seminar (3.0 cr)
- NURS 6703 - Nurse Executive Seminar II (2.0 cr)
- NURS 6704 - Nurse Executive Practicum II (1.0 cr)
- NURS 6705 - Executive Leadership Seminar III: Quality and Change Management (1.0 cr)
- NURS 6706 - Executive Leadership Practicum II: Quality and Change Management (1.0 cr)
Informatics

The nursing informatics (NI) specialty area prepares graduates with knowledge and skills necessary for leadership roles in health and nursing informatics to address the issues for consumers, clinical providers, and public health for processing and managing information through the use of various technologies. A wide array of courses throughout the University of Minnesota accompany nursing offerings, which offers students the opportunity to strengthen their disciplinary and interdisciplinary expertise.

With increasing demand for computerizing health information, graduates of the nursing informatics specialty are well positioned to assume leadership roles in nursing and health informatics field. The NI area of study provides knowledge and scholarship complemented by clinical experiences in the following areas:

* Systems analysis and design
* Knowledge representation and interoperability
* Clinical decision support and evidence-based practice
* Human factors and usability
* Leadership and health informatics
* Consumer, clinical provider, and population health informatics
* Health policy leadership
* Development and project management of health informatics projects
* Program evaluation
* Organization and administration of health services
* Ethical foundations of nursing
* Applied research

Integrated Health and Healing

The integrative health and healing specialty area prepares graduates with skills necessary for working with individuals, families, communities and health systems in developing holistic approaches to health promotion, disease prevention, and chronic disease management, with a special emphasis on managing lifestyle changes and incorporating the use of complementary therapies. Graduates are prepared to work in diverse settings including hospitals, outpatient settings, health plans, corporate and community organizations, and in private practice. A wide array of courses are available which offer students the opportunity to strengthen their disciplinary and interdisciplinary expertise. Through a collaboration with the Center for Spirituality and Healing, students can opt to concurrently earn a graduate certificate in integrative therapies and healing practices, including a focus in health coaching.

The integrative health and healing area of study provides a foundation of knowledge and practical experiences in the following areas:

* Optimal healing environments
* Botanical medicine
* Clinical aromatherapy
* Mind/body healing
* Functional nutrition
* Energy healing
* Health coaching
* Self-care
* Advanced integrative health and healing skills and program planning
* Applied research

Students choosing to complete coursework part-time are well accommodated by the curriculum.

Required Coursework

**CSPH 5000** - Explorations in Complementary Therapies and Healing Practices (1.0 - 4.0 cr)
**CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
**CSPH 5102** - Art of Healing: Self as Healer (1.0 cr)
**CSPH 5226** - Advanced Meditation: Body, Brain, Mind, and Universe (1.0 cr)
**CSPH 5431** - Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health (2.0 cr)
**CSPH 5503** - Aromatherapy Fundamentals (1.0 cr)
**CSPH 5621** - Foundations of Integrative Imagery, Phase I (2.0 cr)
**CSPH 5701** - Fundamentals of Health Coaching I (4.0 cr)
**CSPH 5711** - Optimal Healing Environments (3.0 cr)

Integrative Therapies (Consult with faculty advisor for approved courses.)

**NURS 5200** - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
**NURS 5222** - Advanced Physiology (3.0 cr)
**NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
**NURS 7000** - DNP Proseminar (1.0 cr)
**NURS 7103** - Nursing Research Methods (3.0 cr)
**NURS 7202** - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
**NURS 7210** - Integrative Health and Healing Practicum I (1.0 cr)
**NURS 7211** - Integrative Health and Healing II (1.0 cr)
**NURS 7212** - Integrative Health and Healing Practicum II (2.0 cr)

Statistics: As approved by D.N.P. specialty

**CSPH 5533** - Introduction to Energy Healing (2.0 cr)
or **CSPH 5535** - Reiki Healing (1.0 cr)
**CSPH 5536** - Advanced Reiki Healing: Level II (1.0 cr)

Nurse Midwifery

This program combines academic preparation with clinical skills for the independent management of health care of women and newborns. Further, students receive additional academic preparation in health care policy, economics, evidence-based practice, evaluation and informatics, and complete a systems change project while in the program. D.N.P. midwifery graduates will be prepared to more quickly fulfill leadership roles in the health care setting.

Courses are offered in a web-based format, with multi-day, on-campus seminars approximately two to three times per semester, in Minneapolis. By taking the courses in a web-based or online format, students may complete the midwifery program without having to relocate. Trips to campus to interact with faculty and other students allow for development of a professional learning community and enhance professional socialization. Midwifery clinical sites are used in or near a student's home community if available. Travel may be necessary depending on available midwifery practice locations. The online program is primarily geared to students in the five-state Upper Midwest region of Minnesota, Iowa, South Dakota, North Dakota, and Wisconsin. For more information about online learning, please visit Online Learning Opportunities.

Nurse-midwives assist women and families to promote and maintain health, and to facilitate optimal individual and family integrity in the context of culture and community.

Required Coursework

**CSPH 5101** - Introduction to Integrative Healing Practices (3.0 cr)
**NURS 5200** - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
**NURS 5222** - Advanced Physiology (3.0 cr)
**NURS 5228** - Pharmacology for Advanced Practice Nursing (2.0 cr)
**NURS 5229** - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
**NURS 6210** - Midwifery Care of the Childbearing Family (3.0 cr)
**NURS 6211** - Midwifery Care of the Childbearing Family Practicum (2.0 cr)
**NURS 6212** - Primary Care Practicum: for Midwives (1.0 cr)
**NURS 6213** - Reproductive Healthcare for Women at Risk (1.0 - 2.0 cr)
**NURS 6214** - Reproductive Healthcare for Women at Risk Practicum (1.0 - 2.0 cr)
**NURS 6305** - Women's Reproductive Healthcare (2.0 - 4.0 cr)
**NURS 6306** - Women's Reproductive Healthcare Practicum (1.0 - 6.0 cr)
**NURS 6501** - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
**NURS 7000** - DNP Proseminar (1.0 cr)
**Pediatric Clinical Nurse Specialist**

Students who pursue the pediatric clinical nurse specialist (PCNS) specialty area take core courses in nursing theory, moral/ethical issues, and research. They acquire skills in health assessment, intervention, and evaluation. They examine the care of children and families with special health care needs. They focus on planning and implementing programs to improve quality of care for children with chronic and complex illnesses. As the population of children with special health care needs continues to increase, there is likely to be a greater demand for clinical experts and leaders in pediatric nursing. The PCNS area of study is supported by the Center for Children with Special Health Care Needs.

PCNS coursework includes supervised clinical experiences. Efforts are made to provide students with clinical settings within their geographical area. Clinical courses are directed by certified faculty and supervised by clinical nurse specialist preceptors. The PCNS area of study can be completed in a two-year (full-time) or three-year (part-time) sequence.

PCNSs work in collaboration with health care teams in a variety of settings to facilitate quality care for children across the continuum of care settings. They function as clinical experts in the planning, implementation, and evaluation of patient care standards. They provide direct care, oversee staff, patient and family education, participate in clinical research, and develop programs specific to the needs of children.

**Required Coursework**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 5200</td>
<td>Holistic Health Assessment and Therapeutics for Advanced Practice Nurses</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 5222</td>
<td>Advanced Physiology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 5228</td>
<td>Pharmacology for Advanced Practice Nursing</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 5229</td>
<td>Clinical Pharmacotherapeutics</td>
<td>2.0 - 4.0 cr</td>
</tr>
<tr>
<td>NURS 6102</td>
<td>Family Health Care Theory for Nursing</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 6405</td>
<td>Advanced Practice CNS Roles Across the Lifespan</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 6920</td>
<td>Primary Care: Assessment of Health and Care of Well Children</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 6921</td>
<td>Assessment of Health and Care of Well Children: Primary Care Practicum</td>
<td>1.0 - 2.0 cr</td>
</tr>
<tr>
<td>NURS 6924</td>
<td>Assessment and Interventions for Children and Youth With Special Health Care Needs</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 7000</td>
<td>DNP Proseminar</td>
<td>1.0 cr</td>
</tr>
<tr>
<td>NURS 7103</td>
<td>Nursing Research Methods</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 7202</td>
<td>Moral and Ethical Positions and Actions in Nursing</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 6929</td>
<td>Advanced Nursing Care of Children with Acute Illness for Pediatric Clinical Nurse Specialists</td>
<td></td>
</tr>
<tr>
<td>OLPD 5356</td>
<td>Disability Policy and Services</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 7926</td>
<td>Systems of Care for Children and Youth With Special Health Care Needs Practicum</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 7926</td>
<td>Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs</td>
<td>2.0 cr</td>
</tr>
</tbody>
</table>

Statistics: As approved by D.N.P. specialty

**Pediatric Nurse Practitioner**

The pediatric nurse practitioner (PNP) area of study incorporates theory and clinical courses to prepare students to provide comprehensive care to children and their families. Most students elect to complete the children with special health care needs (C SHCN) leadership track by taking additional courses which are supported by the Center for Children with Special Health Care Needs.

Coursework includes nursing theory, moral/ethical issues, research, child assessment, management of childhood illnesses, and health policy. Courses are taught by faculty from the School of Nursing, School of Public Health, the Institute of Child Development, Family Social Science, the Medical School, and the Institute of Community Integration in the College of Education.

Supervised clinical experience is incorporated in the program. Efforts are made to meet students’ individual goals and to provide experiences in their geographic area. Clinical experiences are available in interdisciplinary settings such as primary care, home care, schools, specialty clinics, community agencies, the legislature, and the Minnesota Department of Health.

At the completion of the program, students are eligible to take the Pediatric Nurse Practitioner certification examinations offered by the American Nurses Credentialing Center or the National Certification Board of Pediatric Nurse Practitioners and Nurses. Students in the CSHCN track are eligible for certification from the Institute on Community Integration.

**Required Coursework**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 5200</td>
<td>Holistic Health Assessment and Therapeutics for Advanced Practice Nurses</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 5222</td>
<td>Advanced Physiology</td>
<td>3.0 cr</td>
</tr>
<tr>
<td>NURS 5228</td>
<td>Pharmacology for Advanced Practice Nursing</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 5229</td>
<td>Clinical Pharmacotherapeutics</td>
<td>2.0 - 4.0 cr</td>
</tr>
<tr>
<td>NURS 6102</td>
<td>Family Health Care Theory for Nursing</td>
<td>2.0 cr</td>
</tr>
<tr>
<td>NURS 6920</td>
<td>Primary Care: Assessment of Health and Care of Well Children</td>
<td>3.0 cr</td>
</tr>
</tbody>
</table>
Psychiatric-Mental Health Nurse Practitioner

Graduate studies in psychiatric-mental health nursing prepare nurses to assume clinical nurse specialist roles with an emphasis on providing direct patient care to persons with major mental disorders and their families. Coursework focuses on the development of advanced practice nursing knowledge and skills required to provide both psychotherapeutic and biological interventions for the management of acute and chronic psychiatric symptoms with a variety of patients in diverse settings. Coursework integrates extant theories and research in the study of advanced health assessment, psychopathology assessment, psychopharmacology, and individual family and group therapy within various community and institutional systems.

Clinical emphasis is on secondary and tertiary psychiatric interventions and outcomes within a managed care context. Students are clinically precepted by certified psychiatric-mental health clinical nurse specialists. Clinical experiences are available in outpatient clinics, community mental health centers, hospitals, schools, and home care agencies. Full-time or part-time students may enroll in the area of study. Current psychiatric nursing experience is strongly encouraged.

Graduates will be academically prepared to take the American Nurses Credentialing Center (ANCC) certification examination for certified specialists in psychiatric-mental health nursing, after obtaining additional required post-master's clinical hours and supervision.

Required Coursework

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- NURS 5222 - Advanced Physiology (3.0 cr)
- NURS 5225 - Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing (3.0 cr)
- NURS 5228 - Pharmacology for Advanced Practice Nursing (2.0 cr)
- NURS 5229 - Clinical Pharmacotherapeutics (2.0 - 4.0 cr)
- NURS 6102 - Family Health Care Theory for Nursing (2.0 cr)
- NURS 6603 - PMH APN Practicum IV: Group as a Health Care Intervention (2.0 cr)
- NURS 6604 - Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing (2.0 cr)
- NURS 6605 - Psychiatric/Mental Health Advanced Nursing Practice Practicum I (1.0 cr)
- NURS 6802 - Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families (2.0 cr)
- NURS 6803 - Psychiatric/Mental Health Adv Prac Nurs Practicum III: Psychotherapy With Individuals, Families (1.0 cr)
- NURS 7000 - DNP Proseminar (1.0 cr)
- NURS 7103 - Nursing Research Methods (3.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7xxx - PMH APN Practicum V
- NURS 7xxx - PMH APN Seminar
- Statistics: As approved by D.N.P. specialty

Public Health Nursing

The D.N.P. program with a specialty in public health nursing prepares nurses for leadership as advanced practice public health nurses in management, education, clinical practice, leadership, policy development, and advocacy. The three-year D.N.P. program is for students who already hold a baccalaureate degree in nursing, and involves both coursework and a practicum. This specialty offers leadership preparation for nurses desiring expertise in population-based public health nursing practice. Students ground their studies in the science of nursing intervention, moral/ethical issues, and nursing research. They then focus on courses that examine the basis of assessment and intervention of populations, integrating the study of health determinants and health disparities. Practicum experiences are arranged to meet the individual needs of students while also meeting accreditation and certification requirements. In addition to completing core studies in the specialty, students also gain skills in evidence-based practice, program evaluation, informatics, teaching/learning, health economics, health care policy, and epidemiology. A final project that is a systematic investigation of a practice problem is planned, implemented, and completed during the curriculum.

Required Coursework

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 6930 - Foundations of Advanced Public Health Nursing Practice (3.0 cr)
- NURS 6931 - Health Equity and Social Justice (3.0 cr)
Public Health Nursing-Adolescent Nursing

The public health nursing-adolescent nursing specialty area prepares nurses for public health positions in management, education, clinical practice, leadership, policy development, research, and advocacy.

Graduate study in adolescent nursing utilizes interdisciplinary courses taught by faculty from the Schools of Nursing, Medicine, and Public Health, and the Institute for Child Development. The Center for Adolescent Nursing offers doctoral/post-doctoral programs for nursing, medical, and public health nutrition students whose research focuses on adolescents. Serving as a national hub for nurses and other professionals with expertise in adolescent health, the center's workshops and institutes draw regional, national, and international audiences from a host of disciplines. Its curriculum emphasizes the special health care needs of youth and teaches learners best practices in working with youth to promote health and health care.

Students should visit the center's website to gain a better idea of what the Center for Adolescent Nursing is about: http://www.nursing.umn.edu/CANL. Students choosing this specialty area complete all coursework for the public health nursing degree. What sets this area of study apart are required courses focusing on adolescent health, giving the student a youth specialty focus.

Required Coursework

- CSPH 5101 - Introduction to Integrative Healing Practices (3.0 cr)
- NURS 5016 - Critical Reading of Scientific Literature in Adolescent Health (1.0 cr)
- NURS 5604 - Advanced Health Assessment and Interventions with Adolescents (2.0 cr)
- NURS 6930 - Foundations of Advanced Public Health Nursing Practice (3.0 cr)
- NURS 6931 - Health Equity and Social Justice (3.0 cr)
- NURS 6932 - The Role of Nursing in Environmental Health (2.0 cr)
- NURS 6933 - Determinants of Health in Developing Countries (2.0 cr)
- NURS 6934 - Population-focused Assessment and Prioritization (3.0 cr)
- NURS 6935 - Population Focused Public Health Nursing Practice: Program Planning and Development (2.0 cr)
- NURS 6936 - Population Focused Public Health Nursing Practice: Program Implementation and Evaluation (1.0 cr)
- NURS 6937 - Population Focused Public Health Nursing Practice: Program Implementation Evaluation Practicum (1.0 cr)
- NURS 6938 - Emergency Preparedness for Public Health Nursing Leaders (2.0 cr)
- NURS 7000 - DNP Proseminar (1.0 cr)
- NURS 7103 - Nursing Research Methods (3.0 cr)
- NURS 7202 - Moral and Ethical Positions and Actions in Nursing (2.0 cr)
- NURS 7930 - Public Health Nursing Leadership Practicum (3.0 cr)
- NURS 7939 - Public Health Nurse Executive Role (3.0 cr)
- NURS 7940 - Individual, Interpersonal, Community, and Organizational Change (3.0 cr)
- PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)

Statistics: As approved by D.N.P. specialty

Post-Master's D.N.P.

The post-master's option is for individuals who already hold a master's degree in a nursing practice specialty and who have nursing specialty preparation. The D.N.P. program prepares nurses for leadership as advanced practice nurses, clinical experts, health care executives, policy experts, and informaticians.

Required Courses

Students must complete the core courses of the D.N.P. program.
Twin Cities Campus

Pediatric Clinical Nurse Specialist Postgraduate Certificate

School of Nursing

School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Pediatric Clinical Nurse Specialist Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a doctor of nursing practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semester must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework; final coursework decisions are made by the faculty adviser.

Courses may include:
- **NURS 5200** - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
- **NURS 6920** - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
- **NURS 6921** - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
- **NURS 6924** - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
- **NURS 7925** - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
- **NURS 7926** - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
- **NURS 7927** - Adv Assessment, Intervention in Families of Children and Youth With Special Health Care Needs Prac (1.0 cr)
Twin Cities Campus
Pediatric Nurse Practitioner Postgraduate Certificate
School of Nursing
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Pediatric Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework; final coursework decisions are made by the faculty adviser.

Courses may include:

NURS 5200 - Holistic Health Assessment and Therapeutics for Advanced Practice Nurses (3.0 cr)
NURS 6920 - Primary Care: Assessment of Health and Care of Well Children (3.0 cr)
NURS 6921 - Assessment of Health and Care of Well Children: Primary Care Practicum (1.0 - 2.0 cr)
NURS 6922 - Primary Care: Assessment and Management of Common Conditions Affecting Children (3.0 cr)
NURS 6923 - Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children (2.0 cr)
NURS 6924 - Assessment and Interventions for Children and Youth With Special Health Care Needs (2.0 cr)
NURS 7925 - Systems of Care for Children and Youth With Special Health Care Needs Practicum (2.0 cr)
NURS 7926 - Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs (2.0 cr)
NURS 7927 - Adv Assessment, Intervention in Families of Children and Youth With Special Health Care Needs Prac (1.0 cr)
Twin Cities Campus
Psychiatric Mental Health Nurse Practitioner Postgraduate Certificate
School of Nursing

Link to a list of faculty for this program.

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455
(612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Psych Mental Hlth Nurse Practitioner Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

The list below is only a sample of courses and may not be applicable for all applicants. Contact the School of Nursing for detailed information about the requirements for this certificate. Each applicant's curriculum is unique and based on the applicant's previous D.N.P. degree and coursework; final coursework decisions are made by the faculty adviser.

Courses may include:
- NURS 6604 - Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing (2.0 cr)
- NURS 6605 - Psychiatric/Mental Health Advanced Nursing Practice Practicum I (1.0 cr)
- NURS 6504 - Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing (2.0 cr)
- NURS 5225 - Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing (3.0 cr)
- NURS 6505 - PMH/APN Prac II:Assessing, Managing Psychiatric Disorders in Adv Prac Psychiatric-Mental Health Nurs (2.0 cr)
- NURS 6602 - PMH Advanced Practice Nursing: Group as a Health Care Intervention (2.0 cr)
- NURS 6603 - PMH APN Practicum IV: Group as a Health Care Intervention (2.0 cr)
- NURS 7xxx: PMH APN IV
- NURS 7xxx: PMH Practicum IV
Women's Health Care Nurse Practitioner Postgraduate Certificate
School of Nursing

Contact Information:
School of Nursing, 5-160 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax: 612-625-7727)
Email: sonstudentinfo@umn.edu
Website: http://www.nursing.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Ad Hlth/Wmn Hlth Care Nrs Pract Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The postgraduate certificate program in nursing offers students with a Doctor of Nursing Practice (D.N.P.) or other graduate degree in a clinical nursing specialty area the opportunity to complete an additional area of study. Completion of required coursework and practice hours provides eligibility to take certification examinations.

Accreditation
This program is accredited by Commission on Collegiate Nursing Education (CCNE).

Program Delivery
This program is available:
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A D.N.P. or other accredited graduate degree in a clinical nursing specialty area is required for admission to this program.

All applicants must have a current registered nurse license.

Special Application Requirements:
Applicants are required to submit transcripts from all institutions where post-secondary credit was earned, reference materials containing an Admission Reference Form and personal letter of reference from two separate individuals, two essays, a current curriculum vitae/resume, a current registered nurse license, and English language proficiency scores (if applicable). Application deadlines for this certificate are a priority deadline of November 1, with rolling admissions on a space available basis until March 1.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 95
  - Paper Based - Total Score: 586
- MELAB
  - Final score: 85
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Please contact the School of Nursing for detailed information about the requirements for this certificate.

Courses may include:

- NURS 6307 - Women's Health Care Practicum (1.0 cr)
- NURS 7504 - Assessment and Management of Health for Advanced Practice Nurses, Practicum I (1.0 - 2.0 cr)
- NURS 6305 - Women's Reproductive Healthcare (2.0 - 4.0 cr)
- NURS 6306 - Women's Reproductive Healthcare Practicum (1.0 - 6.0 cr)
- NURS 6501 - Assessment and Management of Health for Advanced Practice Nurses, I (3.0 cr)
- NURS 6925 - Advanced Concepts in Women's Health for Nurse Practitioners (2.0 - 3.0 cr)
- NURS 6926 - Advanced Concepts in Women's Health for ANP/WHNP Practicum (2.0 cr)
- NURS 6408 - Advanced Nursing Care of Older Adults Practicum (1.0 cr)
- NURS 7505 - Assessment and Management of Health for Advanced Practice Nurses Practicum II (1.0 - 2.0 cr)
- NURS 6407 - Advanced Nursing Care of Older Adults (3.0 cr)
Twin Cities Campus
Experimental and Clinical Pharmacology M.S.
Experimental and Clinical Pharmacology
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-153 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-626-8419)
Email: dicki002@umn.edu
Website: http://www.pharmacy.umn.edu/ecp/grad/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A U.S. bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

GRE scores are required from non-U.S. Pharm.D. applicants. Foreign students may be required to have a phone interview. All international students who are non-English speakers are required to submit TOEFL scores. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement.

Special Application Requirements:
Students are generally admitted to the ECP program for fall semester only. The application deadline is February 1. Applications received after February 1 will be considered on a space-available basis only.

Application to the ECP program at the University of Minnesota is done entirely online through ApplyYourself. A supplemental departmental application form is also required. Applicants should upload it directly to the ApplyYourself system.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (TOEFL).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 24 major credits and 6 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.
Twin Cities Campus

Experimental and Clinical Pharmacology Minor
Experimental and Clinical Pharmacology
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-153 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-626-8419)
Email: dicki002@umn.edu
Website: http://www.pharmacy.umn.edu/ecp/grad/home.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Experimental and Clinical Pharmacology Ph.D.
Experimental and Clinical Pharmacology
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Experimental and Clinical Pharmacology, University of Minnesota College of Pharmacy, 7-153 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-626-8419)
Email: dicki002@umn.edu
Website: http://www.pharmacy.umn.edu/ecp/grad/home.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 70
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Experimental and Clinical Pharmacology (ECP) graduate program was designed specifically for students interested in clinical research. Its goal is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients.

Students study such topics as experimental pharmacotherapy, drug metabolism, infectious disease, pharmacometrics, and pharmacogenomics. Graduates are prepared for distinguished careers in clinical research.

Program Delivery
This program is available:
  • via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A U.S. bachelor's degree or a comparable foreign degree from a recognized college or university is required.

Preference is given to candidates who have had a professionally-related pharmacy education, but those from other fields such as biology, chemistry, statistics, and public health will be considered.

All international students who are non-English speakers are required to submit TOEFL scores. However, applicants who have completed 24 quarter credits or 16 semester credits within the past 24 months in residence as full-time students at recognized institutions of higher learning in the United States or other English-speaking countries before entering the University of Minnesota are generally exempted from this requirement. ETS will download your TOEFL score directly into ApplyYourself. Non U.S.-Pharm.D. applicants are required to submit GRE scores. Foreign students may be required to have a phone interview.

Special Application Requirements:
Application to the ECP program at the University of Minnesota is done entirely online through ApplyYourself. A supplemental departmental application form is also required. Applicants should upload it to the ApplyYourself system.

International applicants must submit score(s) from one of the following tests:
  • TOEFL
    - Internet Based - Total Score: 79
    - Internet Based - Writing Score: 21
    - Internet Based - Reading Score: 19
    - Paper Based - Total Score: 550
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
36 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must pass one written preliminary examination and one preliminary oral examination before writing the dissertation.

