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This is the Degree Programs and Faculty section of the 2007-2009 Graduate School Catalog for the University of Minnesota
Key to Abbreviations

**Faculty**
Graduate faculty are listed at the beginning of each degree program. After the faculty name, the home department will be listed (unless the department is the same as the program name), followed by the graduate faculty status in the program. Professors emeriti are identified by "(emeritus)."

**Membership Categories**
- **Senior Member (SM)—** Authorization to advise students at all levels, including the doctorate; to serve as a thesis reviewer and as an examiner on student examining committees, including service as chair of doctoral committees; to teach courses for graduate credit; and to participate in governance. In fields that also offer a professional doctorate, some senior member appointments may be restricted to the supervision of students seeking the professional degree.
- **Affiliate Senior Member (ASM)—** Authorization to assume the same responsibilities as senior member, but not to participate in governance. In fields that also offer a professional doctorate, some affiliate senior member appointments may be restricted to the supervision of students seeking the professional degree.
- **Affiliate Member/Advising (AM2)—** Authorization to advise students at the master’s level; to serve as a thesis reviewer at the master’s level and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to co-advising doctoral students with a senior member or affiliate senior member of the graduate faculty, and to serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.
- **Affiliate Member/Advising (AM2)—** Authorization to advise students at the master’s level; to serve as a thesis reviewer at the master’s level and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to advise students at all levels, including the doctorate; to serve as a thesis reviewer and as an examiner on student examining committees, including service as chair of doctoral committees; to teach courses for graduate credit; and to participate in governance. In fields that also offer a professional doctorate, some senior member appointments may be restricted to the supervision of students seeking the professional degree.
- **Exempt Member (SM)—** Authorization to serve as a thesis reviewer and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.
- **Affiliate Member (AM)—** Authorization to serve as a thesis reviewer and as an examiner on student examining committees at all levels, but not as chair, and to teach courses for graduate credit. Examining status does not include membership on the graduate faculty and does not confer governance privileges.
- **Affiliate Member/Advising (AM2)—** Authorization to serve as a thesis reviewer and as an examiner on student examining committees at all levels, but not as chair, and to teach courses for graduate credit. Examining status does not include membership on the graduate faculty and does not confer governance privileges.

**Tests**
The following test abbreviations appear throughout graduate program listings.

- **ECFMG**—Educational Commission Foreign Medical Graduates
- **GMAT**—Graduate Management Admission Test
- **GRE**—Graduate Record Examination
- **IELTS**—International English Language Testing System
- **MELAB**—Michigan English Language Assessment Battery
- **SPEAK**—Speaking Proficiency English Assessment Kit
- **TOEFL**—Test of English as a Foreign Language
- **TSE**—Test of Spoken English
- **USMLE**—United States Medical Licensing Examination

For more information about these individual tests, see page 7 in the General Information section.

Accountancy

**Contact Information**—Master of Accountancy, Department of Accounting, University of Minnesota, 3-108 Carlson School of Management, Minneapolis, MN 55455 (612-624-7511; fax 612-626-7795; macct@umn.edu; www.carlsonschool.umn.edu/macct). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Professor**
John W. Dickhaut, M2
Frank B. Gigler, M2
Edward L. Joyce, M2
Chandra S. Kanodia, M2
Judy A. Rayburn, M2

**Associate Professor**
Gordon L. Duke, M2
Pervin K. Shroff, M2
Ramgopal Venkataraman, M2

**Senior Lecturer**
Frank J. Beil, M
Gary W. Carter, AM2
Paul G. Guterman, M2
Frederick R. Jacobs, AM2
Larry Kallio, M2
Terry L. Tranter, AM2

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

**Curriculum**—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 (MBT) and MBA 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 endless 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.

**Prerequisites for Admission**—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 completed at least an additional 24 semester hours (36 quarter hours) in business-related or accounting courses.

Generally, a cumulative GPA of 3.00 (on a 4.00 scale) is required for admission. Any questions on admission requirements should be directed to the M.Acc. office.