The final oral examination for the Ph.D. is a defense of the thesis. This must be done within five calendar years after passing the preliminary oral examination.
Twin Cities Campus

Medicinal Chemistry M.S.
Graduate Studies in Medicinal Chemistry
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-624-0139)
Email: medchem@umn.edu
Website: http://www.pharmacy.umn.edu/medchem/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly to the M.S. program. See the Medicinal Chemistry Ph.D. or contact the director of graduate studies for more information.

The medicinal chemistry program emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Students must complete a core curriculum of advanced courses in organic and medicinal chemistry, as well as credits in a minor or related field.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Students are not admitted directly to the M.S. program. See the Medicinal Chemistry Ph.D.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 12 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

At least 2 semesters must be completed before filing a Degree Program Form.

Students must complete a core curriculum of advanced courses in organic chemistry and medicinal chemistry (totaling 12 cr); and 6 credits in a minor or related field.
Twin Cities Campus
Medicinal Chemistry Minor
Graduate Studies in Medicinal Chemistry
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-624-0139)
Email: medchem@umn.edu
Website: http://www.pharmacy.umn.edu/medchem/home.html

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in medicinal chemistry emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum of 12 credits in a focused area (which may include biochem or chem credits taken as required for the major program) is required for the doctoral minor, including introductory courses (MEDC 8001 and 8002), advanced medicinal chemistry courses, and other courses in the medicinal chemistry core curriculum.
Twin Cities Campus
Medicinal Chemistry Ph.D.
Graduate Studies in Medicinal Chemistry
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Medicinal Chemistry, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax: 612-624-0139)
Email: medchem@umn.edu
Website: http://www.pharmacy.umn.edu/medchem/home.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 48
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in medicinal chemistry emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants should have a B.S. or M.S. degree in an appropriate related science field such as pharmacy, chemistry, or biology. Students majoring in other degree programs that encompass chemical, biochemical, or biological fields of study are also encouraged to apply. All applicants should have completed undergraduate chemistry through elementary organic chemistry. Undergraduate coursework in biochemistry and physical chemistry is also a prerequisite, but under certain circumstances such coursework may be taken during the first year. Students may apply for admission to the Ph.D. program only, and usually are admitted fall semester only.

Special Application Requirements:
Scores from the General (Aptitude) Test of the GRE, three letters of recommendation from college-level faculty, a complete set of official transcripts, and a statement of immediate and long range career objectives are required. All application materials should be submitted by the admissions deadline listed on the departmental website in order to be considered for fellowship, teaching, and research assistantships awarded in the next academic year.

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
• IELTS
  - Total Score: 6.5
• MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Program Requirements
24 credits are required in the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

Students must also participate in the department seminar program, successfully complete a comprehensive exam requirement that serves as the preliminary written exam, and prepare and defend an original research proposal which serves as the preliminary oral exam.

All students must complete a core curriculum of advanced courses in organic chemistry and biochemistry (totaling 12 credits); and medicinal chemistry (12 cr).
Twin Cities Campus
Pharmaceutics M.S.
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics, Room 9-177 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 USA (612-624-5153; fax: 612-626-2125)
Email: pceuts@umn.edu
Website: http://www.pharmacy.umn.edu/pharmaceutics

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly to the M.S. program. Pharmaceutics Ph.D. students may pursue an M.S. through a change of status request. See the Pharmaceutics Ph.D program for more information.

The pharmaceutics program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics. Minor fields of particular value include biochemistry, biometry, chemistry, biomedical engineering, chemical engineering, mechanical engineering, pharmacology, and statistics.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
Special Application Requirements:
Note: Students are not admitted directly to the M.S. program. Pharmaceutics Ph.D. students may pursue an M.S. through a change of status request. See the Pharmaceutics Ph.D program for more information.

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Students take core courses in pharmaceutics and chemistry. In addition to coursework, a preliminary written exam and preparation of a thesis and its defense are required. Coursework for the M.S. includes 14 credits in 5xxx or 8xxx courses in the major, and 6 credits in one or more related fields outside the major to comprise a minimum of 20 credits for the degree. A complete list of degree program requirements can be obtained from the director of graduate studies. Additional courses are selected in consultation with the major adviser.
Twin Cities Campus
Pharmaceutics Minor
Graduate Studies in Pharmaceutics
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
Department of Pharmaceutics, Room 9-177 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-5153; fax 612-626-2125)
Email: pceuts@umn.edu
Website: http://www.pharmacy.umn.edu/pharmaceutics

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program requires summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Pharmaceutics Program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics. Minor fields of particular value include biochemistry, biometry, chemistry, biomedical engineering, chemical engineering, mechanical engineering, pharmacology, and statistics.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Required Coursework
A minor in pharmaceutics requires a minimum of 12 credits in PHM 5xxx, PHM 8xxx, or PHAR 6xxx courses and approval of the pharmaceutics director of graduate studies. In addition, one member of the Ph.D. supervisory committee must be a pharmaceutics graduate faculty member. The minor program must be declared prior to the preliminary oral examination.
**Twin Cities Campus**  
Pharmaceutics Ph.D.  
Graduate Studies in Pharmaceutics  
College of Pharmacy

Link to a list of faculty for this program.

**Contact Information:**  
Department of Pharmaceutics, Room 9-177 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 USA (612-624-5153; fax: 612-626-2125)  
Email: pceuts@umn.edu  
Website: [http://www.pharmacy.umn.edu/pharmaceutics](http://www.pharmacy.umn.edu/pharmaceutics)

- Program Type: Doctorate  
- Requirements for this program are current for Fall 2011  
- Length of program in credits: 35  
- This program requires summer semesters for timely completion.  
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the [General Information](http://www.pharmacy.umn.edu/pharmaceutics) section of the catalog website for requirements that apply to all major fields.

The Pharmaceutics Program offers emphases in physical pharmacy, biopharmaceutics, and pharmacokinetics. Minor fields of particular value include biochemistry, biomedical engineering, biometry, chemistry, chemical engineering, mechanical engineering, molecular biology, pharmacology, and statistics.

**Program Delivery**  
This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**  
The preferred undergraduate GPA for admittance to the program is 3.20.

Undergraduate (and graduate, if applicable) scholastic records, recent GRE scores, a statement of career goals, and three letters of recommendation are used to determine each candidate's admissibility. Minimum GRE scores (80th percentile for the quantitative and 4.5 for the analytical writing sections are preferred), as well as a preferred GPA of 3.20 from U.S. schools, and "First Class" or the equivalent on transcripts from foreign institutions. A minimum TOEFL score of 100 (Internet) and a 23 for the speaking subscore is preferred for applicants whose native language is not English. Fall admission is preferred and the deadline to apply is December 31. (Students who want to know their chances for admission before paying the application fee can use a free pre-evaluation feature on the pharmaceutics website to determine if their credentials are competitive.)

Applicants must submit their test score(s) from the following:  
- GRE  
  - General Test - Analytical Writing: 4.5

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 100  
  - Internet Based - Speaking Score: 23

- IELTS  
  - Total Score: 6.5

The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the [General Information](http://www.pharmacy.umn.edu/pharmaceutics) section of the catalog website.
Program Requirements
This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. requires a minimum of 29 upper-division course credits (5xxx or above, including 12 credits in a minor or supporting program), and a collateral field with a minimum of 6 credits. Students must take advanced courses in pharmaceutics, chemistry, mathematics, statistics, and pharmacology. A complete list of degree program requirements may be obtained from the director of graduate studies. In addition, students complete a preliminary written exam, a written research proposal based on thesis research, a preliminary oral exam, and finally, a thesis and its defense.
Twin Cities Campus
Social and Administrative Pharmacy Minor
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax: 612-625-9931)
Email: cremi001@umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 12
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Social and Administrative Pharmacy Program are prepared for research and related activities investigating relationships between biological and physical factors in social settings that involve the drug use process. The flexible interdisciplinary program uses the resources of the many health and social science departments at the University, and may include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and mentored to become professional scientists. Those who complete the program will understand the process of conducting high quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

Social and administrative pharmacy (SAPH) is the application of behavior-oriented interdisciplinary theories to pharmacy problem solving and pharmacy system development. This includes the study of the social, psychosocial, political, legal, public policy, historic, and economic factors that impinge upon the use, non-use, and abuse of drugs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus

Social and Administrative Pharmacy Ph.D.
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax:612-625-9931)
Email: cremi001@umn.edu
Website: http://www.pharmacy.umn.edu/pchs/saph/home.html

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 71
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Students in the Social and Administrative Pharmacy Program are prepared for research and related activities investigating relationships between biological and physical factors in social settings that involve the drug use process. This flexible interdisciplinary program uses the resources of the many health and social science departments at the University, and may include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and mentored to become professional scientists. Those who complete the program will understand the process of conducting high quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

Social and administrative pharmacy (SAPH) is the application of behavior-oriented interdisciplinary theories to pharmacy problem solving and pharmacy system development. This includes the study of the social, psychosocial, political, legal, public policy, historic, and economic factors that impinge upon the use, non-use, and abuse of drugs.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Applicants must complete a supplementary application form in addition to the Graduate School application. The supplementary form along with three letters of recommendation should be uploaded to the Graduate School Apply Yourself application. GRE scores are required and a performance level of 580 (158 for November 1, 2011-June 30, 2012) is preferred on the TOEFL for all international applicants whose native language is not English.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
35 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

Two preliminary written exams are required: one concentrates on research design, methodological issues, and statistical analysis; the other on material specific to social and administrative pharmacy. Students must also pass a preliminary oral exam.
Twin Cities Campus
Social and Adminstrative Pharmacy M.S.
Pharmaceutical Care and Health
College of Pharmacy

Link to a list of faculty for this program.

Contact Information:
7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax: 612-625-9931)
Email: cremi001@umn.edu
Website: http://www.pharmacy.umn.edu/pchs/saph/home.html

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 32
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Study within the Social and Administrative Pharmacy Program is tailored carefully to the specific needs and objectives of the student. It is a flexible, interdisciplinary program which utilizes all resources of the University's many outstanding departments in an effort to provide the student with knowledge and experience in areas she/he feels are applicable to the resolution of pharmacy-oriented problems.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Although the majority of students in the program are pharmacists, a pharmacy education is not required. A bachelor's degree or its foreign equivalent from a recognized college of pharmacy and a strong scholastic record are desirable. Individuals from other fields such as economics, engineering, computer science, medicine, psychology, sociology, or public health may be admitted if their undergraduate coursework satisfies the prerequisites for graduate coursework.

Special Application Requirements:
Applicants must complete a supplementary application form in addition to the Graduate School application. The supplementary form along with three letters of recommendation should be uploaded to the Graduate School Apply Yourself application. GRE scores are required and a performance level of 580 (158 for November 1, 2011-June 30, 2012) is preferred on the TOEFL for all international applicants whose native language is not English.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

**Plan A:** Plan A requires 16 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

**Plan B:** Plan B requires 16 major credits and 6 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The balance of coursework taken to meet the 30 semester credit minimum (8 credits in addition to the 16 major field credits and 6 minor or related field credits) is determined by agreement between the student and adviser.

Plan B also requires two papers of publishable quality; one paper must include a research component with an analysis of data.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.
Twin Cities Campus
Aging Studies Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D-305 Mayo Memorial Building, 420 Delaware Street SE, Minneapolis, MN 55455 9612-626-3500, f: 612-624-4498
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 18
- This program does not require summer semesters for timely completion.
- Degree: Aging Studies PostBaccalaureate Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Certificate on Aging is an 18 credit graduate level program; with some courses offerings available online as well as in a face-to-face format. The certificate is designed to increase knowledge and understanding in the multi-faceted field of human aging. This interdisciplinary program provides students with the background and confidence necessary to meet the challenges of serving the aging population. The courses are offered through the Center on Aging within the Division of Health Policy and Management.

Aging Studies at the University of Minnesota involves an interdisciplinary approach to gerontology for those individuals who hold at least a bachelor's degree. The interdisciplinary nature of the program embraces different backgrounds and interests, and is suitable for graduates from any major.

The primary purpose of Aging Studies is to prepare professionals for work in programs, businesses, organizations, and agencies that address the needs of an aging population. Examples include hospitals; long-term care facilities; education; clinics; home health care agencies; hospice and end-of-life care organizations; insurance groups, counseling and social services; physician groups; financial planning; architecture and design; public policy makers; and nursing.

Accreditation
This program is accredited by CEPH

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students who have completed 16-semester credits/24-quarter credits (within the past 24 months) in an academic program in a recognized institution of higher learning in the U.S. do not need to submit the TOEFL as part of the application process.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
Key to test abbreviations (TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

*Courses taken as required courses cannot also be used as electives.

Required Courses
Core Courses
Take 5 - 6 credits(s) from the following:
• GER0 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
• GER0 5110 - Biology of Aging (3.0 cr)
• GER0 5111 - Studying Aging and Chronic Illness (2.0 cr)
• GER0 5115 - Introduction to Geriatrics (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)

Elective Courses
Courses taken as required courses cannot also be used as electives.
Take 12 - 13 credits(s) from the following:
• FSOS 8105 - Family Gerontology (3.0 cr)
• GER0 5100 - Topics in Gerontology (0.5 - 4.0 cr)
• GER0 5110 - Biology of Aging (3.0 cr)
• GER0 5111 - Studying Aging and Chronic Illness (2.0 cr)
• GER0 5115 - Introduction to Geriatrics (2.0 cr)
• GER0 5125 - Gerontology Service Learning (3.0 cr)
• GER0 8020 - Seminar in Gerontology (2.0 cr)
• PSY 5138 - Psychology of Aging (3.0 cr)
• SW 5313 - Social Work with Older Adults (2.0 cr)
• SW 5810 - Seminar: Special Topics (1.0 - 4.0 cr)
• SOC 8590 - Topics in Life Course Sociology (3.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• PA 5412 - Aging and Disability Policy (3.0 cr)
Twin Cities Campus
Biostatistics M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)
Email: sph-ssc@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Biostatistics M.P.H. Program requires that students meet the Association of Schools of Public Health (ASPH) Core Competencies in five core public health areas, including administration, behavioral science, biostatistics, environmental health, and epidemiology, plus an additional requirement in ethics.

The master of public health (M.P.H.) program has different course requirements than the master of science (M.S.). In place of the four elective courses (one in health science and three in biostatistics), which are required for the M.S., the M.P.H. requires five public health courses. The M.P.H. program also requires students to complete a field experience in addition to a written master's project like the M.S. Plan B written project. Unlike the M.S., the M.P.H. does not have a comprehensive written exam requirement. More detailed information is available in the Program Requirements section below.

Accreditation
This program is accredited by CEPH (Council on Education for Public Health).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The admissions committee reviews applicants according to their personal statements, background and experience, record of academic achievement, demonstrated academic potential, letters of recommendation, compatibility of interests with program faculty, and other factors.

Test scores and GPAs provide competitive points of reference for admission but are not alone decisive in the admissions review.

Prospective applicants should have taken at least:
- Three semesters of calculus (including multivariable calculus)
- One semester of linear algebra

Experience with a programming language (eg. Java, C, Python) is helpful, but not required.

Preferred GRE performance expectations (test taken post-August 2011): 150 Verbal; 146 Quantitative

Special Application Requirements:
International applicants who have attended post-secondary institutions outside of the U.S. are also required to submit the following supporting documentation to SOPHAS.
World Education Services (WES) evaluation of foreign academic credentials. The University of Minnesota School of Public Health requires all applicants with foreign academic credentials to provide a WES course-by-course evaluation of those credentials. Note: Applicants with transcripts from Canadian schools are exempt from this requirement. Instead, applicants should have copies of their Canadian transcripts sent directly to SOPHAS.

Through special arrangements with SOPHAS, WES will deliver its credential evaluation report directly to SOPHAS by secure electronic transmission. This expedites the delivery of the evaluation report as well as images of the applicant's verified transcripts to SOPHAS and allows SOPHAS to process the report most efficiently. Go to http://www.wes.org/sophas for more information.

Note: Once WES receives the required documentation, it can complete an evaluation in seven business days or less, depending on the type of service requested. However, if additional research, correspondence, or verification is required, the evaluation will take longer. Students are recommended to start the process at least six weeks prior to the program deadline to ensure that their WES evaluation reports are complete by the deadline.

Proof of English Proficiency
Applicants whose native language is not English, or whose academic study was done exclusively at non-English speaking institutions, must prove English proficiency by providing either official Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) scores. Official report of the scores should be sent directly to SOPHAS using designation code 5688 for the TOEFL or designation code SOPHAS for the IELTS.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 450
  - General Test - Quantitative Reasoning: 550

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 34 major credits and 8 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The Plan B project demonstrates the student's familiarity with the tools of research or scholarship in the major, the capacity to work independently, and the ability to present the results of the investigation effectively. The master's project should involve a combined total of 120 hours of work.

MPH Program Curriculum
- PUBH 7405 - Biostatistics: Regression (4.0 cr)
- PUBH 7406 - Advanced Regression and Design (4.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Complementary and Alternative Medicine Interdisciplinary Concentration Area

The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Global Health Interdisciplinary Concentration Area

The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad. SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area

The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators.

For example, according to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.
SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Biostatistics M.S.
School of Public Health
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-ssc@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 40 to 44
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biostatistics combines statistics, biomedical science, and computing to advance health research. Biostatisticians design, direct, and analyze clinical trials; develop new statistical methods; and analyze data from observational studies, laboratory experiments, and health surveys. This is an ideal field for students who have strong mathematical backgrounds and who enjoy working with computers, collaborating with investigators, and participating in health research. Students take courses in biostatistical methods, theory of statistics, clinical trials, statistical computing, categorical data, survival analysis, and health sciences.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.10.

For the M.S., prospective applicants should have taken at least three semesters of calculus (including multivariable calculus) and one semester of linear algebra. Experience with a programming language (e.g., Java, C) is helpful, but not required.

Preferred GRE performance expectations (test taken post-August 2011): 150 Verbal; 146 Quantitative

Special Application Requirements:
Students should apply for admission during fall semester only. New students are not admitted in spring semester.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 450
  - General Test - Quantitative Reasoning: 550

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations: (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 29 major credits and 11 credits outside the major. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

A comprehensive written exam to be taken after finals of spring semester in year 1.

The Plan B project demonstrates the student's familiarity with the tools of research or scholarship in the major, the capacity to work independently, and the ability to present the results of the investigation effectively. The master's project should involve a combined total of 120 hours of work.

Biostatistics M.S. Coursework

PUBH 7405 - Biostatistics: Regression (4.0 cr)
PUBH 7406 - Advanced Regression and Design (4.0 cr)
PUBH 7407 - Analysis of Categorical Data (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7494 - Master's Project: Biostatistics (1.0 - 3.0 cr)
STAT 5101 - Theory of Statistics I (4.0 cr)
STAT 8101 - Theory of Statistics I (4.0 cr)
STAT 5102 - Theory of Statistics II (4.0 cr)
STAT 8102 - Theory of Statistics II (4.0 cr)

3 Biostatistics elective courses (at least 8 credits)

GEOG 5561 - Principles of Geographic Information Science (4.0 cr)
GIS 5571 - ArcGIS I (3.0 cr)
MATH 5615H - Honors: Introduction to Analysis I (4.0 cr)
MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
PUBH 7460 - Advanced Statistical Computing (3.0 cr)
PUBH 7465 - Biostatistics Consulting (3.0 cr)
PUBH 7470 - Statistics for Translational and Clinical Research (3.0 cr)
PUBH 7475 - Statistical Learning and Data Mining (3.0 cr)
PUBH 8422 - Modern Nonparametrics (3.0 cr)
PUBH 8435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
PUBH 8472 - Spatial Biostatistics (3.0 cr)
PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
STAT 5401 - Applied Multivariate Methods (3.0 cr)
STAT 5601 - Nonparametric Methods (3.0 cr)
WRIT 5051 - Graduate Research Writing Practice for Non-native Speakers of English (3.0 cr)
WRIT 5052 - Graduate Research Presentations and Conference Writing for Non-Native Speakers of English (3.0 cr)

Students must complete at least 3 credits of a health science elective.

CSCI 5481 - Computational Techniques for Genomics (3.0 cr)
PBIOL 5301 - Plant Genomics (3.0 cr)
PSY 5137 - Introduction to Behavioral Genetics (3.0 cr)
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6101 - Environmental Health (2.0 cr)
PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6381 - Genetics in Public Health (2.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
Program Sub-plans
A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Rochester
This sub-plan is a way for the existing University of Minnesota Twin Cities (UMTC) M.S. program in biostatistics to be offered to students on the Rochester campus of the University of Minnesota (UMR). The objective of the sub-plan is to enable student employees at the Mayo Clinic as well as other students in Rochester to complete requirements for an M.S. degree in biostatistics while minimizing the necessity to travel back and forth from Rochester to the Twin Cities, or to establish residence in the Twin Cities. Courses are offered through interactive teleconnections to the Rochester campus, and some electives are offered through existing web-based courses, while other approved electives are offered in ITV classrooms by adjunct faculty with graduate faculty appointments at the UMR facilities.

Prospective students interested in the biostatistics M.S. program in Rochester apply directly to the School of Public Health through the Schools of Public Health Application Service (SOPHAS) centralized online application system at www.sophas.org. The application and admission requirements are identical for Twin Cities and Rochester applicants.

For the M.S. Plan B degree, students must complete 11 courses with a GPA of 3.00, pass a written exam, complete the Plan B project, and pass a final oral exam. Most students need two years of full-time study to finish the degree. The required credits are divided among three areas: 1) seven required courses in statistical theory and biostatistics methods; 2) one elective course in health science; 3) three elective courses in biostatistics. Details of the program are available in the Student Handbook at www.sph.umn.edu/biostatistics. The M.S. Plan A thesis degree is for those who have completed advanced work, such as a Ph.D. in a mathematical science and who want to begin dissertation research in biostatistics methodology after only one year of coursework. Students complete at least 20 credits (14 in biostatistics and 6 in related fields), pass a written exam, complete the Plan A thesis, and a final oral exam.
Twin Cities Campus
Biostatistics Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E. Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636 fax: 612-624-4498)
Email: sph-ssc@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12 to 14
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biostatistics combines statistics, biomedical science, and computing to advance health research. Biostatisticians design, direct, and analyze clinical trials; develop new statistical methods; and analyze data from observational studies, laboratory experiments, and health surveys. This is an ideal field for students who have strong mathematical backgrounds and who enjoy working with computers, collaborating with investigators, and participating in health research. Students take courses in biostatistical methods, theory of statistics, clinical trials, statistical computing, categorical data, survival analysis, and health sciences.

The biostatistics minor is designed for students in non-biostatistics degree programs at the University of Minnesota. Minors are available for both M.S. and Ph.D. students.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Minor Options

M.S. Minor in Biostatistics
Take 2 or more course(s) from the following:
• PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
• PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
• PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
• PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
• PUBH 7450 - Survival Analysis (3.0 cr)

-OR-

Ph.D. Minor in Biostatistics for Non-Statistics Students
Students should take the required set of 2 core courses (either 7401 and 7402, or 7405 and 7406) first, before choosing two additional courses from the list of elective courses below.

NOTE: One course may be taken S/N and all other courses must be taken A/F

Biostatistics Core
• PUBH 7405 - Biostatistics: Regression (4.0 cr)
• PUBH 7406 - Advanced Regression and Design (4.0 cr)
• PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
• PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
• Electives

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 02, 2012
Take 2 or more course(s) from the following:
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)
- PUBH 7450 - Survival Analysis (3.0 cr)

-OR-

Ph.D. Minor for Graduate Students in Statistics
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)

Take 2 or more course(s) from the following:
- PUBH 8422 - Modern Nonparametrics (3.0 cr)
- PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
- PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
- PUBH 8462 - Advanced Survival Analysis (3.0 cr)
- PUBH 8472 - Spatial Biostatistics (3.0 cr)
- PUBH 8482 - Sequential Analysis (3.0 cr)
**Twin Cities Campus**

**Biostatistics Ph.D.**

*School of Public Health - Adm*

**School of Public Health**

Link to a list of faculty for this program.

**Contact Information:**
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)
Email: sph-ssc@umn.edu
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 55 to 63
- This program does not require summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Biostatistics combines statistics, biomedical science, and computing to advance health research. Biostatisticians design, direct, and analyze clinical trials; develop new statistical methods; and analyze data from observational studies, laboratory experiments, and health surveys. This is an ideal field for students who have strong mathematical backgrounds and who enjoy working with computers, collaborating with investigators, and participating in health research. Students take courses in biostatistical methods, theory of statistics, clinical trials, statistical computing, categorical data, survival analysis, and health sciences.

**Program Delivery**
This program is available:
• via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.70.

Prospective applicants should have taken at least three semesters of calculus (including multivariable calculus) and one semester of linear algebra. Experience with a programming language (e.g., Java, C) is helpful, but not required.

In addition to completing the SOPHAS application, students are also required to submit the following supporting documentation directly to SOPHAS:
- Statement of purpose and objectives (an essay describing past education, experience, and current professional career objectives)
- Résumé or curriculum vitae (C.V.)
- Official postsecondary transcripts from all institutions attended, including previous study at the University of Minnesota (transcripts must be sent directly from the institutions to SOPHAS)
- Three letters of recommendation from persons qualified to assess the student's academic work; clinical, public health, or professional experiences; and leadership potential

**Special Application Requirements:**
All admitted international Ph.D. applicants are required to provide a World Education Services (WES) document verification report prior to beginning the program.

**Proof of English Proficiency**
Applicants whose native language is not English, or whose academic study was done exclusively at non-English speaking institutions, must prove English proficiency by providing either official Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) scores. Official report of the scores should be sent directly to SOPHAS using designation code 5688 for the TOEFL or designation code SOPHAS for the IELTS. Scores must be less than two years old. The preferred minimum English language test scores for admission to the School of Public Health are listed below.

The English Language test requirement may be waived if an applicant can provide proof of one of the following:
- Completion of 16 semester credits/24 quarter credits (within the past 24 months) in an academic program at a recognized institution of higher learning in the U.S. or Canada.
- An Educational Commission for Foreign Medical Graduates (ECFMG) certificate. Students should have an official or attested copy.
sent directly to the University of Minnesota School of Public Health at the address listed above.

Applicants must submit their test score(s) from the following:
• GRE
  - General Test - Verbal Reasoning: 150
  - General Test - Quantitative Reasoning: 146

International applicants must submit score(s) from one of the following tests:
• TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
• IELTS
  - Total Score: 7
• MELAB
  - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
19 to 25 credits are required in the major.
12 to 14 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.3 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

The Ph.D. program requires seven core courses (including mathematical statistics, linear models, probability models, and Bayesian methodology) and three elective courses in biostatistical theory and methods, a preliminary written examination on the material from some of the required courses, a preliminary oral examination, a written dissertation, and dissertation defense in a final oral examination. This usually requires three years of full-time study after the M.S. degree.

Schedule 1 and 2
For students admitted to the University of Minnesota with an M.S. in statistics or biostatistics.

PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
PUBH 8401 - Linear Models (4.0 cr)
PUBH 8432 - Probability Models for Biostatistics (3.0 cr)
PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
STAT 8101 - Theory of Statistics 1 (4.0 cr)
STAT 8102 - Theory of Statistics 2 (4.0 cr)
STAT 8111 - Mathematical Statistics I (3.0 cr)
STAT 8112 - Mathematical Statistics II (3.0 cr)

Take 3 or more course(s) from the following:
• PUBH 8435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
• PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)
• PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)
• PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)
• PUBH 8462 - Advanced Survival Analysis (3.0 cr)
• PUBH 8472 - Spatial Biostatistics (3.0 cr)
• PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)
• PUBH 8482 - Sequential Analysis (3.0 cr)
• PUBH 8492 - Theories of Hierarchical and Other Richly Parametrized Linear Models (3.0 cr)

Schedule 3
For students entering the Ph.D. program with an undergraduate degree in mathematics, statistics, or biostatistics.

**MATH 5616H - Honors: Introduction to Analysis II (4.0 cr)**

**PUBH 7405 - Biostatistics: Regression (4.0 cr)**

**PUBH 7406 - Advanced Regression and Design (4.0 cr)**

**PUBH 7407 - Analysis of Categorical Data (3.0 cr)**

**PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)**

**PUBH 7450 - Survival Analysis (3.0 cr)**

**PUBH 8401 - Linear Models (4.0 cr)**

**PUBH 8432 - Probability Models for Biostatistics (3.0 cr)**

**PUBH 8442 - Bayesian Decision Theory and Data Analysis (3.0 cr)**

**STAT 8101 - Theory of Statistics 1 (4.0 cr)**

**STAT 8102 - Theory of Statistics 2 (4.0 cr)**

**STAT 8111 - Mathematical Statistics I (3.0 cr)**

**STAT 8112 - Mathematical Statistics II (3.0 cr)**

Take 3 or more course(s) from the following:

- **PUBH 8422 - Modern Nonparametrics (3.0 cr)**
- **PUBH 8435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)**
- **PUBH 8445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)**
- **PUBH 8446 - Advanced Statistical Genetics and Genomics (3.0 cr)**
- **PUBH 8452 - Advanced Longitudinal Data Analysis (3.0 cr)**
- **PUBH 8462 - Advanced Survival Analysis (3.0 cr)**
- **PUBH 8472 - Spatial Biostatistics (3.0 cr)**
- **PUBH 8475 - Statistical Learning and Data Mining (3.0 cr)**
- **PUBH 8482 - Sequential Analysis (3.0 cr)**
- **PUBH 8492 - Theories of Hierarchical and Other Richly Parametrized Linear Models (3.0 cr)**
**Twin Cities Campus**

Clinical Research M.S.

*School of Public Health - Adm*

**School of Public Health**

Link to a [list of faculty](#) for this program.

**Contact Information:**
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; f: 612-624-4498)

Email: sph-SSC@umn.edu

Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 44
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the [General Information](#) section of the catalog website for requirements that apply to all major fields.

This interdisciplinary program trains health professionals to design, implement, and manage research in human populations. Because the field is fast becoming more complex, sophisticated, and regulated, there is an emerging recognition of, and demand for, formalized training. This program focuses primarily on patient-oriented health research, including mechanisms of human disease, therapeutic interventions, clinical trials, and development of new techniques. It focuses less on epidemiologic and behavioral studies, or on outcomes research and health services research; students interested in these areas may be better served by seeking a master of public health (M.P.H.) degree.

**Program Delivery**

This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

An advanced health professional degree, e.g. M.D., D.D.S., D.O., D.N.P., D.C., D.V.M., Pharm.D., Ph.D.; an advanced doctoral degree in a clinical biomedical field; or an advanced nursing degree.

Students must have completed or must be at an advanced stage of their clinical practice training and be affiliated with someone at the University of Minnesota who can provide advising and access to a clinical project. The admissions committee considers exceptions on an individual basis.

**Special Application Requirements:**

The M.S. has specific application requirements including an advanced health professional degree, and training sufficient to be eligible for a license to practice as supported in the form of an official transcript. One of the three required recommendation letters and a completed School of Public Health Recommendation form should be from the clinical director of training supporting the applicant's potential as a clinical researcher.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language

Key to [test abbreviations](#) (TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 28 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

Required Coursework

Also required: both sessions of the University of Minnesota Responsible Conduct of Research course, validated by ORTTA; and the NIH online training, Protection of Human Research Subjects, validated by the electronic certificate given at end of course.

PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
PUBH 6303 - Clinical Research Project Seminar (2.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6348 - Writing Research Grants (2.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Elective Courses (3 credits)
Twin Cities Campus

Clinical Research Postbaccalaureate Certificate

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 OR 1-800-774-8636; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 15
- This program does not require summer semesters for timely completion.
- Degree: Clinical Research PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

There is a growing need for health professionals who advance science discoveries to clinical applications through research on human beings; i.e., clinical research. This includes observational studies and clinical trials on individuals and in communities. It is increasingly recognized that many individuals seek formal training in clinical research, both in the U.S. and abroad, but cannot spend the time or do not have the resources to attend an on-campus program or do an original research project for a thesis. This certificate in clinical research includes the alternative of distance learning for health professionals in Minnesota, outside the state, and in other countries.

Of the 15 required credits, 13 are are offered entirely online. The 2-credit PUBH 6303 Seminar will be offered as a hybrid with much of the didactic portions online and student presentations done either during an 8-week, on-campus period or via live video technology. Additional elective courses may be either online or in-person.

Program Delivery

This program is available:
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants are required to have a baccalaureate degree and at least five years of relevant clinical research experience or GRE scores.

Special Application Requirements:
All applications are reviewed holistically. Submit to the University of Minnesota School of Public Health:
- Completed application and application fee. The application can be found at http://www.sph.umn.edu/prospective/admissions/documents/RegentsCertificateApplicationforAdmissionForm.pdf
- Statement of purpose and objectives describing the reason for applying, career goals, and how the certificate will help achieve them
- One letter of recommendation
- Official transcripts of record from each college/university attended
- Resume or C.V.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
- Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
PUBH 6301 - Fundamentals of Clinical Research (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6303 - Clinical Research Project Seminar (2.0 cr)
PUBH 7400 - Topics: Biostatistics (0.5 - 4.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)

or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)

or PUBH 6450 - Biostatistics I (4.0 cr)
Community Health Promotion M.P.H.

School of Public Health - Adm

Through coursework and fieldwork taken at the School of Public Health, students in community health promotion develop basic competencies in theory, health behavior and policy interventions, assessment methods, cultural competency, and management.

Each graduate should have the ability to:
- Use theories of behavior and social change to inform the planning and evaluation of health interventions
- Identify individual, community, and policy-level interventions that are effective in promoting healthy behaviors and social conditions
- Design and implement effective individual, community, and policy-level interventions targeting a variety of health behaviors
- Assess the health status of populations and communities
- Utilize appropriate data collection strategies and qualitative and quantitative methods to evaluate health interventions
- Identify the role of cultural, social, and behavioral factors in influencing health behaviors and status
- Develop and adapt approaches to solving health problems, taking into account cultural differences
- Communicate health information effectively both in writing and orally
- Advocate for public health programs and resources
- Collaborate with public health agencies and other constituency groups
- Coordinate and manage health programs/services
- Relate ethical considerations and values to one's professional practice

The M.P.H. in community health promotion is a good path for students planning for careers as public health practitioners or planning to pursue a Ph.D. degree in social and behavioral epidemiology, which is available in the School of Public Health.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

In addition to completing the SOPHAS application, students are required to submit the following supporting documentation directly to SOPHAS (http://www.sophas.org):
- Statement of purpose and objectives - An essay describing past education, experience, and current professional career objectives. Students are encouraged to comment on any or all of the following: plans to use their education and training; the needs and/or challenges they perceive as important in the field of study; and any personal qualities, characteristics, and skills they believe will enable them to be successful in the chosen field of study.
- Résumé or curriculum vitae (C.V.)
- Official post-secondary transcripts from all U.S. institutions attended (must be sent directly from the institutions to SOPHAS). This includes previous study at the University of Minnesota.
- Three letters of recommendation from persons qualified to assess the applicant's academic work; clinical, public health, or professional experience

**Special Application Requirements:**
Applicants are admitted from a wide variety of academic backgrounds, including social and behavioral sciences (e.g., psychology, sociology, anthropology), the humanities, basic sciences (e.g., biology, nursing), and mathematics. There is no single appropriate undergraduate major; however, applicants should meet prerequisites by the time of admission.

Who should apply? Individuals who want skills to:
- influence policy and public opinion on health issues;
- develop and evaluate innovative community-based programs to prevent disease and injury;
- work with communities, health departments, and non-profit organizations and policymakers to create healthy living and working environments;
- work on issues related to specific population, including youth and disadvantaged populations.

And individuals who:
- have a variety of backgrounds, including those trained in basic sciences, social and behavioral sciences, and the humanities;
- plan to pursue a Ph.D. degree in social and behavioral epidemiology at the University of Minnesota;
- have met the prerequisites listed below before admission.

**Prerequisites for Admission**
- Baccalaureate degree or higher from an accredited college or university
- College-level courses in the following areas:
  - Social and behavioral sciences (at least 3 courses)
  - Introductory statistics (1 course)
  - One year of paid or volunteer experience in a public health, social service, or community setting

**Preferences for Admission**
- Strong personal statement indicating why applicant is interested in pursuing a community health education degree
- Compatibility of interests with program faculty
- GPA of 3.0
- Combined GRE (verbal, quantitative) score of 1,000 and analytical writing score of 3.5
- TOEFL score of 600/250/100 for international applicants
- Strong reference letters

Applicants must submit their test score(s) from the following:
- **GRE**
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500

International applicants must submit score(s) from one of the following tests:
- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan B:** Plan B requires 28 to 48 major credits and 10 to 30 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students must complete either a needs assessment, program evaluation, program development, or a research project.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.
A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses

- PUBH 6050 - Community Health Theory and Practice I (3.0 cr)
- PUBH 6051 - Community Health Theory and Practice II (3.0 cr)

Health Behavior and Policy Interventions (minimum of 8 credits)

- PUBH 6010 - Public Health Approaches to HIV/AIDS (3.0 cr)
- PUBH 6025 - e-Public Health: Online Intervention Design (3.0 cr)
- PUBH 6045 - Skills for Policy Development (1.0 cr)
- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6085 - Combating the Global Pandemic: Tobacco and Alcohol (2.0 cr)
- PUBH 6133 - Violence Prevention and Control: Theory, Research, and Application (2.0 cr)
- PUBH 6605 - Reproductive and Perinatal Health (2.0 cr)
- PUBH 6606 - Children's Health: Issues, Programs, and Policies (2.0 cr)
- PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
- PUBH 6627 - Sexual Behavior Education: Criteria, Curricula, and Controversy (1.0 cr)
- PUBH 6634 - Advocacy and Children's Rights (2.0 cr)
- PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
- PUBH 6914 - Community Nutrition Intervention (3.0 cr)
- SW 8505 - Advanced Community Organization and Advocacy (3.0 cr)

Assessment Methods (9-10 credits)

- PUBH 6034 - Program Evaluation for Public Health Practice (3.0 cr)
- PUBH 6035 - Applied Research Methods (3.0 cr)
- PUBH 6415 - Biostatistical Methods II (3.0 cr)
  or PUBH 6451

Public Health Core Courses (11-12 credits)

Students can take 6102 instead of 6101; 6341 instead of 6320; 6450 instead of 6414; and 6742 instead of 6741.

- PUBH 6101 - Environmental Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Master's Project and Field Experience (2-4 credits)

- PUBH 7094 - Culminating Experience: Community Health Promotion (1.0 - 6.0 cr)
- PUBH 7096 - Field Experience: Community Health Promotion (1.0 - 6.0 cr)

Electives to total 48 credits

Electives are to be determined with the adviser. They must be graduate-level courses but are not restricted to School of Public Health courses. Elective courses may be relevant to target groups or health behaviors, or advanced courses in epidemiology or biostatistics; relevant to the master's project; or expand professional skills by providing practical experience in a variety of public health-related proficiency areas.

Program Sub-plans

A sub-plan is not required for this program. Students may not complete the program with more than one sub-plan.

Complementary and Alternative Medicine Interdisciplinary Concentration Area

The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus

Environmental Health M.P.H.

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Bldg, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612/624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42 to 51
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master's and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

Applicants must indicate an interest in one of the following specialties within the major: the general environmental health, environmental health policy, environmental infectious diseases, environmental and occupational epidemiology, regulatory toxicology, occupational and environmental health nursing, occupational environmental medicine, occupational injury epidemiology and control, or industrial hygiene.

The industrial hygiene program is accredited by the Applied Science Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410-347-7700).

Accreditation
This program is accredited by Council on Education for Public Health and the Accreditation Board for Engineering and Technology.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum qualifications include a baccalaureate degree with coursework in the basic sciences. Occupational health nursing applicants must have a bachelor's degree from an accredited school of nursing.

Program Course Prerequisites
All specialties require basic sciences. Industrial hygiene also requires demonstrable strengths in physics, chemistry (including organic chemistry), biology and math (including calculus). A microbiology background is preferred for the environmental infectious diseases specialty.

In addition to completing the SOPHAS application, students are required to submit the following supporting documentation directly to SOPHAS (http://www.sophas.org):
- Statement of purpose and objectives - An essay describing past education, experience, and current professional career objectives. Students are encouraged to comment on any or all of the following: plans for using education and training; the needs and/or challenges the student perceives as important in the field of study; and any personal qualities, characteristics, and skills the student believes will enable success in the chosen field of study.
- Résumé or curriculum vitae (C.V.)
- Official post-secondary transcripts from all U.S. institutions attended, including previous study at the University of Minnesota (must be sent directly from the institutions to SOPHAS)
- Three letters of recommendation from persons qualified to assess the applicant’s academic work; clinical, public health, or professional experiences

Applicants must submit their test score(s) from the following:
- GRE
- GMAT
- MCAT
- LSAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 20 to 30 major credits and 10 to 12 credits outside the major. The final exam is written and oral. A capstone project is required.

Capstone Project: The purpose of the master's project is to enable students to demonstrate: familiarity with the tools of research and scholarship in the field of public health; the ability to work independently; the ability to plan and carry out a systematic investigation related to a public health issue; and the ability to effectively present, in written and oral form, the results of their investigation. The master's project for students in the environmental M.P.H. program may take one of four forms: 1) a written report, often in the form of a manuscript suitable for publication in a peer-reviewed journal, that demonstrates the student's ability to do quantitative analyses, utilizing data collected by the student or obtained from another source; 2) a literature review, of publishable quality, which demonstrates the student's ability to critically review the literature and synthesize published findings on a medical or public; 3) an NIH Grant Proposal; or 4) a portfolio.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

May be part of a joint/dual degree program.

Specialty Areas

Environmental and Occupational Epidemiology

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

This specialty strives to understand the causal impact of environment and occupation on human health, because public health interventions are most likely to be effective when disease and injury etiology is understood. Epidemiologists develop studies to identify factors that cause diseases and injuries. The study of environmental and occupational epidemiology requires knowledge of both subject matter and methods. The curriculum emphasizes both, comprising epidemiology.

General Core Requirements

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

Proposed Electives
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6160 - Metabolomics (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6171 - Exposure Assessment for Air Contaminants (3.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
- PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6396 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
- VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- OR-  

Environmental Health Policy
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
This specialty provides broad, multidisciplinary training in environmental health issues, including occupational health, risk assessment, risk management, decision making, and policy analysis. The multidisciplinary curriculum includes coursework in core public health and environmental health sciences, research methods, statistics, exposure and risk assessment, environmental and occupational health policy, and policy economics. Internship experiences are arranged with leading occup

General Requirements
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6116 - Environmental Law (1.0 cr)

Proposed Electives
Select electives in consultation with adviser.
Take 2 or more credits(s) from the following:

- PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6634 - Advocacy and Children's Rights (2.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6726 - Medical Device Industry: Business and Public Policy (3.0 cr)
- PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 2.0 cr)
- PUBH 6835 - Principles of Health Policy (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
- PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
- PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
- ANTH 5041 - Ecological Anthropology (3.0 cr)
- ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
- PA 5001 - Intellectual Foundations of Public Action (3.0 cr)
- PA 5002 - Introduction to Policy Analysis (1.5 cr)
- PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
- PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
- PA 5031 - Empirical Analysis I (4.0 cr)
- PA 5032 - Intermediate Regression Analysis (2.0 cr)
- PA 5033 - Multivariate Techniques (2.0 cr)
- PA 5035 - Survey Research and Data Collection (1.5 cr)
- PA 5711 - Science and Technology Policy (3.0 cr)
- PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PA 8790 - Advanced Topics in Science, Technology, and Environmental Policy (1.0 - 3.0 cr)
- PA 5311 - Program Evaluation (3.0 cr)

-OR-

Environmental Infectious Diseases (EID)
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
This specialty is concerned with the emergence of food-borne and infectious diseases in the United States and around the world. The environment and changing conditions in it can have a great impact on the distribution and occurrence of infectious diseases. Global climate change is a growing concern regarding the potential expansion of tropical vector borne diseases. In evaluating the chain of infection, environment may play a key role in reserv

General Requirements
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)

Recommended Electives
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
• PUBH 7210 - Topics: Global Food Systems (0.5 cr)
• PUBH 7214 - Principles of Risk Communication (1.0 cr)
• VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
• VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
• FSCN 4121 - Food Microbiology (3.0 cr)
• MICB 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
• MICB 4131 - Immunology (3.0 cr)
• MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
• MICB 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)

-OR-

General Program
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

General Requirements
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)

Electives
13 credits, selected in consultation with adviser.

-OR-

Global Environmental Health
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

The global environmental health track provides key information for individuals looking to work in the field of global environmental health either overseas or in the U.S. Issues of water and air quality, food safety, and the effects of industrialization are examined, as well as major ecological problems such as deforestation and sustainable agriculture. Interactions between the physical environment and biological health risks are considered also, as the effects of globalization of trade and the

General Requirements
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6133 - Global Health Seminar (1.0 cr)
PubH 72xx Topics: Globalization and Health (1 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)

Electives
7-9 credits, selected in consultation with adviser.

-OR-

Occupational and Environmental Health Nursing (OEHN)
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Occupational and environmental health nursing (OEHN) provides intensive training for nurses interested in the development, management, and evaluation of health services, programs, and policies designed to promote health and prevent work-related injuries and disease.

**General Requirements**
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core Courses**
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Occupational and Environmental Health Nursing Course Requirements**
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

**School of Nursing Courses**
- NURS 8170 - Research in Nursing (3.0 cr)
- NURS 8600 - Advanced Public Health Nursing (2.0 cr)

**Recommended Electives**
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- PUBH 6034 - Program Evaluation for Public Health Practice (3.0 cr)
- PUBH 6055 - Social Inequalities in Health (2.0 cr)
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
- NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

**Occupational and Environmental Medicine**
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Environmental and occupational epidemiology strives to understand the causal impact of environment and occupation on human health, because public health interventions are most likely to be effective when disease and injury etiology is understood. Epidemiologists develop studies to identify factors that cause diseases and injuries. The study of environmental and occupational epidemiology requires knowledge of both subject matter and methods. The curriculum emphasizes both, comprising epidemiolog

**General Core Requirements**
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core**
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Specialty Program Course Requirements**
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
- PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
Select electives in consultation with adviser.

-OR-

**Regulatory Toxicology and Risk Assessment**

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Regulatory toxicology and risk assessment teaches students to think analytically about the biochemical mechanisms of toxicity, and how toxicity is used to protect human health through laboratory research, and the development of sound environmental policy and regulations. Strong background in the biological sciences, interest in laboratory research or environmental regulation and policy. Emphasis: biological sciences, physiology, biochemistry, cellular and molecular biology, toxicology.

**General Requirements**

- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)

**Ethics Courses**

- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core Courses**

- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Specialty Program Course Requirements**

- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
- PUBH 6160 - Metabolomics (3.0 cr)
- PUBH 6161 - Regulatory Toxicology (2.0 cr)
- PUBH 8160 - Advanced Toxicology (2.0 cr)
- PUBH 8161 - Current Literature in Toxicology (1.0 cr)

**Electives**

At least 7 credits, selected in consultation with adviser.

---

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

**Industrial Hygiene**

The Industrial hygiene (IH) program is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment.

**Required Coursework**

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Hazardous Substances Academic Training (HSAT) is a sub-specialty within the IH track that trains master's level professionals with an emphasis in hazardous wastes and haza

**School of Public Health Core Requirements**

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Choose one of the following courses:

- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)

**Division of Environmental Health Sciences Core Requirements**

- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Occupational Health and Safety Core Requirements**

- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

**Industrial Hygiene Program Requirements**

- PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6174 - Control of Workplace Exposure (3.0 cr)
- PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
- PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
- PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)

**HSAT Program Requirements**

Optional certification

Take 0 or more credits(s) from the following:

- PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
- Take one of the following:
  - PUBH 6190 - Environmental Chemistry (3.0 cr)
  - CE 4561 - Solid Hazardous Wastes (3.0 cr)
  - 40-hour Continuing Education Class (for example, one of the following from CPHEO):
    - (i) Safety and Health Training for Hazardous Waste Site Personnel 40 hours; or
    - (ii) Hazardous Materials Emergency Response 40 hours

**Industrial Hygiene Electives**

Select electives in consultation with adviser.

Take 0 or more credits(s) from the following:

- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6116 - Environmental Law (1.0 cr)
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6131 - Working in Global Health (2.0 cr)
- PUBH 6132 - Air, Water, and Health (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6161 - Regulatory Toxicology (2.0 cr)
- PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
- PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- PUBH 6415 - Biostatistical Methods II (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 7220 - Personal Protective Equipment and Respiratory Protection (1.0 cr)
- PUBH 7260 - Ergonomics and the Prevention of Workplace Injuries (1.0 cr)
- CE 4561 - Solid Hazardous Wastes (3.0 cr)
- CE 5551 - Environmental Microbiology (3.0 cr)
- IE 5511 - Human Factors and Work Analysis (4.0 cr)
- IE 5513 - Engineering Safety (4.0 cr)
- KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
- ME 5113 - Aerosol/Particle Engineering (4.0 cr)
- ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
- PA 5721 - Energy and Environmental Policy (3.0 cr)

**Complementary and Alternative Medicine Interdisciplinary Concentration Area**

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

**Global Health Interdisciplinary Concentration Area**

This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.
Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., and includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus

Environmental Health M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Bldg, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 33 to 51
- This program does not require summer semesters for timely completion.
- n/a
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master's and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

Applicants must indicate an interest in one of the following specialties within the major: the general environmental health, environmental health policy, environmental infectious diseases, environmental and occupational epidemiology, regulatory toxicology, occupational and environmental health nursing, occupational environmental medicine, occupational injury epidemiology and control, or industrial hygiene.