**Special Application Requirements**—Results of the GMAT are required. Three letters of recommendation from persons qualified to evaluate most recent work and potential for graduate study. Either in-person or telephone interview with program director depending on applicant’s location. Applicants are considered for admission for fall and spring semesters.
Degree Programs and Faculty

Courses—Refer to Accounting (ACCT), Tax (MTB), Operation Management Science (OMS), Finance (FINA), and Information and Decision Sciences (IDSC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.Acc. Degree Requirements
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.

Language Requirements—None.

Aerospace Engineering and Mechanics

Contact Information—Chair, Graduate Admissions Committee, 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; aem-dgs@aem.umn.edu; www.aem.umn.edu.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Roger E. A. Arndt, Civil Engineering, SM
Gary J. Balas, SM
Graham V. Candler, SM
Roger L. Fosdick, SM
William L. Garrard, SM
Richard D. James, SM
Daniel D. Joseph, SM
Perry H. Leo, SM
Ellen K. Longmire, SM
Mitchell B. Luxkin, Mathematics, SM
Ivan Marusic, AMS
Thomas W. Shield, SM
Ellad Tadmor, SM
Yiyuan J. Zhao, SM

Associate Professor
Yohannes Ketema, AM
Krishnan Mahesh, SM

Adjunct Associate Professor
Dale F. Enns, AMS

Assistant Professor
Ryan S. Elliott, SM
Demoz Gebre-Egziabher, SM
Bernard Mettler, SM

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

Curriculum—The department offers an M.S. and a Ph.D. degree 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.

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.

Courses—Refer to Aerospace Engineering and Mechanics (AEM) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Programs can contain no more than two courses at 4xxx.

M.Aero.E. Coursework Only and Design Project Degree Requirements
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. 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.

Language Requirements—None.

Final Exam—The final exam is oral.

M.S. Degree Requirements
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, and research in engineering sciences that are basic to the program. The final exam is oral.

For both Plan A and Plan B, the program must include at least one sequence of 8xxx courses in aerospace engineering and no more than 6 credits of 4xxx courses. 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students
Majoring in Other Fields—At least one sequence of two 8xxx courses in aerospace engineering is required.

Ph.D. Degree Requirements
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 at least four years of coursework, but the heart of the program is the thesis research. The program must contain a minimum of 42 credits of approved coursework and four semesters of colloquium attendance. 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 minimum credit requirement they must be in one-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.

Language Requirements—None.

Minor Requirements for Students
Majoring in Other Fields—At least 12 credits in aerospace engineering are required, including at least one sequence of two 8xxx courses.

Agriculture and Applied Economics
See Applied Economics.

Agricultural Engineering
See Biosystems and Agricultural Engineering.
American Studies

Contact Information—Department of American Studies, University of Minnesota, 104 Scott Hall, 72 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4190; www.cla.umn.edu/american/). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Sara M. Evans, History, SM
Richard D. Leppert, Cultural Studies and Comparative Literature, SM
Elaine Tyler May, SM

Professor
Patricia C. Albers, American Indian Studies, SM
Ronald R. Aminzade, Sociology, SM
W. John Archer, Cultural Studies and Comparative Literature, SM
David O. Born, Preventive Sciences, SM
Timothy Andres Brennan, Cultural Studies and Comparative Literature, ASM
Rose M. Brewer, African American and African Studies, SM
Hazel Dicken-Garcia, Journalism and Mass Communication, SM
Mary G. Dietz, Political Science, SM
Lisa J. Disch, Political Science, SM
Penny A. Edgell, Sociology, SM
James Farr, Political Science, SM
Donna R. Gabaccia, History, SM
Philip J. Gersmehl, Geography, SM
Edward M. Griffin, English, SM
Karen N. Hoyle, Library Collection, and Preservation (Children's Literature Research Collections), AM
Mary Jo Kane, Kinesiology, SM
Sally J. Kenney, Public Affairs, SM
Sally G. Kohlstedt, Geology and Geophysics (Science/Technology, History of) SM
Alex J. Lubit, Music, SM
Karal Ann R. Marling, Art History, SM
Judith A. Martin, Geography-Urban and Regional Planning, SM
Lary L. May, SM
Russell R. Menard, History, SM
Ellen Messer-Davidow, English, SM
Richa Nagar, Gender, Women, and Sexuality Studies, ASM
John D. Nichols, American Indian Studies, SM
David W. Noble, SM
Riv-Ellen Pfeffer, SM
Paula Rabinowitz, English, SM
Steven Ruggles, History, SM
Harvey B. Sarles, Cultural Studies and Comparative Literature, SM
Eric Sheppard, Geography, SM
David E. Wilkins, American Indian Studies, SM
John S. Wright, English, African American and African Studies, SM
Jack D. Zipes, German, Scandinavian, and Dutch, SM