The industrial hygiene program is accredited by the Applied Science Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410-347-7700).

Accreditation
This program is accredited by Accreditation Board for Engineering and Technology (ABET) for Industrial Hygiene.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Minimum requirements include a baccalaureate degree with coursework in the basic sciences. Each specialty requires slightly different preparation: http://www.sph.umn.edu/programs/ehs/tracks/index.asp.

Industrial Hygiene Science
In addition to program requirements - industrial hygienist requires demonstrable strengths in physics, chemistry (including organic chemistry), biology, and math (including calculus). One or two missing requirements may be completed upon enrollment.

Complete online SOPHAS application at http://www.sophas.org. Applicants should submit all supporting documentation directly to SOPHAS, including: test scores (GRE, GMAT, MCAT, DAT, LSAT); statement of purpose and objectives; résumé or curriculum vitae (C.V.); and official postsecondary transcripts from all U.S. institutions attended (including previous study at the University of Minnesota), sent directly from the institutions to SOPHAS.

Other requirements include three letters of recommendation from persons qualified to assess the applicant's academic work; clinical, public health, or professional experiences, all to be submitted online. For more information on admissions see

Applicants must submit their test score(s) from the following:

- **GRE**
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5
- **GMAT**
- **MCAT**
  - Verbal Reasoning score: 10
  - Physical Science score: 10
  - Biological Reasoning score: 10
- **LSAT**
- **DAT**
  - Score: 18

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

---

**Program Requirements**

**Plan A:** Plan A requires 14 to 20 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

**Plan B:** Plan B requires 17 to 25 major credits and 6 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The Plan B project is a master's project.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

The M.S. program prepares students for specialized careers in environmental and occupational health. M.S. students receive a solid technical background in their disciplines and by graduation are proficient in applied or basic research.

The minimum credits required for graduation depend on the chosen specialty area. Most specialty areas require a two-year program. M.S. students have the option of completing a Plan A with a thesis or a Plan B project.

**Specialty Areas**

Students may pursue a general program in environmental and occupational health, focus in a specialty area, or pursue the industrial hygiene sub-plan.

**Environmental Chemistry**

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Environmental chemistry examines the interactions of pollutants with air, water, soil, and their exposures to humans and wildlife. The curriculum emphasizes the processes that control chemical behavior, transport, and fate as a function of environmental factors and chemical properties.

**General Requirements**
Thesis/dissertation will be taken for 10 credits

PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
STAT 5021 - Statistical Analysis (4.0 cr)
STAT 5022 - Statistical Analysis (4.0 cr)
PUBH 6777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Division Core Courses

PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Specialty Program Course Requirements

CE 5541 - Environmental Water Chemistry (3.0 cr)
EEB 5601 - Limnology (3.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)

Proposed Electives

Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- CBIO 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
- CE 4561 - Solid Hazardous Wastes (3.0 cr)
- CE 8503 - Environmental Mass Transport (4.0 cr)
- CE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- CE 8561 - Analysis and Modeling of Aquatic Environments I (3.0 cr)
- EEB 4611 - Biogeochemical Processes (3.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
- WRS 8050 - Special Topics in Water Resources Science (1.0 - 3.0 cr)
- EEB 5609 - Ecosystem Ecology (3.0 cr)

-OR-

Environmental and Occupational Epidemiology

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Environmental and occupational epidemiology strives to understand the causal impact of environment and occupation on human health, because public health interventions are most likely to be effective when disease and injury etiology is understood.

Epidemiologists develop studies to identify factors that cause diseases and injuries.

General Core Requirements

PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core

PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
or PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements

PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)

Proposed Electives

Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6121 - Topics: Injury Prevention in the Workplace, Community, and Home (1.0 - 2.0 cr)
- PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6395 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
Environmental Health Policy
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Environmental health policy provides broad, multidisciplinary training in environmental health issues, including occupational health, risk assessment, risk management, decision making, and policy analysis.

General Requirements
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
- PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
- PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
- PUBH 6115 - Worker Protection Law (1.0 cr)
- PUBH 6116 - Environmental Law (1.0 cr)

Proposed Electives
Select electives in consultation with adviser.
- Take 0 or more credits(s) from the following:
  • PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
  • PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
  • PUBH 6080 - Seminar: Policy, Politics, and Ethics of Public Health Decision Making (2.0 cr)
  • PUBH 6420 - Introduction to SAS Programming (1.0 cr)
  • PUBH 6634 - Advocacy and Children's Rights (2.0 cr)
  • PUBH 6711 - Public Health Law (2.0 cr)
  • PUBH 6724 - The Health Care System and Public Health (3.0 cr)
  • PUBH 6726 - Medical Device Industry: Business and Public Policy (3.0 cr)
  • PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 2.0 cr)
  • PUBH 6835 - Principles of Health Policy (2.0 cr)
  • PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
  • PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
  • PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
  • PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
  • PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
  • ANTH 5041 - Ecological Anthropology (3.0 cr)
  • ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
  • PA 5001 - Intellectual Foundations of Public Action (3.0 cr)
  • PA 5002 - Introduction to Policy Analysis (1.5 cr)
  • PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
  • PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
  • PA 5031 - Empirical Analysis I (4.0 cr)
  • PA 5032 - Intermediate Regression Analysis (2.0 cr)
  • PA 5033 - Multivariate Techniques (2.0 cr)
  • PA 5035 - Survey Research and Data Collection (1.5 cr)
  • PA 5711 - Science and Technology Policy (3.0 cr)
  • PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
  • POL 5441 [Inactive] (3.0 cr)
  • PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Environmental Infectious Diseases
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
The Environmental Infectious Diseases (EID) specialty is concerned with the emergence of food-borne and infectious diseases in the United States and around the world. The environment, and changing conditions in the environment can have a great impact on the distribution and occurrence of infectious diseases. In evaluating the chain of infection, environment may play a key role in reservoir maintenance, as well as a route of transmission through food, water, and air.

General Requirements
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

or PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)

Recommended Electives
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
• PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
• PUBH 7210 - Topics: Global Food Systems (0.5 cr)
• PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
• VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)
• VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
• FSCN 4121 - Food Microbiology (3.0 cr)
• FSCN 4122 - Food Fermentations and Biotechnology (2.0 cr)
• MICB 4121 - Microbial Ecology and Applied Microbiology (3.0 cr)
• MICB 4131 - Immunology (3.0 cr)
• MICB 4151 - Molecular and Genetic Bases for Microbial Diseases (3.0 cr)
• MICB 4171 - Biology, Genetics, and Pathogenesis of Viruses (3.0 cr)

-OR-

Exposure Science
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Students in the Exposure Science program study methods for the identification, measurement and simulation of human exposure and dose from single and multimedia environmental exposures. Students will receive training on various aspects of exposure analysis such as measurements and modeling; chemical, biological, and physical principles required to analyze exposure; mechanisms of exposure; development of molecular biomarkers; and genomic, proteomic, and metabolomic metrics for assessing exposure.

General Requirements
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
or STAT 5021 - Statistical Analysis (4.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6100 - Topics: Environmental Health (0.5 - 4.0 cr)
PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
PUBH 6190 - Environmental Chemistry (3.0 cr)
PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)

Electives
Select electives in consultation with adviser.

-OR-

General Program in Environmental Health
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Students are admitted to the General Program in Environmental Health when they are looking for a program of study that does not fit precisely with the specialty tracks defined in the environmental health sciences major. Emphasis is on the development of a broad, solid foundation in environmental health, with a larger than usual number of elective credits to allow the student an opportunity to pursue their particular interests.

General Requirements
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
or PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
Choose at least two courses from each of the following EOH focus areas.

Exposure
Take 2 or more course(s) from the following:
- PUBH 6171 - Exposure Assessment for Air Contaminants (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)

Policy
Check with adviser for other policy class options.
Take 2 or more course(s) from the following:
- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)

Health Effects
Take 2 or more course(s) from the following:
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

Electives
Select electives in consultation with adviser.

-OR-

Global Environmental Health
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
The global environmental health track provides key information for individuals looking to work in the field of global environmental health either overseas or in the U.S. Issues of water and air quality, food safety, and the effects of industrialization are examined, as well as major ecological problems such as deforestation and sustainable agriculture.

General Requirements
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)
or PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements
PUBH 6131 - Working in Global Health (2.0 cr)
PUBH 6132 - Air, Water, and Health (2.0 cr)
PUBH 6133 - Global Health Seminar (1.0 cr)
PubH 72xx Topics: Globalization and Health (1 cr)
PUBH 6390 - Topics: Epidemiology (0.5 - 4.0 cr)
PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)

Electives
7-9 credits, selected in consultation with adviser.

-OR-

Occupational and Environmental Health Nursing (OEHN)
Occupational and Environmental Health Nursing (OEHN) provides intensive training for nurses interested in the development, management and evaluation of health services, programs, and policies designed to promote health and prevent work-related injuries and disease.
General Requirements
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Specialty Program Course Requirements
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
NURS 8600 - Advanced Public Health Nursing (2.0 cr)
NURS 8170 - Research in Nursing (3.0 cr)

Recommended Electives
Select electives in consultation with adviser.
Take 3 or more credits from the following:
• PUBH 6034 - Program Evaluation for Public Health Practice (3.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
• PUBH 6342 - Epidemiologic Methods II (3.0 cr)
• PUBH 6346 - Writing Research Grants (2.0 cr)
• NURS 8100 - The Discipline of Nursing (3.0 cr)

Program Sub-plans
Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Industrial Hygiene
Industrial hygiene (IH) is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment.

Hazardous Substances Academic Training (HSAT) is a sub-specialty within the IH track that trains master's-level professionals with an emphasis in hazardous wastes and hazardous materials health and safety management. Students in this area take all the IH required courses and in addition complete practicum and research project work in the field of hazardous materials or hazardous waste management.

Required Coursework
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

School of Public Health Core Requirements
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Choose one of the following courses.
PUBH 6414 - Biostatistical Methods I (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

Division of Environmental Health Sciences Core Requirements
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Occupational Health and Safety Core Requirements
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
Industrial Hygiene Program Requirements
PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6174 - Control of Workplace Exposure (3.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)

HSAT Program Requirements
Optional certification
Take 0 or more credits(s) from the following:
• PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
  • One of the following:
    • PUBH 6190 - Environmental Chemistry (3.0 cr)
    • CE 4561 - Solid Hazardous Wastes (3.0 cr)
    • 40-hour Continuing Education Class (for example, one of the following from CPHEO):
      (i) Safety and Health Training for Hazardous Waste Site Personnel, 40 hours;
      (ii) Hazardous Materials Emergency Response, 40 hours

Industrial Hygiene Electives
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
• PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
• PUBH 6115 - Worker Protection Law (1.0 cr)
• PUBH 6116 - Environmental Law (1.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6131 - Working in Global Health (2.0 cr)
• PUBH 6132 - Air, Water, and Health (2.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)
• PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 6451 - Biostatistics II (4.0 cr)
• PUBH 7220 - Personal Protective Equipment and Respiratory Protection (1.0 cr)
• PUBH 7260 - Ergonomics and the Prevention of Workplace Injuries (1.0 cr)
• CE 4561 - Solid Hazardous Wastes (3.0 cr)
• CE 5551 - Environmental Microbiology (3.0 cr)
• IE 5511 - Human Factors and Work Analysis (4.0 cr)
• IE 5513 - Engineering Safety (4.0 cr)
• KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
• ME 5113 - Aerosol/Particle Engineering (4.0 cr)
• ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
• PA 5721 - Energy and Environmental Policy (3.0 cr)
Twin Cities Campus

Environmental Health Minor

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, D305 Mayo Building, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612/624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate minor related to major
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 6
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master's minor requires a minimum of 8 graduate credits; the doctoral minor requires a minimum of 14 graduate credits. Courses for the minor must be selected from those offered by the School of Public Health. In order to meet the minor requirements, students must successfully complete graduate coursework in each of the following disciplines: biostatistics, epidemiology, and environmental health.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• completely online (all program coursework can be completed online)

Program Requirements
Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

Suggested courses include PUBH 6101 - Environmental Health or PUBH 6102 - Issues in Environmental Health; PUBH 6320 - Fundamentals of Epidemiology or PUBH 6341 - Epidemiologic Methods I; and PUBH 6414 - Biostatistical Methods I or PUBH 6450 - Biostatistics I.

Students completing a master's minor in environmental health must complete 8 credits in environmental health, including PUBH 6103, 6104, and 6105.

Students completing a doctoral minor are required to take a minimum of 14 credits in environmental health, including PUBH 6103, 6104, and 6105.

Students who have already taken comparable graduate-level courses in these disciplines may use other public health courses to complete the minor requirement with the approval of the public health adviser and the director of graduate studies. Since public health courses may have prerequisites or enrollment limitations, early planning with an adviser is suggested.
Twin Cities Campus

Environmental Health Ph.D.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Doctorate
• Requirements for this program are current for Fall 2011
• Length of program in credits: 36 to 60
• This program does not require summer semesters for timely completion.
• Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Environmental health is the study of how exposures to external hazards, including chemical, physical, and biological agents, affect human health. Environmental health researchers and professionals seek to understand how to evaluate exposures that create risk to human health, how those exposures elicit biological responses that lead to disease and injury, and how policy is developed and used to prevent adverse health effects. This program offers academic programs at the master's and doctoral levels, conducts research in diverse areas of environmental health, offers continuing education, and conducts outreach. The academic programs prepare students to be leaders in environmental health in academia, industry, consulting groups, and government agencies. The program's training and research emphasizes the importance of translating basic scientific knowledge into solutions for current societal problems and concerns.

The Ph.D. brings students to a high level of academic competence through a combination of advanced coursework and research, and prepares students to assume leadership roles in the field.

The division offers Ph.D. degrees in the following specialty areas:
- Environmental chemistry
- Environmental and occupational epidemiology
- Environmental health policy
- Environmental infectious diseases
- Environmental physiology
- Industrial hygiene
- Occupational and environmental health nursing

Applicants must indicate an interest in one of the following specialties within the major: the general environmental health, environmental health policy, environmental infectious diseases, environmental and occupational epidemiology, regulatory toxicology, occupational and environmental health nursing, occupational environmental medicine, occupational injury epidemiology and control, or industrial hygiene. The industrial hygiene program is accredited by the Applied Science Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410-347-7700).

Accreditation
This program is accredited by Accreditation Board for Engineering and Technology (ABET) for Industrial Hygiene.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

A baccalaureate degree with coursework in the basic sciences. Each specialty requires slightly different preparation. Industrial Hygiene requires physics, biology, chemistry, organic, and calculus.
Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 550
  - General Test - Quantitative Reasoning: 550
  - General Test - Analytical Writing: 4
- GMAT
- MCAT
- LSAT

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
20 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

Specialty Areas

Environmental Chemistry
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105
Environmental chemistry examines the interactions of pollutants with air, water, soil, and their exposures to humans and wildlife. The curriculum emphasizes the processes that control chemical behavior, transport, and fate as a function of environmental factors and chemical properties.

General Requirements
- Thesis/dissertation will be taken for 24 credits
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- STAT 5021 - Statistical Analysis (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Division Core Courses
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Specialty Program Course Requirements
- CE 5541 - Environmental Water Chemistry (3.0 cr)
- CE 8542 - Chemistry of Organic Pollutants in Environmental Systems (3.0 cr)
- EEB 5601 - Limnology (3.0 cr)
- PUBH 6190 - Environmental Chemistry (3.0 cr)

Proposed Electives
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- CBIO 8004 - Economic and Social Aspects of Conservation Biology (3.0 cr)
Environmental and Occupational Epidemiology

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Environmental and occupational epidemiology strives to understand the causal impact of environment and occupation on human health, because public health interventions are most likely to be effective when disease and injury etiology is understood.

General Core Requirements
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core
- PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
- PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
- PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

Specialty Program Course Requirements

Thesis/dissertation will be taken for 24 credits.
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
- PUBH 8141 - Doctoral Seminar in Observational Inference (2.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Proposed Electives

Select electives in consultation with advisor.

Take 0 or more credits(s) from the following:
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6121 - Topics: Injury Prevention in the Workplace, Community, and Home (1.0 - 2.0 cr)
- PUBH 6122 - Seminar: Safety in the Workplace (1.0 cr)
- PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
- PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
- PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
- PUBH 6173 - Exposure to Physical Agents (2.0 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 7400 - Topics: Biostatistics (0.5 - 4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 7460 - Advanced Statistical Computing (3.0 cr)
- PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
- PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)

Environmental Health Policy

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Environmental health policy provides broad, multidisciplinary training in environmental health issues, including occupational health, risk assessment, risk management, decision making, and policy analysis.

General Requirements
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

Division Core Courses
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)

**Specialty Program Course Requirements**
Thesis/dissertation will be taken for 24 credits.
PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
PUBH 6115 - Worker Protection Law (1.0 cr)
PUBH 6116 - Environmental Law (1.0 cr)
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Proposed Electives**
Select electives in consultation with adviser.
Take 0 or more credits from the following:
• PUBH 6049 - Legislative Advocacy Skills for Public Health (3.0 cr)
• PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
• PUBH 6080 - Seminar: Policy, Politics, and Ethics of Public Health Decision Making (2.0 cr)
• PUBH 6420 - Introduction to SAS Programming (1.0 cr)
• PUBH 6634 - Advocacy and Children's Rights (2.0 cr)
• PUBH 6711 - Public Health Law (2.0 cr)
• PUBH 6724 - The Health Care System and Public Health (3.0 cr)
• PUBH 6726 - Medical Device Industry: Business and Public Policy (3.0 cr)
• PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 2.0 cr)
• PUBH 6835 - Principles of Health Policy (2.0 cr)
• PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
• PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
• PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)
• PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
• PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• ANTH 5041 - Ecological Anthropology (3.0 cr)
• ANTH 8203 - Research Methods in Social and Cultural Anthropology (3.0 cr)
• PA 5001 - Intellectual Foundations of Public Action (3.0 cr)
• PA 5002 - Introduction to Policy Analysis (1.5 cr)
• PA 5021 - Economics For Policy Analysis and Planning I (3.0 cr)
• PA 5022 - Economics For Policy Analysis and Planning II (1.5 - 3.0 cr)
• PA 5031 - Empirical Analysis I (4.0 cr)
• PA 5032 - Intermediate Regression Analysis (2.0 cr)
• PA 5033 - Multivariate Techniques (2.0 cr)
• PA 5035 - Survey Research and Data Collection (1.5 cr)
• PA 5311 - Program Evaluation (3.0 cr)
• PA 5711 - Science and Technology Policy (3.0 cr)
• PA 5722 - Environmental and Resource Economics Policy (3.0 cr)
• PA 5441 - Education Policy and the State Legislature (3.0 cr)

-OR-

**Environmental Infectious Diseases**
Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

The Environmental Infectious Diseases (EID) specialty is concerned with the emergence of food-borne and infectious diseases in the United States and around the world. The environment, and changing conditions in the environment can have a great impact on the distribution and occurrence of infectious diseases. In evaluating the chain of infection, environment may play a key role in reservoir maintenance, as well as a route of transmission through food, water, and air.

**General Requirements**
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Division Core Courses**
Thesis/dissertation will be taken for 24 credits.
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Specialty Program Course Requirements**
PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6380 - Ecology of Infectious Diseases (3.0 cr)
PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
VMED 8090 - Epidemiology of Zoonoses and Diseases Common to Animals and Humans (3.0 cr)

Recommended Electives

Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- VMED 5420 - Molecular Epidemiology of Infectious Disease (3.0 cr)
- FSCN 4121 - Food Microbiology (3.0 cr)
- FSCN 4122 - Food Fermentations and Biotechnology (2.0 cr)
- MICA 8002 - Structure, Function, and Genetics of Bacteria and Viruses (4.0 cr)
- MICA 8003 - Immunity and Immunopathology (4.0 cr)
- MICA 8010 - Microbial Pathogenesis (3.0 cr)

-OR-

Occupational and Environmental Health Nursing

Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

Occupational and Environmental Health Nursing (OEHN) provides intensive training for nurses interested in the development, management and evaluation of health services, programs, and policies designed to promote health and prevent work-related injuries and disease.

General Requirements

PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Division Core Courses

PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

Specialty Program Course Requirements

Thesis/dissertation will be taken for 24 credits.
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)
PUBH 6451 - Biostatistics II (4.0 cr)
PUBH 8120 - Occupational Health and Safety Research Seminar (1.0 cr)
PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
NURS 8170 - Research in Nursing (3.0 cr)
NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)
NURS 8600 - Advanced Public Health Nursing (2.0 cr)
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

Recommended Electives

Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
- PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
- PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
- PUBH 8142 - Epidemiologic Uncertainty Analysis (2.0 cr)

-OR-

Environmental Physiology

This is a trans-disciplinary program emphasizing new perspectives on the study of how humans, as complex heterogeneous biological systems, respond and adapt to their environment. Such study is required to understand the role of the environment in injury and disease, and to shape future technologies and policy for monitoring and protecting human health.

General Requirements

Thesis/dissertation will be taken for 24 credits.
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)

**Specialty Program Course Requirements**
PUBH 8163 - Toxicology (5.0 cr)
PUBH 8165 - Current Topics in Toxicology (1.0 cr)
PUBH 8166 - Experiences in Toxicology Research (3.0 cr)
PHSL 5101 - Human Physiology (5.0 cr)
BIOL 4004 - Cell Biology (3.0 cr)
BIOC 4331 - Biochemistry I: Structure, Catalysis, and Metabolism in Biological Systems (4.0 cr)
BIOC 4333 - Biochemistry II: Molecular Mechanisms of Signal Transduction and Gene Expression (4.0 cr)
or BIOC 8001 - Biochemistry: Structure, Catalysis, and Metabolism (3.0 cr)
BIOC 8002 - Molecular Biology and Regulation of Biological Processes (3.0 cr)

**Recommended Electives**
Select electives in consultation with adviser.
Take 0 or more credits(s) from the following:
• ANSC 8344 - Mechanisms of Hormone Action (2.0 cr)
• PHCL 5111 - Pharmacogenomics (3.0 cr)
• BIOC 8216 - Signal Transduction and Gene Expression (3.0 cr)
• PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
• PUBH 6414 - Biostatistical Methods I (3.0 cr)
• PUBH 6160 - Metabolomics (3.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)

**Program Sub-plans**
Students are required to complete one of the following sub-plans.
Students may not complete the program with more than one sub-plan.

**Industrial Hygiene**
Industrial hygiene is concerned with the health and safety of people at work, and the community at large. Specific concerns are with the recognition, evaluation and control of potential workplace hazards, including chemical, physical, and biological agents; and the potential health threats to the community and the environment.

Hazardous Substances Academic Training (HSAT) is a sub-specialty within the IH track that trains master's level professionals with an emphasis in hazardous wastes and hazardous materials health and safety management. Students in this area take all the IH required courses and in addition complete practicum and research project work in the field of hazardous materials or hazardous waste management.

**Required Coursework**
- Environmental Health Sciences Core: PUBH 6103, PUBH 6104, PUBH 6105

**School of Public Health Core Requirements**
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
Choose one of the following courses.
PUBH 6414 - Biostatistical Methods I (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)

**Division of Environmental Health Sciences Core Requirements**
PUBH 6103 - Exposure to Environmental Hazards (2.0 cr)
PUBH 6104 - Environmental Health Effects: Introduction to Toxicology (2.0 cr)
PUBH 6105 - Environmental and Occupational Health Policy (2.0 cr)
PUBH 7194 - Master's Project: Environmental Health (1.0 - 5.0 cr)
PUBH 7196 - Field Experience: Environmental Health (1.0 - 5.0 cr)

**Occupational Health and Safety Core Requirements**
PUBH 6130 - Occupational Medicine: Principles and Practice (2.0 cr)
PUBH 6150 - Interdisciplinary Evaluation of Occupational Health and Safety Field Problems (3.0 cr)
PUBH 6170 - Introduction to Occupational Health and Safety (3.0 cr)

**Industrial Hygiene Program Requirements**
PUBH 6172 - Industrial Hygiene Applications (2.0 cr)
PUBH 6173 - Exposure to Physical Agents (2.0 cr)
PUBH 6174 - Control of Workplace Exposure (3.0 cr)
PUBH 6175 - Environmental Measurements Laboratory (2.0 cr)
PUBH 6192 - Measurement and Properties of Air Contaminants (2.0 cr)
PUBH 6193 - Advanced Topics in Human Exposure Science (2.0 cr)

HSAT Program Requirements

Optional certification

Take 0 or more credits(s) from the following:

• PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)

• One of the following:
  • PUBH 6190 - Environmental Chemistry (3.0 cr)
  or CE 4561 - Solid Hazardous Wastes (3.0 cr)
  or 40-hour Continuing Education Class (for example, one of the following from CPHEO):
    (i) Safety and Health Training for Hazardous Waste Site Personnel, 40 hours;
    (ii) Hazardous Materials Emergency Response, 40 hours

Industrial Hygiene Electives

Select electives in consultation with adviser.

Take 0 or more credits(s) from the following:

• PUBH 6112 - Risk Analysis: Application to Risk-Based Decision Making (3.0 cr)
• PUBH 6115 - Worker Protection Law (1.0 cr)
• PUBH 6116 - Environmental Law (1.0 cr)
• PUBH 6120 - Injury Prevention in the Workplace, Community, and Home (2.0 cr)
• PUBH 6131 - Working in Global Health (2.0 cr)
• PUBH 6132 - Air, Water, and Health (2.0 cr)
• PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)
• PUBH 6161 - Regulatory Toxicology (2.0 cr)
• PUBH 6176 - Hazardous Materials and Waste Management (2.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6190 - Environmental Chemistry (3.0 cr)
• PUBH 6415 - Biostatistical Methods II (3.0 cr)
• PUBH 5451 - Biostatistics II (4.0 cr)
• PUBH 7220 - Personal Protective Equipment and Respiratory Protection (1.0 cr)
• PUBH 7260 - Ergonomics and the Prevention of Workplace Injuries (1.0 cr)
• CE 4561 - Solid Hazardous Wastes (3.0 cr)
• CE 5551 - Environmental Microbiology (3.0 cr)
• IE 5511 - Human Factors and Work Analysis (4.0 cr)
• IE 5513 - Engineering Safety (4.0 cr)
• KIN 5001 - Foundations of Human Factors/Ergonomics (3.0 cr)
• ME 5113 - Aerosol/Particle Engineering (4.0 cr)
• ME 5133 - Aerosol Measurement Laboratory (4.0 cr)
• PA 5721 - Energy and Environmental Policy (3.0 cr)
Twin Cities Campus

Epidemiology M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42 to 48
- This program does not require summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Epidemiology is the science that describes quantitative trends in health and disease for populations, with application in the biological, environmental, behavioral, and social sciences. Epidemiologists generally collaborate with multidisciplinary teams of health professionals, such as physicians, laboratory scientists, exercise physiologists, nutritionists, statisticians, veterinarians, and behavioral scientists.

Epidemiologists analyze public health trends, design and implement studies, and interpret study results for policy and program development. Beyond investigation into the causes of disease, epidemiologists also develop intervention strategies to prevent disease and promote health. Epidemiologists work at both the individual and community levels to translate medical and laboratory data into population trends.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Preferred GRE performance expectation (test taken post August 2011): A combination of 300 on the quantitative and verbal sections of the test and a score of 3.5 on the analytical writing assessment. Some programs may have higher preferred minimum scores. Check specific programs for details.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 22 major credits and 26 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The purpose of the master's project is to enable students to demonstrate:
- familiarity with the tools of research and scholarship in the field of public health;
- the ability to work independently;
- the ability to plan and carry out a systematic investigation related to a public health issue; and
- the ability to effectively present, in written and oral form, the results of their investigation.

The master's project for students in the epidemiology M.P.H. program may take one of three forms:
- A written report, often in the form of a manuscript suitable for publication in a peer-reviewed journal, that demonstrates the student's ability to do quantitative analyses, utilizing data collected by the student or obtained from another source
- A literature review, of publishable quality, which demonstrates the student's ability to critically review the literature and synthesize published findings on a medical or public health issue
- An NIH Grant Proposal

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Required Courses**

**Epidemiology Core Courses (18 credits)**

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6390 - Topics: Epidemiology (0.5 - 4.0 cr)
- PUBH 7394 - Culminating Experience: Epidemiology (1.0 - 6.0 cr)
- PUBH 7396 - Field Experience: Epidemiology (1.0 - 5.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
  - or PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)

  **"Epi of" Courses**

- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
  - or PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
  - or PUBH 6387 - Cancer Epidemiology (2.0 cr)

**Biostatistics Courses (8 credits)**

- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

**Public Health Core (8 credits)**

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
  - or PUBH 6101 - Environmental Health (2.0 cr)
  - or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  - or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

**Basic Science Course (4 credits)**

Not required for students with a prior earned doctorate in a health-related discipline. Nurses or other health professionals may be exempt.

- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)

**Electives (8-10 credits)**

10 credits required for the standard program.
8 credits required for the accelerated program.

Program Sub-plans
A sub-plan is not required for this program. Students may complete the program with more than one sub-plan.

**Complementary and Alternative Medicine Interdisciplinary Concentration Area**

The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

**Global Health Interdisciplinary Concentration Area**

The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

**Health Disparities Interdisciplinary Concentration Area**

The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:

- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

**Course Group 0**

**Public Health Policy Interdisciplinary Concentration Area**

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy
SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Epidemiology M.S.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program does not require summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: Students are not admitted directly into the master of science program; it is available only by special arrangement with the program. Students interested in a master's degree in epidemiology should apply for the master of public health (M.P.H.) degree through the School of Public Health (SPH). For more information on the M.P.H. program, visit the SPH website at www.sph.umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
Students are not admitted directly into the master of science program; it is available only by special arrangement with the program. Students interested in a master's degree in epidemiology should apply for the master of public health (M.P.H.) program through the School of Public Health (SPH). For more information on the M.P.H. degree, visit the SPH website at www.sph.umn.edu.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Plan B: Plan B requires 22 major credits and 8 credits outside the major. The final exam is oral. A capstone project is required.
Capstone Project: A master's project is required, equivalent to approximately 4 semester credits.

This program may be completed with a minor.
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 1 semesters must be completed before filing a Degree Program Form.

These requirements apply only to students admitted by special arrangement with the program; students are not admitted directly into the master's program. Students interested in a master's degree in epidemiology should apply for the master of public health (M.P.H.) program through the School of Public Health (SPH). For more information on the M.P.H. degree, visit the SPH website.
Twin Cities Campus

Epidemiology Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E. Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The minor in epidemiology is open only to students enrolled in master's and doctoral programs outside of the School of Public Health. Students enrolled in master's and doctoral programs in the School of Public Health are not eligible for this minor because the requirements in the epidemiology minor are part of their major field of study.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's minor requires at least 8 credits.

The doctoral minor requires 12 credits: 10 credits in epidemiology and biostatistics, and 2 credits in epidemiology or methods courses. The director of graduate studies must approve the student's selection of elective credits.

The doctoral minor offers two 12-credit options. Option 1, for students with prior epidemiology training, consists of PUBH 8341 (3 credits), PUBH 8342 (3 credits), PUBH 7401 (4 credits), and two credits of electives in an epidemiology- or biostatistics-related area, to be approved by the epidemiology DGS.

Option 2, for students without extensive epidemiology/biostatistics training, consists of PUBH 6341 (3 credits), PUBH 6342 (3 credits), PUBH 6450 (4 credits), and two credits of electives in an epidemiology- or biostatistics-related area, to be approved by the epidemiology DGS. For more detailed information, please contact Andrea Kish at kish@umn.edu.
Twin Cities Campus

Epidemiology Ph.D.

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 63
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The epidemiology Ph.D. program is designed for students interested in research and teaching careers in the health sciences. Students select one of two formal tracks: clinical/biological epidemiology (CBE) or social/behavioral epidemiology (SBE). The two tracks, each with a minimum of 63 credits, emphasize advanced epidemiologic design, methodology, and analytic skills.

The social/behavioral epidemiology track focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment. The clinical/biological epidemiology track focuses on the etiology of diseases, particularly cardiovascular, cancer, genetics, and infectious diseases. A detailed description of the details related to each track may be obtained online or by contacting the major coordinator at epichstu@umn.edu.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

For the doctoral program, applicants must have completed or be about to complete a master's degree in a related field.

Special Application Requirements:
Because of the program's strong emphasis on methodology, quantitative aptitude is very important. This can be demonstrated by scoring at or above the 70th percentile on the quantitative section of the GRE, along with satisfactory grades in college-level quantitative courses. At least three recommendations (form and separate letter) from faculty and/or work supervisors with knowledge of the applicant's scholastic and professional capabilities and potential, and a statement of goals and objectives (letter of intent) for seeking a career in epidemiology are also required.

In addition to the above materials, applicants for the Ph.D. program must submit a separate essay (statement of research interests) beyond what is required for the SOPHAS application process that provides evidence of their potential to conduct original research in a specific epidemiologic area and, if possible, that indicates an interest in particular methodologies or study designs. Serious doctoral applicants are encouraged to contact the major coordinator at epichstu@umn.edu before applying. Students begin their studies in the fall semester. Applications must be completed by December 1 of the year prior to beginning the doctoral program for scholarship consideration; the final deadline is February 15.

Applicants must submit their test score(s) from the following:
- GRE
- TOEFL

International applicants must submit score(s) from one of the following tests:
- TOEFL
- Internet Based - Total Score: 100
- Paper Based - Total Score: 600
  • IELTS
    - Total Score: 7
  • MELAB
    - Final score: 80

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

27 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.25 is required for students to remain in good standing.

At least 2 semesters must be completed before filing a Degree Program Form.

Students may select one of two formal tracks; both have an applied perspective that emphasizes study design, measurement, quantitative analysis, and data interpretation. Social/behavioral epidemiology focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment. Clinical/biological epidemiology focuses on the biological causes of diseases, especially determinants of cardiovascular disease, cancer, infectious diseases, and genetic epidemiology.

The Ph.D. program includes a minimum curriculum of 63 credits. Students must pass written and oral preliminary exams, serve as a TA for 1 semester, write and defend a dissertation, and prepare a first-authored manuscript for publication.

Coursework includes 16 credits in epidemiology, biostatistics, ethics, writing grants, and teaching core courses common to both tracks; 6 credits in advanced methodology/statistics that focus on track-specific courses; 4 credits of content-area courses; and 13 credits of supporting program or minor coursework. In addition, the Graduate School requires 24 thesis credits as part of the doctoral requirements that can be taken once the preliminary qualifying exams are completed.

**Required Coursework**

17 credits plus 24 thesis credits

- PUBH 7401 - Fundamentals of Biostatistical Inference (4.0 cr)
- PUBH 6348 - Writing Research Grants (2.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 8888 - Thesis Credit: Doctoral (1.0 - 24.0 cr)
- GRAD 8101 - Teaching in Higher Education (3.0 cr)
- PUBH 8341 - Advanced Epidemiologic Methods: Concepts (3.0 cr)
- PUBH 8342 - Advanced Epidemiologic Methods: Applications (3.0 cr)

**Program Sub-plans**

Students are required to complete one of the following sub-plans. Students may not complete the program with more than one sub-plan.

**Clinical/Biological Epidemiology**

Clinical/biological epidemiology focuses on the biological causes of diseases, especially determinants of cardiovascular disease, cancer, infectious diseases, and genetic epidemiology.

**Clinical/Biological Track**

Clinical/Biological Track (22 credits minimum)

- PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
- Biological Methods/Statistics (6 credits minimum).
Choose additional credits from the following courses:
- PUBH 6363 - Design and Analysis of Group-Randomized Trials in Epidemiology (3.0 cr)
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
- PUBH 6915 - Nutrition Assessment (2.0 cr)
- PUBH 7445 - Statistics for Human Genetics and Molecular Biology (3.0 cr)
- PUBH 8141 - Doctoral Seminar in Observational Inference (2.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)

Content area courses (4 credits minimum)
- PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6140 - Occupational and Environmental Epidemiology (2.0 cr)

Supporting Program/Minor Credits
13 credits minimum. Chosen in consultation with adviser. Potential supporting program courses include courses from the additional biological methods/statistics courses listed above not used to satisfy the biological methods/statistics requirement, or other appropriate courses. Other courses can be considered with adviser's approval.

Social/Behavioral Epidemiology
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Social/behavioral epidemiology focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment.

Social/Behavioral Track
Social/Behavioral Track (22 credits minimum)
Behavioral Methods/Statistics (6 credits minimum)
- PUBH 6363 - Design and Analysis of Group-Randomized Trials in Epidemiology (3.0 cr)
Take 1 or more course(s) totaling 0 or more credits(s) from the following:
- PUBH 7402 - Biostatistics Modeling and Methods (4.0 cr)
- PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
- PUBH 7435 - Latent Variable Measurement Models and Path Analysis (3.0 cr)
- PUBH 7407 - Analysis of Categorical Data (3.0 cr)
- EPSY 8268 - Hierarchical Linear Modeling in Educational Research (3.0 cr)
- EPSY 8282 - Statistical Analysis of Longitudinal Data (3.0 cr)
- PUBH 8140 - Validity Concepts in Epidemiologic Research (2.0 cr)
- PUBH 6915 - Nutrition Assessment (2.0 cr)
- EPSY 8264 - Advanced Multiple Regression Analysis (3.0 cr)
- EPSY 8267 - Applied Multivariate Analysis (3.0 cr)
- EPSY 8221 - Psychological Scaling (3.0 cr)
Content area courses (4 credits minimum)
- PUBH 6333 - Principles of Human Behavior I (2.0 cr)
- PUBH 6334 - Human Behavior II (2.0 cr)

Supporting Program/Minor Credits
13 credits minimum. Chosen in consultation with adviser. Potential supporting program courses include courses from the additional biological methods/statistics courses listed above not used to satisfy the biological methods/statistics requirement, or other appropriate courses. Other courses can be considered with adviser's approval.
Twin Cities Campus

Gerontology Minor

School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
Graduate Minor Program in Gerontology, Center on Aging/MAGEC, School of Public Health, MMC 197, Mayo Memorial Building, 420 Delaware Street, Minneapolis, MN 55455 (612-624-1185)
Email: coa@umn.edu
Website: http://www.coa.umn.edu/education/GerontologyMinor/index.htm

• Program Type: Graduate free-standing minor
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 8
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The gerontology minor is available to master's (M.A. and M.S.) and doctoral students. The minor provides a multidisciplinary foundation in gerontology for the master's minors and a more intensive preparation in aging for Ph.D. minors. Past students who have minored in gerontology have majored in many departments, including but not limited to: curriculum and instruction (adult education); communication disorders; dentistry; design, housing, and apparel; family medicine and community health; family social science; journalism and mass communication; kinesiology; nursing; psychology; social work; and sociology. The program of courses is tailored in advance, with consultation between the student and the director of graduate studies of the gerontology minor.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• completely online (all program coursework can be completed online)
• primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
• partially online (between 50% to 80% of instruction is online)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The master's and doctoral minors are developed in consultation with, and should be approved in advance by, the director of graduate studies for gerontology. The master's minor requires at least 8 credits, including GERO 5105 - Multidisciplinary Perspectives on Aging (3 cr), or an alternative course approved by the director of graduate studies. The doctoral minor requires at least 12 credits.

Courses are ordinarily taken from a designated course list provided by the Center on Aging and annually updated by the minor program. Students are welcome to identify and propose to the director of graduate studies additional courses on aging that might fulfill the minor requirements.

Graduate Program Requirements

Master's Minor
Take 8 or more credits(s) from the following:
- FSOS 8105 - Family Gerontology (3.0 cr)
- GERO 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
- GERO 5100 - Topics in Gerontology (0.5 - 4.0 cr)
- GERO 5110 - Biology of Aging (3.0 cr)
- GERO 5111 - Studying Aging and Chronic Illness (2.0 cr)
- GERO 5115 - Introduction to Geriatrics (2.0 cr)
- GERO 5125 - Gerontology Service Learning (3.0 cr)
- GERO 8020 - Seminar in Gerontology (2.0 cr)
- PA 5412 - Aging and Disability Policy (3.0 cr)
• PSY 5138 - Psychology of Aging (3.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• SW 5313 - Social Work with Older Adults (2.0 cr)
• SW 5810 - Seminar: Special Topics (1.0 - 4.0 cr)

-OR-

Doctoral Minor
Take 12 or more credits from the following:
• FSOS 8105 - Family Gerontology (3.0 cr)
• GERO 5105 - Multidisciplinary Perspectives on Aging (3.0 cr)
• GERO 5100 - Topics in Gerontology (0.5 - 4.0 cr)
• GERO 5110 - Biology of Aging (3.0 cr)
• GERO 5111 - Studying Aging and Chronic Illness (2.0 cr)
• GERO 5115 - Introduction to Geriatrics (2.0 cr)
• GERO 5125 - Gerontology Service Learning (3.0 cr)
• GERO 8020 - Seminar in Gerontology (2.0 cr)
• PA 5412 - Aging and Disability Policy (3.0 cr)
• PSY 5138 - Psychology of Aging (3.0 cr)
• PUBH 6904 - Nutrition and Aging (2.0 cr)
• PUBH 8803 - Long-Term Care: Principles, Programs, and Policies (2.0 cr)
• SW 5313 - Social Work with Older Adults (2.0 cr)
• SW 5810 - Seminar: Special Topics (1.0 - 4.0 cr)
Twin Cities Campus
Health Care Administration M.H.A.
School of Public Health - Adm
School of Public Health

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42 to 60
- This program requires summer semesters for timely completion.
- Degree: Master of Healthcare Administration

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The full-time master of healthcare administration (M.H.A.) program is appropriate for applicants with limited or no healthcare work experience or individuals who wish to make a career change from industries other than health care. Now ranked second in the nation by U.S. News & World Report, the program is accredited by the CAHME.

The program's consistently high rankings are a reflection of many factors--an outstanding faculty of researchers and practitioners, location in one of the nation's centers of healthcare innovation, an extraordinary alumni association, and a track record of educating outstanding leaders for the healthcare industries.

Accreditation
This program is accredited by Commission on Accreditation of Healthcare Management Education

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Full-time program applicants should have a strong commitment to managing people and resources to create and sustain outstanding healthcare services and organizations. Strong quantitative and communication skills are essential; prior experience in health care is not required.

Other requirements:
- Bachelor's degree from an accredited college or university
- Post August 2011 GRE test with a combination of 300 on the quantitative and verbal sections of the test and a score of 3.5 on the analytical writing assessment
- Letter of intent
- Resume
- Official transcripts
- Three letters of recommendation
- On-site panel interview (telephone interview for international applications)

Special Application Requirements:
For the executive program: At least three years of management or clinical leadership experience in a healthcare organization is required. The program reserves the right to require the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT) as a part of the admissions process.

For the full-time program: To prepare for the program's rigorous curriculum, the faculty highly recommends the following coursework prior to matriculation:
Applications must submit their test score(s) from the following:

- **GRE**
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5

- **GMAT**
  - Total score: 500

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600

- **IELTS**
  - Total Score: 7

- **MELAB**
  - Final score: 80

Key to test abbreviations (GRE, GMAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan C:** Plan C requires 42 to 60 major credits and null credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** Please see website for information: www.sph.umn.edu

This program may not be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

**Required Courses**

- **PUBH 6560** - Operations Research and Quality in Health Care (2.0 cr)
- **PUBH 6556** - Health and Health Systems (2.0 - 3.0 cr)
- **PUBH 6541** - Statistics for Health Management Decision Making (3.0 cr)
- **PUBH 6562** - Information Technology in Health Care (2.0 cr)
- **PUBH 6535** - Managerial Accounting for Health Services (3.0 cr)
- **PUBH 6547** - Health Care Human Resources Management (2.0 cr)
- **PUBH 6557** - Health Finance I (3.0 cr)
- **PUBH 6555** - Topics in Health Economics (2.0 cr)
- **PUBH 6556** - Health Finance II (3.0 cr)
- **PUBH 6565** - Innovation of Healthcare Services (2.0 cr)
- **PUBH 6564** - Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System (2.0 cr)
- **PUBH 6553** - Health Care Management Ethics (1.0 cr)
- **PUBH 6596** - Legal Considerations in Health Services Organizations (2.0 cr)

In addition to the required courses above, students must choose one of the following options:

**Executive MHA**

The Executive MHA is specifically designed for practicing executives, physicians, and other healthcare professionals seeking to advance their management and leadership capabilities. This is a 42-credit, 25-month program.

- **PUBH 6569** - Healthcare Policy (1.0 cr)
**PUBH 6751 - Principles of Management in Health Services Organizations** (2.0 cr)
**PUBH 6533 - Health Care Management Ethics** (1.0 cr)
**PUBH 6596 - Legal Considerations in Health Services Organizations** (2.0 cr)
**PUBH 6570 - Topics: Organizational Integration in Healthcare Delivery** (2 cr)
**PUBH 6570 - Topics: Healthcare Strategies in Competitive Markets** (2 cr)
**PUBH 6570 - Topics: Healthcare Marketing** (1 cr)
**PUBH 6570 - Topics: Managing the Embedded Medical Practice** (2 cr)
**PUBH 6566 - Topics: Core Concepts in Managing Healthcare Options** (1 cr)
**PUBH 6567 - Topics: Core Concepts in Managing Healthcare Options** (1 cr)

-OR-

**Full-time MHA**

This program is appropriate for applicants with limited or no healthcare work experience or individuals who wish to make a career change. This is a 60-credit, two-year program.

**Year 1: An Introduction to Healthcare Administration**
- **PUBH 6544 - Principles of Problem Solving in Health Services Organizations** (3.0 cr)
- **PUBH 7596 - Clerkship in Health Care Administration** (2.0 cr)
- Electives (2-4 cr) - can take up to 4 elective credits during Year I

**Year II: Advanced Courses and Specialization in Healthcare Administration**
- **PUBH 6832 - Economics of the Health Care System** (3.0 cr)
- **PUBH 6568 - Interprofessional Teamwork in Health Care** (2.0 cr)
- **ENTR 6041 - New Product Design and Business Development** (2.0 - 4.0 cr)
- **PUBH 6554 - Healthcare Strategy and Marketing** (2.0 cr)
- **PUBH 6727 - Health Leadership and Effecting Change** (2.0 cr)
- Electives (2-4 cr) - can take up to 4 elective credits during Year II

**ENTR 6041 - New Product Design and Business Development** (2.0 - 4.0 cr)

*or* **PUBH 6577 (2 cr) Advanced Problem Solving.**

**Program Sub-plans**

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

**Online**

**Saudi Arabia**
**Twin Cities Campus**

**Health Services Research, Policy, and Administration M.S.**  
*School of Public Health - Adm*

**School of Public Health**

Link to a list of faculty for this program.

**Contact Information:**  
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)  
Email: sph-SSC@umn.edu  
Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Master's  
- Requirements for this program are current for Fall 2011  
- Length of program in credits: 46 to 52  
- This program does not require summer semesters for timely completion.  
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The master of science in health services research, policy, and administration (M.S.-HSRP&A) is an excellent program for those who wish to develop their analytical capabilities to contribute to healthcare management, health services research, or health policy work.

The M.S.-HSRP&A focuses on the organization, delivery, and quality of health services. It deals with policy issues related to costs, access, and quality of health services and equitable distribution of health resources. The core curriculum is a multidisciplinary examination of the social, political, and economic forces that affect the organization, financing, and delivery of healthcare services. Students develop analytical capabilities that may be applied to healthcare management, health services research, or health policy work. Strong quantitative skills are essential.

The program's core quantitative emphasis is enhanced by interest areas in program evaluation, analytic healthcare management, and health services research applications.

**Program Delivery**

This program is available:  
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

Preferred GRE scores from exams taken before August 1, 2011, are: Verbal: 500, Quantitative 500, Analytical Writing: 3.5.

Applicants must submit their test score(s) from the following:  
- GRE  
  - General Test - Verbal Reasoning: 153  
  - General Test - Quantitative Reasoning: 144  
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:  
- TOEFL  
  - Internet Based - Total Score: 100  
  - Paper Based - Total Score: 600  
- IELTS  
  - Total Score: 7  
- MELAB  
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 33 to 36 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is oral.

Plan B: Plan B requires 37 major credits and 9 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: A written research project that demonstrates knowledge of a topic within the field of health services research.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Focus Requirements

Plan A: Outcomes Research (49-52 credits)

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6863 - Understanding Health Care Quality (2.0 cr)
- PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
- PUBH 8810 - Research Studies in Health Care (3.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6864 - Conducting Health Outcomes Research (3.0 cr)
- PUBH 8777 - Thesis Credits: Master's (1.0 - 18.0 cr)

Electives (6 credits)

-OR-

Plan B: Research and Policy (46 credits)

- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6832 - Economics of the Health Care System (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6802 - Managing Electronic Health Information (3.0 cr)
- PUBH 6835 - Principles of Health Policy (2.0 cr)
- PUBH 6855 - Medical Sociology (3.0 cr)
- PUBH 6470 - SAS Procedures and Data Analysis (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 7784 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)
- PUBH 7894 - MS in Health Services Research, Policy, and Administration Plan B Project (1.0 - 2.0 cr)

Electives (9 credits) chosen from a structured interest area

Joint- or Dual-degree Coursework: Joint Degree Program with Law and M.S. in Health Services Research, Policy, and Administration (J.D./M.S.). Student may take a total of 9 credits in common among the academic programs.
Twin Cities Campus

Health Services Research, Policy, and Administration Minor

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

Program Type:
Graduate minor related to major
Requirements for this program are current for Fall 2011
Length of program in credits (Masters): 6
Length of program in credits (Doctorate): 12
This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The minor in health services research, policy, and administration (HSRP&A) is available as a minor to other M.S. and Ph.D. students across the University. HSRP&A emphasizes a population health orientation research and policy perspective and analytic methods related to health policy and healthcare systems.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

Ph.D. and M.S. Minor Required Coursework
The HSRP&A minor coursework must be chosen from within that major from the following course number sequences: PUBH 65xx, PUBH 67xx, PUBH 68xx, or PUBH 88xx.