Associate Professor
Lisa Albright, School of Social Work, SM
Bruce P. Braun, Geography, SM
Robert “Robin” Brown, Cultural Studies and Comparative Literature, SM
Brenda J. Child, SM
Susan Craddock, Gender, Women, and Sexuality Studies, ASM
Jeffrey R. Crump, Design, Housing, and Apparel, SM
Maria Damon, English, SM
Roderick Ferguson, SM
Kirsten Fischer, History, SM
Vinay Gidwani, Geography, ASM
George D. Green, History, SM
Ronald Greene, Communication Studies, ASM
Douglas Hartmann, Sociology, SM
Ann Hironaka, Sociology, ASM
Erika Lee, History, SM
Josephine D. Lee, English, SM
Richard Lee, Psychology, SM
Patrick McNamara, History, ASM
Louis G. Mendoza, Chicano Studies, SM
Carol A. Miller, SM
Roger P. Miller, Geography, SM
Lisa A. Norling, History, SM
Jean M. O'Brien-Kehoe, History, SM
Joanna O'Connell, Spanish and Portuguese, SM
Daniel J. Philippson, Rhetoric, SM
Jennifer L. Pierce, SM
Jani Scandura, English, ASM
Robert B. Silberman, Art History, SM
Katherine M. Solomonson, Architecture, SM
Eden Torres, Gender, Women, and Sexuality Studies, SM
David Treuer, English, ASM
Barbara Welke, History, SM
Michelle M. Wright, English, ASM
Jacquelyn N. Zita, Gender, Women, and Sexuality Studies, SM

Assistant Professor
M. Bianet Castellanos, M2
David A. Y. O. Chang, History, M2
Tracey Ann Deutsch, History, M2
Kale Fajardo, M2
Karen Zouwen Ho, M2
Trica Keaton, M2
David Martinez, American Indian Studies, M2
Keith A. Mayes, African American and African Studies, M2
Kevin P. Murphy, History, M2
Hoon Song, Anthropology, M2
Brian G. Southwell, Journalism and Mass Communications, M2
Dara Z. Strolovitch, Political Science, M2
Natasha Tinsley, English, M2
David Valentine, Anthropology, M2

Senior Fellow
Harry C. Boye, Public Affairs, AM

Other
Colleen J. Sheehy, Weisman Art Museum, AM

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

Curriculum—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 create a field of concentration 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.

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—The following should be sent to the department office: a special application cover sheet available through the department office or on the Web site, a personal statement, three letters of recommendation, an academic writing sample, scores from the General (Aptitude) Test of the GRE that are less than five years old, and transcripts of all college work. Applications must be submitted by December 1. Entry is only in fall semester.

Courses—Refer to American Studies (AMST) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—One 4xxx course in American studies, English, history, American Indian studies, or another appropriate program, may be included as one of the seminars to meet course requirements in American studies. As long as a member of the graduate faculty teaches the course, students can register for additional 4xxx courses by contracting to take the course as an AMST 8xxx directed study with appropriate additional coursework.

M.A. Degree Requirements
The master’s degree is not designed as a terminal degree and students are not admitted to it. A Ph.D. student may elect to pursue the M.A. All coursework is applicable to the Ph.D.