The master's minor requires 6 credits and is individually tailored with the advice and approval of the HSRP&A program director. The Ph.D. minor requires 12 credits, of which 2 courses are prescribed below. The remaining credits can be selected from other HSRP&A courses.

PUBH 6556 - Health and Health Systems (2.0 - 3.0 cr)
or PUBH 6724 - The Health Care System and Public Health (3.0 cr)
PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
or PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
Health services research is a multidisciplinary field of study. Health services researchers examine how social factors, government policies, financing systems, organizational structures, and personal behaviors affect access to needed care, the quality of care provided, and the cost of care delivery. The focus of research is broad and includes individuals, families, providers, healthcare organizations, communities, and populations. The field of health services research is ultimately interested in both "health," understood as health status and well-being; as well as "health care," understood as the effective delivery of healthcare services.

The doctoral program in health services research, policy, and administration is primarily for students interested in academic careers or senior research positions in government or the private sector. The core curriculum is a multidisciplinary examination of the social, political, and economic forces that affect the organization, financing, and delivery of health care services. The emphasis is on theory, modeling, and quantitative methods. Coursework is complemented by the student's involvement with faculty on health services research projects; through weekly academic research seminars; doctoral colloquia, and conference presentations.

Students come from a variety of educational backgrounds, including decision sciences, economics, political science, sociology, business, engineering, and public affairs. Strong quantitative skills are essential.

**Program Delivery**
This program is available:
- via classroom (the majority of instruction is face-to-face)

**Prerequisites for Admission**
The preferred undergraduate GPA for admittance to the program is 3.00.

Preferred GRE scores from exams taken before August 1, 2012 are: Verbal: 600, Quantitative: 600, Analytical Writing: 5.0

The Ph.D. program requires prerequisites in calculus and statistics. Applicants who have not completed the prerequisites, but are otherwise qualified for admission, are required to take relevant courses at the University or another accredited institution before beginning the program.

**Special Application Requirements:**
All applicants must submit the following: official grade transcripts from all previous academic institutions; a statement indicating reasons for seeking the Ph.D. in health services research, policy, and administration, and elaborating on the applicant's research interests; three letters of reference attesting to the applicant's academic ability and potential for a career in health services research or academia, and a résumé, or C.V. Students are admitted fall semester only. The programs are full time, on campus.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 153
  - General Test - Quantitative Reasoning: 144
  - General Test - Analytical Writing: 5
International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

30 to 31 credits are required in the major.
21 to 26 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

All doctoral students complete coursework in the required core area, specialized area of emphasis courses, and a supporting program within their area of emphasis.

The options for area of emphasis are: multidisciplinary social sciences, sociology of health and illness, health decision science, health organization and management science, clinical outcomes research, health policy, and health economics.

**Required Courses**

All doctoral students complete the Ph.D. core.

- **PUBH 7401** - Fundamentals of Biostatistical Inference (4.0 cr)
- **PUBH 7402** - Biostatistics Modeling and Methods (4.0 cr)
- **PUBH 8810** - Research Studies in Health Care (3.0 cr)
- **PUBH 8811** - Research Methods in Health Care (3.0 cr)
- **PUBH 8830** - Writing for Research (2.0 cr)
- **PUBH 8831** - Writing for Research (2.0 cr)
- **PUBH 6341** - Epidemiologic Methods I (3.0 cr)
- **PUBH 6832** - Economics of the Health Care System (3.0 cr)
- **PUBH 6855** - Medical Sociology (3.0 cr)
- **PUBH 6742** - Ethics in Public Health: Research and Policy (1.0 cr)
- **PUBH 6835** - Principles of Health Policy (2.0 cr)

or **PUBH 8801** - Health Services Policy Analysis: Theory (3.0 cr)

**Area of Emphasis Options**

**Multidisciplinary Social Science**

All doctoral students complete the Ph.D. core courses.

- **PUBH 6742** - Ethics in Public Health: Research and Policy (1.0 cr)

**PUBH 8801** - Health Services Policy Analysis: Theory (3.0 cr)

**APEC 5151** - Applied Microeconomics: Firm and Household (3.0 cr)

Choose one additional theory course to be decided with your adviser.

- **PUBH 6862** - Cost-Effectiveness Analysis in Health Care (3.0 cr)

or **PUBH 8821** - Health Economics II (3.0 cr)

or **APEC 8203** - Applied Welfare Economics and Public Policy (3.0 cr)

or **SOC 8701** - Sociological Theory (4.0 cr)

or **SOC 8721** - Theories of Social Psychology (3.0 cr)
Health Organizations and Management Science
All doctoral students complete the Ph.D. core.

PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
or PUBH 6835 - Principles of Health Policy (2.0 cr)

Take 6 - 8 credits from the following:

• IDSC 8711 - Cognitive Science (4.0 cr)
• MGMT 8301 - Seminar in Organizational Behavior (4.0 cr)
• MGMT 8302 - Seminar in Organizations Theory (4.0 cr)
• SCO 8721 - Management of Technological Operations (3.0 cr)
• SCO 8745 - Research on Quality Management (3.0 cr)
• PUBH 8894 - Directed Research: Health Services Research, Policy, and Administration (1.0 - 8.0 cr)
• SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)

SOC 8412 - Social Network Analysis: Theory and Methods (3.0 cr)
or NURS 8171 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

Supporting Program
Students are required to select a minimum of 12 credits for a supporting program with advice from adviser and area of emphasis faculty.

-OR-

Health Decision Science
All doctoral students complete the Ph.D. core.

PUBH 6835 - Principles of Health Policy (2.0 cr)
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 6809 - Advanced Methods in Health Decision Science (3.0 cr)

Choose a minimum of 2 credits from the following:

Take 2 or more credits from the following:

• IDSC 8721 - Behavioral Decision Theory (2.0 cr)
• IDSC 8711 - Cognitive Science (4.0 cr)
• IDSC 8511 - Conceptual Topics and Research Methods in Information and Decision Sciences (4.0 cr)

Supporting program must total a minimum of 12 credits, and must be approved by the area of emphasis faculty.

Take 12 or more credits from the following:

• IE 5112 - Introduction to Operations Research (3.0 cr)
• PUBH 7450 - Survival Analysis (3.0 cr)
• PUBH 7420 - Clinical Trials: Design, Implementation, and Analysis (3.0 cr)
• PUBH 7440 - Introduction to Bayesian Analysis (3.0 cr)

-OR-

Sociology of Health and Illness
All doctoral students complete the Ph.D. core.

Core Policy Course
PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
or PUBH 6835 - Principles of Health Policy (2.0 cr)

Area of Emphasis Required Courses (theoretical foundations)
Take 6 or more credits from the following:

• PUBH 8805 - Sociological Theory in Health Services Research (3.0 cr)
• PUBH 8701 - Sociological Theory (4.0 cr)
• Sociology of Knowledge (3 cr)
or Seminar in Organizations Theory (4cr)
or Race Relations Theory (3cr)

Take 12 or more credits including 2 or more sub-requirements(s) from the following:

• Area of Specialization (disparities, demography, social networks, family, etc.)
  Take 8 or more credits from the following:
  • SOC 8735 - Sociology of Culture (3.0 cr)
  • SOC 8590 - Topics in Life Course Sociology (3.0 cr)
  • SOC 8390 - Topics in Political Sociology (3.0 cr)
  • SOC 8101 - Sociology of Law (3.0 cr)
  • SOC 8290 - Topics in Social Stratification (3.0 cr)
  • SOC 8501 - Sociology of the Family (3.0 cr)
  • SOC 8221 - Sociology of Gender (3.0 cr)
• Advanced Methodology
  Take 4 or more credits from the following:
  • PSY 8881 - Seminar: Quantitative and Psychometric Methods (3.0 cr)
Clinical Outcomes Research
All doctoral students complete the Ph.D. core.
Core Policy Course
PUBH 6835 - Principles of Health Policy (2.0 cr)
or PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
Area of Emphasis Required Courses
PUBH 6342 - Epidemiologic Methods II (3.0 cr)
PUBH 6343 - Epidemiologic Methods III (4.0 cr)
PUBH 6664 - Conducting Health Outcomes Research (3.0 cr)
PUBH 6863 - Understanding Health Care Quality (2.0 cr)
PUBH 7450 - Survival Analysis (3.0 cr)
Supporting Program
Take 12 or more credits from the following:
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6662 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
PUBH 6810 - Survey Research Methods (3.0 cr)
-OR-
Health Policy
All doctoral students complete the Ph.D. core.
Prerequisites
By the end of the first year, take, substitute, or test out of one of the following courses:
PUBH 6724 - The Health Care System and Public Health (3.0 cr)
or PUBH 6556 - Health and Health Systems (2.0 - 3.0 cr)
Core Policy Course
PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
Area of Emphasis Required Coursework
PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
PUBH 8802 - Health Services Policy Analysis: Applications (2.0 cr)
Supporting Program (minimum 12 credits)
Take 12 or more credits from the following:
PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
PUBH 6662 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
PUBH 8813 - Measurement of Health-Related Social Factors (3.0 cr)
PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
or PUBH 7430 - Statistical Methods for Correlated Data (3.0 cr)
or PUBH 6810 - Survey Research Methods (3.0 cr)
-OR-
Health Economics
All doctoral students complete the Ph.D. core.
Prerequisites
Calculus, statistics and micro-economics
Core Policy Course
PUBH 8801 - Health Services Policy Analysis: Theory (3.0 cr)
Area of Emphasis Required Core
PUBH 8821 - Health Economics II (3.0 cr)
APEC 8001 - Applied Microeconomic Analysis of Consumer Choice and Consumer Demand (2.0 cr)
APEC 8002 - Applied Microeconomic Analysis of Production and Choice Under Uncertainty (2.0 cr)
APEC 8003 - Applied Microeconomic Analysis of Game Theory and Information (2.0 cr)
APEC 8004 - Applied Microeconomic Analysis of Social Choice and Welfare (2.0 cr)
or Microeconomic Analysis
ECON 8001 - Microeconomic Analysis (2.0 cr)
ECON 8002 - Microeconomic Analysis (2.0 cr)
ECON 8003 - Microeconomic Analysis (2.0 cr)
ECON 8004 - Microeconomic Analysis (2.0 cr)

or Microeconomic Theory
- ECON 8101 - Microeconomic Theory (2.0 cr)
- ECON 8102 - Microeconomic Theory (2.0 cr)
- ECON 8103 - Microeconomic Theory (2.0 cr)
- ECON 8104 - Microeconomic Theory (2.0 cr)

Take 12 or more credits(s) including 1 or more sub-requirements(s) from the following:
- Students who choose to take APEC 8211, must also take 8212. Students who choose to take ECON 8205, must take either 8206, 8207, or 8208.

Students who choose to take ECON 8117, must also take 8118.
- Take 2 or more course(s) from the following:
  - APEC 8211 - Econometric Analysis I (4.0 cr)
  - APEC 8212 - Econometric Analysis II (4.0 cr)
  - ECON 8205 - Applied Econometrics (2.0 cr)
  - ECON 8206 - Applied Econometrics (2.0 cr)
  - ECON 8207 - Applied Econometrics (2.0 cr)
  - ECON 8208 - Applied Econometrics (2.0 cr)
  - HRIR 8811 - Advanced Quantitative Research Methods in Human Resources and Industrial Relations (2.0 - 4.0 cr)
  - HRIR 8812 - Core Seminar: Human Resources and Industrial Relations Research Methods (4.0 cr)
  - ECON 8117 - Noncooperative Game Theory (2.0 cr)
  - ECON 8118 - Noncooperative Game Theory (2.0 cr)
  - APEC 8202 - Mathematical Optimization in Applied Economics (3.0 cr)
  - APEC 8205 - Applied Game Theory (3.0 cr)
  - APEC 8206 - Dynamic Optimization: Applications in Economics and Management (3.0 cr)

- Students may use these courses to reach the overall 12-credit requirement.
- Take 0 or more course(s) from the following:
  - ECON 8xxx
  - APEC 8xxx
  - PUBH 8682 - Cost-Effectiveness Analysis in Health Care (3.0 cr)
Management Fundamentals Postbaccalaureate Certificate

School of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The management fundamentals certificate is specifically designed for employed executives, physicians, and other healthcare professionals seeking to advance their management and leadership capabilities. Specific features of this design include a curriculum that parallels the first portion of the executive M.H.A. curriculum. Students in the certificate who decide to pursue the executive M.H.A. can apply to the program and, if admitted, complete the degree by finishing the executive M.H.A. curriculum.

The curriculum includes a focus on the management of complex, integrated health systems, including the expanded role of physicians as providers, managers, and leaders in those systems. Program faculty are actively involved in applied research with health systems with a focus on integrated health system performance. The on-campus session invites alumni and expert speakers to participate with students in symposia and other learning events.

Students complete the certificate in eight months. The program is designed to minimize interference with work and family: most of the coursework is online and asynchronous; students spend only eight days on campus at the outset of the program. The program builds on the practical application of learning to the participant's organization. The program is based on a learning cohort model in which all students start the program together and progress through the same curriculum providing myriad opportunities for students to learn and work together.

Accreditation

This program is accredited by Commission on Accreditation of Healthcare Management.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:

Admission to the certificate is decided by the M.H.A. faculty with the advice and counsel of an admissions committee. Admission to the certificate requires the following:
- a bachelor's degree from an accredited college or university
- at least two years experience in a healthcare organization
- current employment in a healthcare organization which affords the opportunity to apply the assignments in the coursework, or an agreement with such an organization in which the applicant is not employed
- a letter of intent describing career interests and the relevance of the certificate to the applicant's personal development

In addition, as noted in the SPH Catalog, applicants whose native language is not English or whose education was completed exclusively at an institution(s) whose language of instruction was not in English must prove English proficiency.

Because the coursework in Certificate 1 is the same as that of the executive M.H.A., some enrollees in the certificate may decide to
pursue the executive M.H.A. after completing the first or second semester of the certificate. Students interested in that option will be required to meet the requirements for admission to the executive M.H.A.

Note: All students in the management fundamentals certificate will be expected to bring a personal computer to the on-campus sessions.

Other than the admission requirements, there are no prerequisites.

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7
- **MELAB**
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan C:** Plan C requires 50 major credits and 10 credits outside the major. The final exam is written and oral. A capstone project is required.

**Capstone Project:** The capstone project for the M.H.A. program builds upon the coursework throughout the program. Students integrate and synthesize the knowledge, attitudes and skills acquired in the curriculum and apply them to the resolution of a significant management problem in a healthcare organization. The capstone project also provides one of the last opportunities in the M.H.A. program for students to further develop and demonstrate their leadership and team competencies, and receive constructive feedback on these competencies, prior to graduation.

M.H.A. students have three options to choose from as they complete their capstone requirement: (1) the Advanced Problem Solving Course; (2) the Carlson Consulting Enterprise Experiential Learning Program; and (3) the New Product Development Course.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

At least 4 semesters must be completed before filing a Degree Program Form.

**Required Coursework**

- **PUBH 6562** - Information Technology in Health Care (2.0 cr)
- **PUBH 6556** - Health and Health Systems (2.0 - 3.0 cr)
- **PUBH 6535** - Managerial Accounting for Health Services (3.0 cr)
- **PUBH 6751** - Principles of Management in Health Services Organizations (2.0 cr)
- **PUBH 6557** - Health Finance I (3.0 cr)
- **PUBH 6568** - Interprofessional Teamwork in Health Care (2.0 cr)
**Twin Cities Campus**

**Maternal and Child Health M.P.H.**

*School of Public Health - Adm*

**School of Public Health**

Link to a [list of faculty](#) for this program.

**Contact Information:**

School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)

Email: sph-SSC@umn.edu

Website: [http://www.sph.umn.edu](http://www.sph.umn.edu)

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42 to 48
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

While the name of the program, Maternal and Child Health (MCH), may suggest that a focus only on mothers and children, the M.P.H. in maternal and child health program is dedicated to improving the health of youth and families too. The program is especially interested in socially vulnerable populations and the environments, behaviors, and policies that affect their long-term health and well-being.

Students come from a variety of backgrounds, but share a common interest in social justice and public health principles. Graduates quickly assume leadership roles in non-profit organizations, research settings, state and local public health agencies, and healthcare organizations.

The program has a standard, on-campus curriculum (with the option of an epidemiology emphasis) and an online curriculum.

**Accreditation**

This program is accredited by Council on Education for Public Health (CEPH).

**Program Delivery**

This program is available:

- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)

**Prerequisites for Admission**

The preferred undergraduate GPA for admittance to the program is 3.00.

At least one year's work or volunteer experience in a clinical, community-based, public health or managed-care agency/program that focuses on women, children, adolescents, and/or families.

Basic understanding of physiological and/or psychological human development as demonstrated by coursework, experience, and/or referenced readings.

Applicants to the online track must hold either an advanced degree (M.S., M.D., M.A., M.S.W., etc.) or have 3-5 years of experience directly related to maternal and child health.

Applicants must submit their test score(s) from the following:

- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:

- TOEFL
- Internet Based - Total Score: 100
- Paper Based - Total Score: 600

IELTS
- Total Score: 7

Key to test abbreviations (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

**Plan B:** Plan B requires 36 to 42 major credits and 10 to 22 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** Students may choose from four options for the M.P.H. project. The choice of options should be decided in consultation with their adviser. The options are:

1. Research project
2. Technical report
3. Critical literature review project
4. Research proposal

Students with an M.C.H. epidemiology emphasis are encouraged to select the research report or the research proposal.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

**Standard or Epidemiology Emphasis**

**Standard Curriculum**

The standard curriculum is for students without advanced degrees or who have limited professional experience. Students complete a minimum of 48 credits in two years.

**Scientific Basis courses (8 credits)**

- **PUBH 6600** - Topics: Maternal and Child Health (0.5 - 4.0 cr)
- **PUBH 6605** - Reproductive and Perinatal Health (2.0 cr)
- **PUBH 6606** - Children's Health: Issues, Programs, and Policies (2.0 cr)
- **PUBH 6607** - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
- **PUBH 6613** - Children and Youth With Special Health Care Needs (2.0 cr)
- **PUBH 6675** - Women's Health (2.0 cr)
- **PUBH 6902** - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- **PUBH 6903** - Child and Adolescent Nutrition (2.0 cr)
- **PUBH 6906** - Global Nutrition (2.0 cr)

**Methodological and Analytical Skills (7-14 credits)**

Select 3 courses from the following list:

- **PUBH 6034** - Program Evaluation for Public Health Practice (3.0 cr)
- **PUBH 6325** - Data Processing with PC-SAS (1.0 cr)
- **PUBH 6342** - Epidemiologic Methods II (3.0 cr)
- **PUBH 6343** - Epidemiologic Methods III (4.0 cr)
- **PUBH 6344** - Research Methods: Application for MPH Project (2.0 cr)
- **PUBH 6415** - Biostatistical Methods II (3.0 cr)
- **PUBH 6451** - Biostatistics II (4.0 cr)
- **PUBH 6617** - Practical Methods for Secondary Data Analysis (3.0 cr)
- **PUBH 6705** - Community Health Assessment (3.0 cr)
- **PUBH 6806** - Principles of Public Health Research (2.0 cr)
- **PUBH 6910** - Critical Review of Research in Public Health Nutrition (1.0 cr)

**Management and Communication Skills (1 credit).**

- **PUBH 6673** - Grant Writing for Public Health (1.0 cr)

**Policy & Advocacy Skills (2 credits).**

- **PUBH 6630** - Foundations of Maternal and Child Health Leadership (3.0 cr)
Select one course from the following list:

- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6634 - Advocacy and Children's Rights (2.0 cr)
- PUBH 6272 - Management and Organization in Hospital and Health Care Systems (4.0 cr)
- PUBH 6760 Healthcare Finance (2.0 cr)

Public Health Core Courses (14-16 credits).

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6101 - Environmental Health (2.0 cr)
  or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Master's Project and Field Experience (4 credits).

- PUBH 7694 - Culminating Experience: Maternal and Child Health (2.0 - 4.0 cr)
- PUBH 7696 - Field Experience: Maternal and Child Health (1.0 - 4.0 cr)

-OR-

**Epidemiology Emphasis Curriculum**

Students admitted into the two-year program also have the option of completing their M.P.H. in maternal and child health with an epidemiology emphasis. This emphasis was created to meet the increasing local, state, and national demands for MCH epidemiologists. It allows students to develop quantitative expertise in MCH content areas.

The MCH program is in our Division of Epidemiology and Community Health, consistently ranked as one of the top epidemiology departments in the United States.

**Scientific Basis of MCH Epi Courses (6 credits)**

Select one course from the following list:

- PUBH 6605 - Reproductive and Perinatal Health (2.0 cr)
- PUBH 6675 - Women's Health (2.0 cr)
- PUBH 6600 - Topics: Maternal and Child Health (0.5 - 4.0 cr)

Select one course from the following list:

- PUBH 6381 - Genetics in Public Health (2.0 cr)
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- PUBH 6387 - Cancer Epidemiology (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)

Select one course from the following list:

- PUBH 6606 - Children's Health: Issues, Programs, and Policies (2.0 cr)
- PUBH 6607 - Adolescent Health: Issues, Programs, and Policies (2.0 cr)
- PUBH 6613 - Children and Youth With Special Health Care Needs (2.0 cr)
- PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
- PUBH 6906 - Global Nutrition (2.0 cr)

**Methodological and Analytical Skills (13 credits)**

- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6390 - Topics: Epidemiology (0.5 - 4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

**Management and Communication Skills (1 credit)**

- PUBH 6673 - Grant Writing for Public Health (1.0 cr)

**Policy and Advocacy Skills (5-6 credits)**

- PUBH 6630 - Foundations of Maternal and Child Health Leadership (3.0 cr)

Select one course from the following list:

- PUBH 6066 - Building Communities, Increasing Health: Preparing for Community Health Work (2.0 cr)
- PUBH 6074 - Mass Communication and Public Health (3.0 cr)
- PUBH 6078 - Public Health Policy as a Prevention Strategy (2.0 cr)
- PUBH 6634 - Advocacy and Children's Rights (2.0 cr)

**Public Health Core Courses (15 credits)**

Students may take 6102 instead of 6101 or 6741 instead of 6742.

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6101 - Environmental Health (2.0 cr)
PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

**Master's Project and Field Experience (4 credits)**
PUBH 7694 - Culminating Experience: Maternal and Child Health (2.0 - 4.0 cr)
PUBH 7696 - Field Experience: Maternal and Child Health (1.0 - 4.0 cr)

**Electives**
Electives to total 48 credits.

**Program Sub-plans**
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

**Online**

**Required Coursework**

**Scientific Basis of MCH (5 credits)**

Scientific Basis of MCH (5 credits).
PUBH 6600 - Topics: Maternal and Child Health (0.5 - 4.0 cr)
PUBH 6606 - Children's Health: Issues, Programs, and Policies (2.0 cr)
PUBH 6613 - Children and Youth With Special Health Care Needs (2.0 cr)
PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)

**Methodological and Analytical Skills (5 credits)**

Methodological and Analytical Skills (5 credits). Select a minimum of three additional credits. These credits should be chosen with consultation of an advisor.
PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)

**Management and Communication Skills (6 credits)**

Management and Communication Skills (6 credits). These credits should be chosen with consultation of an advisor.
NURS 5925 - Grant Writing and Critique (1.0 cr)
PUBH 6655 - Principles and Programs in Maternal and Child Health (2.0 cr)

**Public Health Core Courses**

Public Health Core Courses (14 credits).
PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

**Master's Project and Field Experience**

Master's Project and Field Experience (4 credits).
PUBH 7696 - Field Experience: Maternal and Child Health (1.0 - 4.0 cr)
PUBH 7694 - Culminating Experience: Maternal and Child Health (2.0 - 4.0 cr)

**Electives**
Electives to total 42 credits.

**Complementary and Alternative Medicine Interdisciplinary Concentration Area**
The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an MPH degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, Interdisciplinary Concentrations Coordinator, at franc004@umn.edu or 612-624-6952.

**Global Health Interdisciplinary Concentration Area**
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.
Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions aboard.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, Interdisciplinary Concentrations Coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area

The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to healthcare. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:

- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, Interdisciplinary Concentrations Coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area

PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- Understanding community dynamics
- Developing advocacy skills for public health
- Analyzing legal and policy structures
- Evaluating and implementing policies and programs
- Influencing community health
- Motivating and educating stakeholders and decision-makers
- Using policy as prevention strategy
- Eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, Interdisciplinary Concentrations Coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Public Health Administration and Policy M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 44
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Health Administration and Policy (PHAP) program offers a core curriculum centering on managing organizations to improve the health of certain populations. Throughout the program there is a strong emphasis on developing effective communication skills and the ability to work well with various cultures and communities.

To receive this degree, students will need to complete the curriculum, a field experience, and a master's project. Graduates pursue public health careers in a variety of settings including non-profit organizations, state and local public health agencies, and healthcare companies.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH).

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Applicants must submit their test score(s) from the following:
- GRE
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5
- GMAT
- MCAT
- LSAT
  - Law School Admission Test (LSAT) score: 150

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 02, 2012
Key to test abbreviations (GRE, GMAT, MCAT, LSAT, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan B: Plan B requires 44 major credits and 1 to 4 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Students complete a master's project.

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Courses

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6101 - Environmental Health (2.0 cr)
  - or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  - or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  - or PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  - or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
- PUBH 6700 - Foundations of Public Health (3.0 cr)
- PUBH 6705 - Community Health Assessment (3.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
- PUBH 6755 - Planning and Budgeting for Public Health (2.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 7796 - Field Experience: Public Health Administration and Policy (1.0 - 4.0 cr)
- PUBH 7784 - Master's Project Seminar: PHAP and HSRP&A (1.0 cr)
- PUBH 7794 - Master's Project: Public Health Administration and Policy (2.0 - 3.0 cr)

Specialty Area (8 credits minimum)

- PUBH 6547 - Health Care Human Resources Management (2.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
- PUBH 6721 - Leading Collaborations (1.0 cr)
- PUBH 6723 - Lean Management in Health Care (1.0 cr)
- PUBH 6835 - Principles of Health Policy (2.0 cr)
- PUBH 6565 - Innovation of Healthcare Services (2.0 cr)
- PUBH 6560 - Operations Research and Quality in Health Care (2.0 cr)
  - or PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
  - or PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 2.0 cr)

Analysis (choose 2 of the following):

- PUBH 6845 - Using Demographic Data for Policy Analysis (3.0 cr)
  - or PUBH 6717 - Decision Analysis for Health Care (2.0 cr)
- PUBH 6811 - Health Disparities Research: Measures, Methods, and Data (2.0 cr)

Select remaining credits from the following:

- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
  - or PUBH 6343 - Epidemiologic Methods III (4.0 cr)
  - or PUBH 6344 - Research Methods: Application for MPH Project (2.0 cr)
  - or PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
  - or PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.
Complementary and Alternative Medicine Interdisciplinary Concentration Area
The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota’s ranking as one of the nation’s healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
PHPIC coursework provides a better understanding of the health care system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:
- understanding community dynamics
- developing advocacy skills for public health
- analyzing legal and policy structures
- evaluating and implementing policies and programs
- influencing community health
- motivating and educating stakeholders and decision-makers
- using policy as prevention strategy
- eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus

Public Health Core Concepts Postbaccalaureate Certificate

School of Public Health - Adm

School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, D305 Mayo Memorial, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612/624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 14
- This program does not require summer semesters for timely completion.
- Degree: Public Health Core Concepts PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The certificate program offers an opportunity to gain the knowledge and skills to understand, assess, and manage population health in public health, health care, and human services settings. Many students will use their public health knowledge and skills to enhance effectiveness and opportunities in their current work or career path. Population science is an increasingly valued area of expertise in many health and human service organizations. It will help prepare public health workers and others to respond to emerging public health issues.

Program Delivery

This program is available:
- via classroom (the majority of instruction is face-to-face)
- completely online (all program coursework can be completed online)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission

The preferred undergraduate GPA for admittance to the program is 3.00.

Admission preferences and prerequisites:
- Applicants must hold a baccalaureate degree.
- Applicant should demonstrate strong written skills.
- The admissions committee looks closely at the applicant's work experience and grades in math and science.

Special Application Requirements:

Applicants must submit to SOPHAS, the centralized online application service:
- Completed SOPHAS application and application fee, designating the University of Minnesota School of Public Health
- Personal essay describing the applicant's reason for applying, career goals, and how the certificate will help them achieve their goals
- Three letters of recommendation
- Official transcripts of record from each college/university attended
- Resume or C.V.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations: TOEFL, IELTS, MELAB.
For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
The public health core concepts certificate curriculum is the same as the core content taught in the School of Public Health's M.P.H. degree programs. All six courses are available in online and in-person formats. Students will be able to register, receive materials, interact with faculty and fellow students, and complete this program without traveling to the campus. If completing coursework online, internet access is required.

- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
  or PUBH 6101 - Environmental Health (2.0 cr)
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  or PUBH 6415 - Biostatistical Methods II (3.0 cr)
  or PUBH 6450 - Biostatistics I (4.0 cr)
  or PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Public Health Food Protection Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, D305 Mayo Memorial, MMC 819, 420 Delaware Street SE, Minneapolis, MN 55455 (612-626-3500; f: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 14
- This program requires summer semesters for timely completion.
- Degree: Public Health Food Protection PBacc Certificate

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public health certificate in food protection is part of the public health practice major. It provides formal training in public health. This training will help prepare public health workers and others to respond to incidences of bio-terrorism, infectious disease outbreaks, and other emerging public health issues. Students typically complete the curriculum by attending at least two Public Health Institutes (PHI), held in May/June of each year.

Many students will use their public health knowledge and skills to enhance effectiveness and opportunities in their current work or career paths. Population science is an increasingly valued area of expertise in many health and human service organizations.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
All applications are reviewed holistically. Submit the following to the University of Minnesota School of Public Health:
- Completed application and application fee (Application can be found at http://www.sph.umn.edu/prospective/admissions/documents/RegentsCertificateApplicationforAdmissionForm.pdf)
- Statement of purpose and objectives, describing the applicant's reason for applying, career goals, and how the certificate will help achieve them
- One letter of recommendation
- Official transcripts of record from each college/university attended
- Resume or C.V.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- PUBH 7213 - Applications of Microbiology to Food Systems Monitoring (1.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- PUBH 7215 - Food Safety: Risk Assessment and Risk Management (1.0 cr)
- PUBH 7233 - Food System Defense: Vulnerabilities in the Food System (1.5 cr)
- PUBH 6181 - Surveillance of Foodborne Diseases and Food Safety Hazards (2.0 cr)
  - or PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
- PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
- PUBH 6711 - Public Health Law (2.0 cr)
  - or PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)

Elective Courses
Students select from the list of electives below to complete the required number of credits. (This list of elective courses will change from year to year.):
- PUBH 7230 - Topics in Infectious Disease: Vector Field Ecology (0.5 cr)
  - or PUBH 7230 - Topics in Infectious Disease: Emerging and Re-emerging Diseases (1 cr)
  - or PUBH 7230 - Topics in Infectious Disease: Salmonella as a Foodborne Pathogen (1 cr)
  - or PUBH 7200 - System Approaches to Food Security, Livestock and Human Health (1 cr)
  - or PUBH 7200 - Dairy Food Systems: Science, Policy and Regulation (1 cr)
  - or PUBH 7200 - Global One Health Leadership Workshop and Practicum (2.5 cr)
  - or PUBH 7200 - Pathogen Hotspots in Manufacturing (0.5 cr)
  - or PUBH 7200 - Food Safety Modernization Act: Crossroads of Science, Regulation, and Policy (1 cr)

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Public Health Minor
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Graduate free-standing minor
- Requirements for this program are current for Fall 2011
- Length of program in credits (Masters): 8
- Length of program in credits (Doctorate): 14
- This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

Note: The minor in public health is available only to students enrolled in master's and doctoral programs outside of the School of Public Health. Students enrolled in master's and doctoral programs within the School of Public Health are not eligible for this minor because the requirements of the public health minor are part of their major field of study.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)
• completely online (all program coursework can be completed online)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

The minor program is designed to suit the particular needs and interests of the students with the provision that a graduate-level course in environmental health, epidemiology, and biostatistics be included in that requirement. These courses must at least meet the content level of the school's basic courses in those three subjects.

The master's minor requires a minimum of 8 graduate credits; the doctoral minor requires a minimum of 14 graduate credits. Courses for the minor must be selected from those offered by the School of Public Health. In order to meet the minor requirements, students must successfully complete graduate coursework in each of the following disciplines: biostatistics, epidemiology, and environmental health.

Suggested courses include PUBH 6101 - Environmental Health or PUBH 6102 - Issues in Environmental Health; PUBH 6320 - Fundamentals of Epidemiology or PUBH 6341 - Epidemiologic Methods I; and PUBH 6414 - Biostatistical Methods I or PUBH 6450 - Biostatistics I.

If students have already taken comparable graduate-level courses in these disciplines, other public health courses can be used to complete the minor requirement with the approval of the public health adviser and the director of graduate studies. Since public health courses may have prerequisites or enrollment limitations, early planning with an adviser is suggested.
Twin Cities Campus
Public Health Nutrition M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax: 612-624-4498)
Email: sph.ssc@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 44 to 63
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Health Nutrition (PHN) program is designed to meet the needs of students who want graduate training in health promotion, disease prevention, program development, and nutrition interventions.

The program's faculty are internationally recognized for research in obesity prevention, child and adolescent nutrition, eating disorder prevention, nutrition epidemiology, and nutrition intervention.

Coordinated Master's Program (CMP):
In addition to the traditional public health nutrition degree, the program offers the opportunity to gain expertise in a concentrated area of study such as epidemiology, global health, alternative medicine, health policy, and disability policy. It also offers a coordinated master's program. Please note that the coordinated master's program requires that students have their own transportation during the academic year and summer session, since many sites are not located on public transportation routes.

Full- and Part-time Program:
Students may pursue the M.P.H. on a full-time or part-time basis, but should note that the majority of the courses are offered only during the day. (Note: The Coordinated Master's Program must be taken on a full-time basis.)

Accreditation
This program is accredited by Council on Education for Public Health (CEPH) & Commission on Accreditation for Dietetics Education.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

The following courses are required for admission: one general biology course with lab; two general chemistry classes with labs; one organic chemistry; one biochemistry; and one social science course. In addition, CMP applicants must also complete one physiology course; one microbiology course with lab; one intro to nutrition course; one intro to food science course; one food systems/service management course. All courses MUST be complete before starting the program. If students are currently completing the prerequisites while they are applying, they must indicate on their application materials how their prerequisites will be completed before they start the program.

Preferred GRE performance expectations (test taken post August 2011): A combination of 300 on the quantitative and verbal sections of the test and a score of 3.5 on the analytical writing assessment. Some programs may have higher preferred minimum scores. Check specific programs for details.

Special Application Requirements:
Students applying for the Coordinated Master's Program track go through a two-step process for admission. The first is to be admitted
to the M.P.H. degree program. After all CMP applications submitted prior to the Dec. 1 CMP application deadline have been reviewed and admission decisions made, the applicant will receive an email questionnaire and will undergo a phone interview. The top eight candidates will be selected to fill the eight available CMP spots. Students not selected for the CMP may not start the standard track and later transfer to the CMP.

Applicants must submit their test score(s) from the following:

- **GRE**
  - General Test - Verbal Reasoning: 500
  - General Test - Quantitative Reasoning: 500
  - General Test - Analytical Writing: 3.5

International applicants must submit score(s) from one of the following tests:

- **TOEFL**
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- **IELTS**
  - Total Score: 7

Key to test abbreviations: (GRE, TOEFL, IELTS).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

---

**Program Requirements**

**Plan B:** Plan B requires 18 to 39 major credits and 22 to 26 credits outside the major. The final exam is oral. A capstone project is required.

**Capstone Project:** The purpose of the master's project is to enable students to demonstrate:

- familiarity with the tools of research and scholarship in the field of public health;
- the ability to work independently;
- the ability to plan and carry out a systematic investigation related to a public health issue; and
- the ability to effectively present, in written form, the results of their investigation.

The program views well-developed investigation and communication skills as essential if public health nutrition professionals are to be effective in advancing the health and well-being of populations and at-risk groups.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.0 is required for students to remain in good standing.

At least 3 semesters must be completed before filing a Degree Program Form.

**Public Health Nutrition Core**

- **PUBH 6901 - Foundations of Public Health Nutrition Leadership** (2.0 cr)
- **PUBH 6914 - Community Nutrition Intervention** (3.0 cr)
- **PUBH 6915 - Nutrition Assessment** (2.0 cr)
- **PUBH 6933 - Nutrition and Chronic Diseases** (2.0 cr)
- **PUBH 7994 - Culminating Experience: Public Health Nutrition** (1.0 - 6.0 cr)
- **PUBH 7996 - Field Experience: Public Health Nutrition** (1.0 - 6.0 cr)

**Tracks**

**Standard Track**

**Lifecycle Courses**

- Take 2 or more course(s) from the following:
  - **PUBH 6902 - Maternal, Infant, and Preschool Nutrition** (2.0 cr)
  - **PUBH 6903 - Child and Adolescent Nutrition** (2.0 cr)
  - **PUBH 6904 - Nutrition and Aging** (2.0 cr)
  - **PUBH 6906 - Global Nutrition** (2.0 cr)

**Research Methods**
PUBH 6910 - Critical Review of Research in Public Health Nutrition (1.0 cr)

Research Methods Options
Take 3 or more credits(s) from the following:
- PUBH 6034 - Program Evaluation for Public Health Practice (3.0 cr)
- PUBH 6035 - Applied Research Methods (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6415 - Biostatistical Methods II (3.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)
- PUBH 6705 - Community Health Assessment (3.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
- PUBH 6617 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

Public Health Core
PUBH 6101 - Environmental Health (2.0 cr)
or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)
PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
PUBH 6414 - Biostatistical Methods I (3.0 cr)
or PUBH 6450 - Biostatistics I (4.0 cr)
PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
and PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)
PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

Electives
Students must take enough graduate-level electives to fulfill minimum credit requirements in order to graduate. Students without a nutrition/dietetics background must take PUBH 6355 - Pathophysiology, PUBH 6905 - Nutrition for Public Health Promotion and Disease Prevention, and FSCN 4621 - Nutrition and Metabolism.

-OR-

Coordinated Master's Program

Lifecycle Courses
Students who already have a nutrition/dietetics undergraduate degree need to select two of the following four courses. Students who do NOT have a nutrition/dietetics undergraduate degree must choose PUBH 6902, PUBH 6903, and PUBH 6904.

Take 2 - 3 course(s) from the following:
- PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
- PUBH 6904 - Nutrition and Aging (2.0 cr)
- PUBH 6906 - Global Nutrition (2.0 cr)

Research Methods
PUBH 6910 - Critical Review of Research in Public Health Nutrition (1.0 cr)

Research Methods Options
Take 3 or more credits(s) from the following:
- PUBH 6034 - Program Evaluation for Public Health Practice (3.0 cr)
- PUBH 6035 - Applied Research Methods (3.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6420 - Introduction to SAS Programming (1.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6415 - Biostatistical Methods II (3.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)
- PUBH 6617 - Practical Methods for Secondary Data Analysis (3.0 cr)
- PUBH 6705 - Community Health Assessment (3.0 cr)
- PUBH 6803 - Conducting a Systematic Literature Review (3.0 cr)
- PUBH 6806 - Principles of Public Health Research (2.0 cr)
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 7250 - Designing and Conducting Focus Group Interviews (1.0 cr)
- NURS 6817 - Qualitative Research Design and Methods (3.0 - 4.0 cr)

Field Experience/Nutrition Practicum
CMP students take four credits of PUBH 7996 in addition to the following:
PUBH 6995 - Community Nutrition Practicum (8.0 cr)
PUBH 6996 - Clinical Nutrition Practicum (9.0 cr)

**Public Health Core**

**Environmental Health**
- PUBH 6101 - Environmental Health (2.0 cr)
- or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)

**Epidemiology**
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
- or PUBH 6341 - Epidemiologic Methods I (3.0 cr)

**Biostatistics**
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
- or PUBH 6450 - Biostatistics I (4.0 cr)

**Ethics**
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Administration/Management**
Take 2 or more credits from the following:
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

**Electives**
CMP students who do not have a nutrition/dietetics undergraduate degree must take FSCN 4621 - Nutrition and Metabolism or FSCN 4612 - Advanced Nutrition AND FSCN 4665 - Medical Nutrition Therapy I, AND FSCN 4666 - Medical Nutrition Therapy II and enough graduate-level elective credits to fulfill the minimum required to graduate. Students with a nutrition/dietetics undergraduate degree must take 8-12 graduate-level elective credits to fulfill 60 total credits.

**Nutritional Epidemiology Track**

**Lifecycle courses**
- PUBH 6902 - Maternal, Infant, and Preschool Nutrition (2.0 cr)
- or PUBH 6903 - Child and Adolescent Nutrition (2.0 cr)
- or PUBH 6904 - Nutrition and Aging (2.0 cr)
- or PUBH 6906 - Global Nutrition (2.0 cr)

**Nutrition Science**
Only students who do not have an undergraduate degree in nutrition/dietetics need to take the following nutrition science courses.
- FSCN 4621W - Nutrition and Metabolism [WI] (4.0 cr)
- PUBH 6905 - Nutrition for Public Health Promotion and Disease Prevention (2.0 cr)

**Epidemiology and Biostatistics Core**
- PUBH 6341 - Epidemiologic Methods I (3.0 cr)
- PUBH 6342 - Epidemiologic Methods II (3.0 cr)
- PUBH 6343 - Epidemiologic Methods III (4.0 cr)
- PUBH 6390 - Topics: Epidemiology (0.5 - 4.0 cr)
- PUBH 6389 - Nutritional Epidemiology (2.0 cr)
- PUBH 6325 - Data Processing with PC-SAS (1.0 cr)
- PUBH 6355 - Pathophysiology of Human Disease (4.0 cr)
- PUBH 6450 - Biostatistics I (4.0 cr)
- PUBH 6451 - Biostatistics II (4.0 cr)

"Epi of" Courses
- PUBH 6385 - Epidemiology and Control of Infectious Diseases (2.0 cr)
- or PUBH 6386 - Public Health Aspects of Cardiovascular Disease (2.0 cr)
- or PUBH 6387 - Cancer Epidemiology (2.0 cr)

**Public Health Core**

**Environmental Health**
- PUBH 6101 - Environmental Health (2.0 cr)
- or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)

**Ethics**
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
- or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

**Administration/Management**
Take 1 or more course(s) from the following:
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)

**Program Sub-plans**
A sub-plan is not required for this program.
Students may complete the program with more than one sub-plan.
Complementary and Alternative Medicine Interdisciplinary Concentration Area
The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Coordinated Option
The Coordinated Masters Program (CMP) in public health nutrition provides both a master of public health degree in public health nutrition and the didactic coursework and supervised practice components for registration eligibility and entry into dietetics practice. The program accepts eight students each year. The CMP provides a public health nutrition concentration area that focuses on rural and disadvantaged populations. Supervised practice experiences are integrated throughout the 24-month program utilizing sites both within and outside of Minnesota. Students complete a total of 1,200 hours of supervised practice. Upon successful completion of the program (i.e. coursework, supervised practice experiences, master's project and a comprehensive oral examination) students will receive an M.P.H. degree and a verification statement of eligibility to write the national registration examination for dietitians.

See Program Requirements Page

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause, and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:
- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area
The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework...
that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the healthcare system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- understanding community dynamics
- developing advocacy skills for public health
- analyzing legal and policy structures
- evaluating and implementing policies and programs
- influencing community health
- motivating and educating stakeholders and decision-makers
- using policy as prevention strategy
- eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Public Health Postbaccalaureate Certificate in Performance Improvement
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, D305 Mayo Memorial, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Performance Improvement PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The public health certificate in performance improvement trains students to understand and apply quality improvement methods at both the systems and organizational level. The program will provide the tools needed in order to achieve and maintain high process performance.

The certificate provides participants with hands-on knowledge about how to improve processes in their respective organizations. By so doing, best practices will be diffused, and process performance will improve public health services.

This certificate addresses concerns voiced by the National Board of Public Health Examiners, the Public Health Accreditation Board, and the Council on Education for Public Health to provide more educational opportunities in performance improvement to working public health professionals.

Program Delivery
This program is available:
- completely online (all program coursework can be completed online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Qualifications for Admission:
- Baccalaureate degree
- Strong writing skills
- A minimum of three years of relevant professional work experience

Special Application Requirements:
All applications are reviewed holistically. Submit the following to the University of Minnesota School of Public Health:
- Completed application and application fee (Application can be found at http://www.sph.umn.edu/prospective/admissions/documents/RegentsCertificateApplicationforAdmissionForm.pdf)
- Statement of purpose and objectives describing the reason for applying, career goals and how the certificate will help achieve them.
- One letter of recommendation from the applicant's organization confirming that he or she is able to staff or lead a process or performance improvement team
- Official transcripts of record from each college/university attended.
- Resume or C.V.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
MELAB
- Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
PUBH 6765 - Continuous Quality Improvement: Methods and Techniques (3.0 cr)
PUBH 6780 - Topics: Public Health Administration and Policy (1.0 - 2.0 cr)
PUBH 6xxx - Advanced Performance Improvement Methods in Public Health (2 cr).
PUBH 6xxx - Public Health Process Improvement Project - Practicum (2 cr).

Students choose one of the following on-line electives:
PUBH 6541 - Statistics for Health Management Decision Making (3.0 cr)
or PUBH 6727 - Health Leadership and Effecting Change (2.0 cr)
or PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
or NURS 6100 - Evidence-based Practice (3.0 cr)
Twin Cities Campus
Public Health Practice M.P.H.
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, MMC 819, D305 Mayo Memorial Building, 420 Delaware Street S.E., Minneapolis, MN 55455; (612-626-3500; fax: 612-624-4498)
Email: sph.ssc@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 42
- This program requires summer semesters for timely completion.
- Degree: Master of Public Health

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The program in public health practice brings together the science and the art of public health, addressing public health as a broad social enterprise that seeks to extend the benefits of current knowledge in ways that will have the maximum impact on the health status of populations.

The school offers academic programs at the master's level that prepare students to be leaders and practitioners in the application of public health principles in agencies delivering preventive health services and public health programs.

Accreditation
This program is accredited by Council on Education for Public Health (CEPH)

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)
- primarily online (at least 80% of the instruction for the program is online with short, intensive periods of face-to-face coursework)
- partially online (between 50% to 80% of instruction is online)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Please refer to Executive Program in public health, public health medicine, or veterinary public health for each program's specific admission requirements.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80
  - Speaking test score: 0
The preferred English language test is Test of English as Foreign Language

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements

Plan B: Plan B requires 28 to 42 major credits and 1 to 14 credits outside the major. The final exam is oral. A capstone project is required.

Capstone Project: Master's Plan B

This program may be completed with a minor.

Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.0 is required for students to remain in good standing.

Core Courses
- PUBH 6751 - Principles of Management in Health Services Organizations (2.0 cr)
- PUBH 6020 - Fundamentals of Social and Behavioral Science (3.0 cr)
- PUBH 6299 - Public Health Is a Team Sport: The Power of Collaboration (1.5 cr)

Epidemiology
- PUBH 6320 - Fundamentals of Epidemiology (3.0 cr)
  - or PUBH 6341 - Epidemiologic Methods I (3.0 cr)
  - or PUBH 6342 - Epidemiologic Methods II (3.0 cr)

Biostatistics
- PUBH 6414 - Biostatistical Methods I (3.0 cr)
  - or PUBH 6415 - Biostatistical Methods II (3.0 cr)
  - or PUBH 6450 - Biostatistics I (4.0 cr)
  - or PUBH 6451 - Biostatistics II (4.0 cr)

Ethics
- PUBH 6741 - Ethics in Public Health: Professional Practice and Policy (1.0 cr)
  - or PUBH 6742 - Ethics in Public Health: Research and Policy (1.0 cr)

Environmental Health
- PUBH 6101 - Environmental Health (2.0 cr)
  - or PUBH 6102 - Issues in Environmental and Occupational Health (2.0 cr)

M.P.H. Culminating Experience
- PUBH 7294 - Master's Project: Public Health Practice (0.5 - 4.0 cr)

Field Experience
- PUBH 7296 - Field Experience: Public Health Practice (0.5 - 6.0 cr)

Program Sub-plans

Students are required to complete one of the following sub-plans. Students may complete the program with more than one sub-plan.

Executive Program in Public Health Practice
This sub-plan is limited to students completing the program under Plan B.

This program builds on the student's work and educational experience. It is possible to complete all work for the M.P.H. degree in 16 months, with 42 graduate credits. On average, students complete the program in three years.

Attending the Public Health Institute during the May Session is a unique opportunity for students from multiple disciplines to connect and immerse themselves in emerging public health issues.

EPPHP is a flexible curriculum that students may tailor to their career and practice. Some established focus areas are:
- Cultural competency
- Food protection
- Preparedness, response, and recovery
- Public health leadership
- Global health*
- Health disparities*
- Public health policy*
- Complementary and alternative medicine*
*These are established interdisciplinary concentrations and the name of the concentration will be listed on the student's transcript. Students must complete and submit a proposal form; please refer to the website for full information.

Students are required to complete the core curriculum, M.P.H. culminating experience, field experience, and elective courses chosen to meet their academic and career interests.

**Public Health Medicine**
The Public Health Medicine (PHM) program prepares medical students to have a deeper understanding of population-based science and the cultural and environmental factors that affect patients.

The classroom requirements of the M.P.H. are completed during a 12-month sabbatical (May through May) from medical school while enrolled full time in the School of Public Health. Most students begin the M.P.H. program after year two of medical school.

Students must complete the basic curriculum, the courses below, and approved electives to meet the required 42-credit minimum.

Students must register for the master's project and field experience while enrolled in the program. They may choose to complete these during their time at the SPH or after returning to medical school. A public health medicine setting is required for field placement but may be double counted for clinical rotation with adviser approval.

**Public Health Medicine**

- PUBH 6210 - Public Health Medicine Seminar (1.0 cr)
- PUBH 6415 - Biostatistical Methods II (3.0 cr)

Take 2 or more course(s) from the following:
- PUBH 6852 - Program Evaluation in Health and Mental Health Settings (2.0 cr)
- PUBH 6724 - The Health Care System and Public Health (3.0 cr)
- PUBH 6862 - Cost-Effectiveness Analysis in Health Care (3.0 cr)

Students must take 10.5 to 11.5 elective credits that are approved by their adviser.

**Veterinary Public Health**
The Veterinary Public Health D.V.M./M.P.H. program is part of the public health practice program. It allows students to combine veterinary studies with a public health degree, giving them the credentials to work at the interface of human wellness and animal health, spanning agriculture and food industry concerns, emerging infectious diseases, and other public health issues.

The program in public health practice brings together the science and the art of public health. It addresses public health as a broad social enterprise that seeks to extend the benefits of current knowledge in ways that will have the maximum impact on the health status of populations.

The program offers academic study at the master's level that prepares students to be leaders and practitioners in the application of public health principles in agencies delivering preventive health services and public health programs. The major emphasizes the importance and applications of basic scientific knowledge to current societal problems and concerns.

Up to 14 credits may be transferred into the M.P.H. from a school of veterinary medicine upon approval of the adviser and major chair. Each of the elective curriculum options outlined below addresses the need for students to have coursework in the following four domains: public health policy and systems development, community intervention, assessment and basic sciences, and program management and communications.

D.V.M./M.P.H. students are also required to take one course to fulfill the veterinary public health competencies: biostatistics, surveillance, infectious disease epidemiology, zoonoses, and environmental health.

**Elective Curriculum (20.5 credit minimum)**

Students select one of the following three options for the elective curriculum. The courses below are examples of applicable coursework. Other courses may be selected only in consultation with the student's VPH adviser. Most courses are offered during a three-week Public Health Institute in May/June of each year on campus at the University of Minnesota.

These lists are not exclusive.

**Option 1 - Food Protection**

Take 21 or more credits(s) from the following:
- PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- PUBH 7211 - Food System Biosecurity: Preparedness and Response (1.0 cr)
• PUBH 7212 - Food System Biosecurity: Threats (1.0 cr)
• PUBH 7213 - Applications of Microbiology to Food Systems Monitoring (1.0 cr)
• PUBH 7214 - Principles of Risk Communication (1.0 cr)
• PUBH 7215 - Food Safety: Risk Assessment and Risk Management (1.0 cr)
• PUBH 7216 - Food Safety Risk Management (1.0 cr)
• PUBH 7217 - Advances in Molecular Epidemiological Analysis (1.0 cr)
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6711 - Public Health Law (2.0 cr)

-OR-

Option 2 - Preparedness, Response, and Recovery (PRR)
Take 21 or more credits(s) from the following:
• PUBH 7214 - Principles of Risk Communication (1.0 cr)
• PUBH 7217 - Advances in Molecular Epidemiological Analysis (1.0 cr)
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 6182 - Emerging Infectious Disease: Current Issues, Policies, and Controversies (3.0 cr)
• PUBH 6711 - Public Health Law (2.0 cr)

-OR-

Option 3 - Infectious Disease
Take 21 or more credits(s) from the following:
• PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
• PUBH 7232 - Surveillance of Foodborne Diseases in Animals and Plants (1.0 cr)
• PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)

Rochester
This sub-plan is optional and does not fulfill the sub-plan requirement for this program.

Complementary and Alternative Medicine Interdisciplinary Concentration Area
The Complementary and Alternative Medicine Interdisciplinary Concentration (CAMIC) offered through the School of Public Health is a unique opportunity for SPH students who are pursuing an M.P.H. degree to acquire and cultivate professional skills in an emerging area of health care that is expanding and altering the field of public health.

The concentration includes coursework from the Center for Spirituality and Healing at the University of Minnesota, a nationally recognized leader in integrative medicine that brings together biomedical, complementary, cross-cultural, and spiritual care.

SPH graduate students must complete a formal program plan if they want the CAMIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Global Health Interdisciplinary Concentration Area
The Global Health Interdisciplinary Concentration (GHIC) provides graduate students who are pursuing an M.P.H. with information necessary to define the constitution, cause and consequences of health problems worldwide. The program offers a unique opportunity to explore the relationships between health, environment, politics, culture, and economic pressures in developed and developing nations.

Developing countries are currently undergoing profound demographic changes—changes that are accompanied by shifts in patterns of illness. In many of these nations, the major causes of morbidity and mortality are mutating from traditional infectious diseases to chronic, non-communicable maladies like cardiovascular diseases, cancer, and diabetes. As a result, there is increasing demand for qualified public health practitioners who can identify and help reduce the vast and varied global vectors for chronic disease.

Practical application of theory in the field is a major component of the GHIC. Students are encouraged to hone their expertise by pursuing an international field experience. The School of Public Health has established relationships with collaborative institutions abroad.

SPH graduate students must complete a formal program plan if they want the GHIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Health Disparities Interdisciplinary Concentration Area
The Health Disparities Interdisciplinary Concentration addresses the unequal burden of health risks, morbidity, and mortality experienced by minority cultural and social groups in the U.S., as well as unequal quality of and access to health care. Achieving optimum health for all segments of our society is a central goal of Healthy People 2020, and a concern in Minnesota as well. Despite

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 02, 2012
Minnesota's ranking as one of the nation's healthiest states, Minnesota has some of the largest gaps among cultural and social groups in health indicators. For example, according to the Minnesota Department of Health:

- Infant mortality rates among the American Indians and African Americans are two to three times higher than for the state as a whole.
- Among African American youth aged 15-24, firearm injury mortality rates are 15 times greater than the rates of all ages, races, and genders combined.
- Women from minority communities are less likely to receive sufficient prenatal care compared to other women.
- Death rates for African Americans and American Indians are two to three times that of the state as a whole. Rates of diabetes, hypertension, cancer, and HIV/AIDS are higher for many minority communities compared to the state as a whole.

SPH graduate students must complete a formal program plan if they want the HDIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.

Public Health Policy Interdisciplinary Concentration Area

The School of Public Health's Public Health Policy Interdisciplinary Concentration (PHPIC) focuses on promoting the health of populations and groups through public and organizational policy. PHPIC is open to students pursuing an M.P.H., includes coursework that explores the way in which federal, state, local, and institutional entities affect the financing, structure, and delivery of public health and medical care.

PHPIC coursework provides a better understanding of the healthcare system as a whole and prevention policy. The challenging curriculum helps M.P.H. majors hone practical skills that are highly sought after in the public health and policy arenas. Students who pursue the concentration can choose courses that emphasize:

- understanding community dynamics
- developing advocacy skills for public health
- analyzing legal and policy structures
- evaluating and implementing policies and programs
- influencing community health
- motivating and educating stakeholders and decision-makers
- using policy as prevention strategy
- eliminating health disparities through policy

SPH graduate students must complete a formal program plan if they want the PHPIC to appear on their transcripts. For more information, contact Carol Francis, interdisciplinary concentrations coordinator, at franc004@umn.edu or 612-624-6952.
Twin Cities Campus
Public Health Preparedness, Response, and Recovery Postbaccalaureate Certificate
School of Public Health - Adm
School of Public Health

Link to a list of faculty for this program.

Contact Information:
School of Public Health, D305 Mayo Memorial, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax: 612-624-4498)
Email: sph-SSC@umn.edu
Website: http://www.sph.umn.edu

- Program Type: Post-baccalaureate credit certificate/licensure/endorsement
- Requirements for this program are current for Fall 2011
- Length of program in credits: 12
- This program requires summer semesters for timely completion.
- Degree: Public Hlth Prepared/Response/Recovery PBacc Cert

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The Public Health Certificate in Preparedness, Response, and Recovery (PHCert-PRR) is a program in the public health practice major. This training will help prepare public health workers and others to respond to incidences of bio-terrorism, infectious disease outbreaks, and other emerging public health issues. Students typically complete the curriculum by attending at least two Public Health Institutes (PHI), held in May/June of each year.

The PHCert-PRR curriculum also offers elective courses in health informatics with scholarships available for interested students. The goal of the scholarship is to leverage health informatics technology capabilities in support of public health PRR and disseminate these models and solutions through teaching and mentoring others in their roles in the private and public sectors and in higher education environments.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.00.

Special Application Requirements:
All applications are reviewed holistically. Submit the following to the University of Minnesota School of Public Health:
- Completed application and application fee (Application can be found at http://www.sph.umn.edu/prospective/admissions/documents/RegentsCertificateApplicationforAdmissionForm.pdf)
- Statement of purpose and objectives describing the reason for applying, career goals, and how the certificate will help achieve them
- One Letter of Recommendation
- Official transcripts of record from each college/university attended
- Resume or C.V.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 100
  - Paper Based - Total Score: 600
- IELTS
  - Total Score: 7
- MELAB
  - Final score: 80

Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.
Program Requirements
Use of 4xxx courses towards program requirements is not permitted.

A minimum GPA of 3.00 is required for students to remain in good standing.

Required Coursework
- PUBH 7223 - Concepts of Disaster Behavioral Health (1.0 cr)
- PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
- PUBH 7221 - Planning for Urgent Threats (1.0 cr)
- PUBH 7214 - Principles of Risk Communication (1.0 cr)
- PUBH 7225 - Communication and Information Technology Tools for Public Health Emergency Response (1.0 cr)
- PUBH 7226 - Media Relations Practicum (1.0 cr)
- PUBH 5230 - Topics: Public Health Practice (2.0 cr)
- PUBH 7200 Disaster 101: A Preparedness Exercise (1 cr)

Students must take at least one course from each of the following groups:
- PUBH 7231 - Surveillance of Foodborne Diseases in Humans (1.0 cr)
- or PUBH 7230 - Topics in Infectious Disease (0.5 - 4.0 cr)
- or PUBH 7217 - Advances in Molecular Epidemiological Analysis (1.0 cr)
- PUBH 7200 - Topics: Public Health Practice (0.5 - 4.0 cr)
- or PUBH 6711 - Public Health Law (2.0 cr)

Students select from the courses above and the following list (not all inclusive) of electives to complete the required number of credits. This list of electives may change from year to year:
- PUBH 7233 - Food System Defense: Vulnerabilities in the Food System (1.5 cr)
- or PUBH 7210 - Topics: Global Food Systems (0.5 cr)
- or PUBH 7200 - Best Practices in Emergency Response (1 cr)
- or PUBH 7200 - Designing for Disaster (1 cr)
- or PUBH 7200 - Global Food Safety System Leadership (1 cr)
- or PUBH 7200 - Fundamentals in Hazard Analysis and Critical Control Point (HACCP) (1 cr)
- or PUBH 7200 - Introduction to GIS (1 cr)
- or PUBH 7230 - Any topic in Infectious Disease
- or PUBH 7210 - Any topic in Global Food Systems

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Rochester
Twin Cities Campus
Comparative and Molecular Biosciences M.S.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/cmb

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Comparative and Molecular Biosciences (CMB) program is to train outstanding scientists in the basic mechanisms of animal and human health and disease.

The CMB program is transdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training. Areas of emphasis include genetic and infectious diseases, and comparative aspects of biology and pathology across animal species and humans. Students receive scientific training that prepares them for careers as independent investigators and educators in academia, industry, and government. The CMB program focuses on health that spans a wide range of species, from laboratory animal, companion animal, and livestock species to humans, and is unique within the University of Minnesota.

Note: The primary emphasis of the CMB program is the training of doctoral students; however, a small number of individuals complete a master's degree. The purpose of the master's degree is to provide technical training and scientific competence in the basic mechanisms of animal and human health and disease.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A bachelor's degree in a biological or basic science is required. Previous laboratory experience is strongly preferred.

Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for fellowships and research assistantships awarded for the next academic year. Students are typically admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
- Total Score: 6.5

**MELAB**
- Final score: 80

The preferred English language test is Test of English as Foreign Language.

Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

**Program Requirements**

**Plan A:** Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The M.S. requires a core curriculum of fundamental coursework and laboratory experiences as well as at least 6 course credits in a minor or related field. Students complete a minimum of 20 course credits and 10 thesis credits; the thesis is based on original laboratory research.
Twin Cities Campus
Comparative and Molecular Biosciences Ph.D.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/cmb

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Comparative and Molecular Biosciences (CMB) program is to train outstanding scientists in the basic mechanisms of animal and human health and disease.

The CMB program is transdisciplinary, bringing together basic, applied, and clinical scientists from a number of departments to provide students with individualized, cutting-edge biomedical research training. Areas of emphasis include genetic and infectious diseases, and comparative aspects of biology and pathology across animal species and humans. Students receive scientific training that prepares them for careers as independent investigators and educators in academia, industry, and government. The CMB program focuses on health that spans a wide range of species, from laboratory animal, companion animal, and livestock species to humans, and is unique within the University of Minnesota.

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

A bachelor's degree in a biological or basic science is required. Previous laboratory experience is strongly preferred.

Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for fellowships and research assistantships awarded for the next academic year. Students are typically admitted for fall semester.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80

The preferred English language test is Test of English as Foreign Language.
Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may not be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

The Ph.D. requires a core curriculum of fundamental coursework and laboratory experiences as well as at least 12 credits of minor/supporting program courses. Considerable flexibility is available for students in selecting their minor/supporting program courses to construct a program around their own interests and research. Students typically complete 24-30 credits in the major field and 12 credits in a minor or supporting program for a recommended total of 36-42 credits. In addition, 24 thesis credits are required. All students are required to complete a teaching experience.
Twin Cities Campus
Veterinary Medicine M.S.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/vmed

- Program Type: Master's
- Requirements for this program are current for Fall 2011
- Length of program in credits: 30
- This program requires summer semesters for timely completion.
- Degree: Master of Science

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Veterinary Medicine graduate program is to promote science-based research and provide high-quality education to develop scientists working to improve the health and well-being of animals and people.

Program Goals:
- Prepare independent basic and applied scientists for successful careers in academia, industry, government, or veterinary practice
- Foster development of specific skills including leadership, communication, independent and critical thinking, teaching, interdisciplinary research in collaborative environments, scientific and grant writing, experimental and analytical methods
- Contribute to the body of knowledge in basic, translational, and applied sciences in animal health and well-being, and emerging and zoonotic threats

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

D.V.M. or equivalent; students with a B.A. or B.S. in biological sciences may be considered. Previous laboratory experience is strongly preferred.

Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for fellowships and research assistantships awarded for the next academic year. Students are typically admitted for fall semester, although there is an October 1 deadline for spring semester admission consideration.

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
  - Final score: 80
The preferred English language test is Test of English as Foreign Language

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012
Key to test abbreviations (TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements

Plan A: Plan A requires 14 major credits, 6 credits outside the major, and 10 thesis credits. The final exam is written and oral.

Plan B: Plan B requires 14 to 20 major credits and 10 to 16 credits outside the major. The final exam is written and oral.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Formal coursework for the M.S. degree varies according to the field of study, interests, and career goals of the individual student. Courses for the minor or supporting field as well as for the major may be taken in disciplines other than veterinary medicine.

Program Sub-plans

A sub-plan is not required for this program.

Students may not complete the program with more than one sub-plan.

Comparative Medicine and Pathology

Comparative medicine and pathology focuses on individual animal medicine, where there is a strong demand to further the knowledge of the fundamental nature of diseases so that they may be prevented, or their detrimental effects on health minimized. Although some overlap with the infectious disease discipline is inevitable, the range of disorders addressed in this track is much broader and includes acute and chronic degenerative, metabolic, genetic, neoplastic, nutritional, inflammatory, and immune-mediated diseases. The focus is on pathological processes, their time course and diagnosis, and the search for means by which to prevent or reverse organ deterioration.

Infectious Diseases

Infectious diseases focuses on diseases attributable to pathogenic infectious organisms and their prevention and control. This track includes investigation of etiological agents, the subtleties of the pathogenesis and of the host animal's resistance and strategies to achieve more effective therapy and prevention. The interaction between pathogen and host requires studies of the dynamic fields of microbiology, virology, cellular and humoral immunology, and genetics, as well as zoonotic mechanisms.

Population Medicine

Population medicine focuses on disease and production problems in animal populations. This epidemiological approach requires rigorous attention to diagnostic and project design methodology, analysis and statistical evaluation, and leads to the development and testing of models for disease and its spread. This includes the evaluation of risk to animals at both the individual and population levels, and the study of human health, food safety, and the environment. These are particular strengths of the graduate program, involving collaboration with the School of Public Health and the Department of Food Science and Nutrition. Through the development of research models for entire systems of livestock production, students and faculty within this branch can provide guidance and leadership in making decisions regarding enhancement of animal health, profitability of production systems, human health, and animal well-being.

Veterinary Surgery, Radiology and Anesthesiology

Surgery/radiology/anesthesiology focuses on the assessment of morphology, physiology and pathophysiology through imaging (radiology), the restoration of health through surgical management (surgery), and the management of pain (anesthesiology) and pathophysiologic catastrophes (critical care). These disciplines operate in the arena of individual animals with high economic or sentimental value, which includes both large and small domestic animals. Research may take the form of basic laboratory studies performed under controlled conditions or, alternatively, of clinical or applied studies such as prospective clinical trials or retrospective analysis of archived or imaged data.
Twin Cities Campus

Veterinary Medicine Minor

College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/vmed

• Program Type: Graduate minor related to major
• Requirements for this program are current for Fall 2011
• Length of program in credits (Masters): 6
• Length of program in credits (Doctorate): 12
• This program does not require summer semesters for timely completion.

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Veterinary Medicine graduate program is to promote science-based research and provide high-quality education to develop scientists working to improve the health and well-being of animals and people.

Program Goals:
- Prepare independent basic and applied scientists for successful careers in academia, industry, government, or veterinary practice
- Foster development of specific skills including leadership, communication, independent and critical thinking, teaching, interdisciplinary research in collaborative environments, scientific and grant writing, experimental and analytical methods
- Contribute to the body of knowledge in basic, translational, and applied sciences in animal health and well-being, and emerging and zoonotic threats.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Program Requirements
Use of 4xxx courses towards program requirements is not permitted.
Twin Cities Campus
Veterinary Medicine Ph.D.
College of Veterinary Medicine - Adm
College of Veterinary Medicine

Link to a list of faculty for this program.

Contact Information:
College of Veterinary Medicine, 1365 Gortner Avenue, Room 443 VMC, Saint Paul, MN 55108 (612-625-3770; fax: 612-626-2825)
Email: cvmmsphd@umn.edu
Website: http://www.cvm.umn.edu/vmed

- Program Type: Doctorate
- Requirements for this program are current for Fall 2011
- Length of program in credits: 60
- This program requires summer semesters for timely completion.
- Degree: Doctor of Philosophy

Along with the program-specific requirements listed below, please read the General Information section of the catalog website for requirements that apply to all major fields.

The mission of the Veterinary Medicine graduate program is to promote science-based research and provide high-quality education to develop scientists working to improve the health and well-being of animals and people.

Program Goals:
- Prepare independent basic and applied scientists for successful careers in academia, industry, government, or veterinary practice
- Foster development of specific skills including leadership, communication, independent and critical thinking, teaching, interdisciplinary research in collaborative environments, scientific and grant writing, experimental and analytical methods
- Contribute to the body of knowledge in basic, translational, and applied sciences in animal health and well-being, and emerging and zoonotic threats

Program Delivery
This program is available:
- via classroom (the majority of instruction is face-to-face)

Prerequisites for Admission
The preferred undergraduate GPA for admittance to the program is 3.25.

D.V.M. or equivalent; students with a B.A. or B.S. in biological sciences may be considered. Previous laboratory experience is strongly preferred.

Applicants must submit a C.V. or résumé; three letters of recommendation from persons familiar with their scholarship and research potential; and a statement of any research experience, as well as career interests, goals, and objectives.

Special Application Requirements:
Submission of all application materials by December 15 is required to ensure consideration for fellowships and research assistantships awarded for the next academic year. Students are typically admitted for fall semester, although there is an October 1 deadline for spring semester admission consideration.

Applicants must submit their test score(s) from the following:
- GRE

International applicants must submit score(s) from one of the following tests:
- TOEFL
  - Internet Based - Total Score: 79
  - Internet Based - Writing Score: 21
  - Internet Based - Reading Score: 19
  - Paper Based - Total Score: 550
- IELTS
  - Total Score: 6.5
- MELAB
The preferred English language test is Test of English as Foreign Language (TOEFL). Key to test abbreviations (GRE, TOEFL, IELTS, MELAB).

For an online application or for more information about graduate education admissions, see the General Information section of the catalog website.

Program Requirements
24 credits are required in the major.
12 credits are required outside the major.
24 thesis credits are required.

This program may be completed with a minor.

Use of 4xxx courses toward program requirements is permitted under certain conditions with adviser approval.

A minimum GPA of 3.00 is required for students to remain in good standing.

Formal coursework for the Ph.D. degree varies according to the field of study, interests, and career goals of the individual student. There are no minimum requirements but students usually take 24 credits in the major field and 12 credits in the minor or supporting field. Courses for the minor or supporting field as well as for the major may be taken in disciplines other than veterinary medicine.

Program Sub-plans
A sub-plan is not required for this program.
Students may not complete the program with more than one sub-plan.

Comparative Medicine and Pathology
Comparative medicine and pathology focuses on individual animal medicine, where there is a strong demand to further the knowledge of the fundamental nature of diseases so that they may be prevented, or their detrimental effects on health minimized. Although some overlap with the infectious disease discipline is inevitable, the range of disorders addressed in this track is much broader and includes acute and chronic degenerative, metabolic, genetic, neoplastic, nutritional, inflammatory, and immune-mediated diseases. The focus is on pathological processes, their time course and diagnosis, and the search for means by which to prevent or reverse organ deterioration.

Infectious Diseases
Infectious diseases focuses on diseases attributable to pathogenic infectious organisms and their prevention and control. This track includes investigation of etiological agents, the subtleties of the pathogenesis and of the host animal's resistance and strategies to achieve more effective therapy and prevention. The interaction between pathogen and host requires studies of the dynamic fields of microbiology, virology, cellular and humoral immunology, and genetics, as well as zoonotic mechanisms.

Population Medicine
Population medicine focuses on disease and production problems in animal populations. This epidemiological approach requires rigorous attention to diagnostic and project design methodology, analysis and statistical evaluation, and leads to the development and testing of models for disease and its spread. This includes the evaluation of risk to animals at both the individual and population levels, and the study of human health, food safety and the environment. These are particular strengths of the graduate program, involving collaboration with the School of Public Health and the Department of Food Science and Nutrition. Through the development of research models for entire systems of livestock production, students and faculty within this branch can provide guidance and leadership in making decisions regarding enhancement of animal health, profitability of production systems, human health, and animal well-being.

Veterinary Surgery, Radiology and Anesthesiology
Surgery/radiology/anesthesiology focuses on the assessment of morphology, physiology, and pathophysiology through imaging (radiology), the restoration of health through surgical management (surgery), and the management of pain (anesthesiology) and pathophysiologic catastrophes (critical care). These disciplines operate in the arena of individual animals with high economic or sentimental value, which includes both large and small domestic animals. Research may take the form of basic laboratory studies performed under controlled conditions or, alternatively, of clinical or applied studies such as prospective clinical trials or retrospective analysis of archived or imaged data.

© 2005 by the Regents of the University of Minnesota
The University of Minnesota is an equal opportunity educator and employer.
Information current as of October 01, 2012