Plan A and B require American studies core seminars—AMST 8201, 8202 (6 credits); two semesters of research seminars in American studies or in another department with approval of the director of graduate studies (6 credits); a comparative cultures course covering international or non-U.S. subjects (3 credits) and two adviser-approved courses in the field of concentration, including one focused on cultural pluralism within the United States (6 credits).

Plan A requires 10 thesis credits for a minimum of 21 course credits and a written thesis.

Plan B requires three additional adviser-approved courses in the field of concentration, (9 credits) for a total of 30 credits. The student is required to write three Plan B papers, each approved by a member of the graduate faculty. The papers are usually expanded seminar papers.

Language Requirements—Reading knowledge of one foreign language is required.

Minor Requirements for Students Majoring in Other Fields—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.
Ph.D. Degree Requirements

Ph.D. students must complete the following course distributions: four core American Studies courses (Introductory Seminars AMST 8201 and AMST 8202; Practicum in American Studies, 8401; and Dissertation Seminar, 8801); 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 field of concentration 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.

Language Requirements—Reading knowledge of one foreign language is required.

Minor Requirements for Students

Majoring in Other Fields—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.

Ancient and Medieval Art and Archaeology

See Classical and Near Eastern Studies.

Animal Sciences

Contact Information—Department of Animal Science, University of Minnesota, 305 Haecker Hall, 1364 Eckles Avenue, St. Paul, MN 55108 (612-624-3491; fax 612-625-5789; twelsh@umn.edu, www.anisci.umn.edu/gradprogram/index.html). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Mitchell S. Abrahamsen, Veterinary and Biomedical Sciences, SM
David R. Brown, Veterinary and Biomedical Sciences, SM
Hugh Chester-Jones, SM
Brian A. Crooker, SM
William R. Dayton, SM
Alfredo DiCostanzo, SM
Mohamed E. El-Halawani, SM
Scott C. Fahrekrug, SM
Douglas N. Foster, SM
Leslie B. Hansen, SM
Marcia R. Hathaway, SM
Dennis G. Johnson, SM
Lee J. Johnston, SM
Mathur S. Kannan, Veterinary and Biomedical Sciences, SM
James G. Linn, SM
Sally L. Noll, SM
Scott M. O’Grady, SM
F. Abel Ponce de Leon, SM
Jeffrey K. Renaeu, SM
Anthony J. Seykora, SM
Gerald C. Shurson, SM
Marshall D. Stern, SM
Jonathan E. Wheaton, SM
Michael E. White, SM

Adjunct Professor

Oladele S. Gazal, Department of Biological Sciences, St. Cloud State University, M
Hans-Joachim G. Jung, Agronomy and Plant Genetics, SM

Associate Professor

Sam K. Baidoo, SM
Yang Da, SM
John Deen, Veterinary Clinical Sciences, SM
Marcia Endres, SM
G. Clifford Lamb, SM
Laura J. Mauro, SM

Assistant Professor

Jacqueline F. Jacob, SM
Yuzhi Li, M2

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

Curriculum—Students 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.

Prerequisites for Admission—A bachelor’s degree in agriculture or a biological field with training in biology, chemistry, physics, and mathematics is required.

Special Application Requirements—Three letters of recommendation evaluating the applicant’s potential, and a statement of career goals are required. The preferred GPA generally required for admission is 3.00 for the M.S. and 3.20 for the Ph.D. GRE scores are required. Applicants are admitted every semester.

Courses—Refer to Animal Science (ANSC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Certain 4xxx courses may be included on the program form with prior approval by the student adviser and the director of graduate studies.

M.S. Degree Requirements

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 Faculty Program 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. These 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, a project(s) is to be conducted that requires approximately 120 hours to complete. The nature and extent of the project is agreed upon in advance by the student and faculty adviser.

Language Requirements—None.

Final Exam—The final exam consists of a public seminar followed by an oral examination.

Minor Requirements for Students

Majoring in Other Fields—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.

Ph.D. Degree Requirements

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.

Language Requirements—None.

Minor Requirements for Students

Majoring in Other Fields—Requirements are designed to fit the student’s needs. 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.

Anthropology

Contact Information—Department of Anthropology, University of Minnesota, 305 Haecker Hall, 1364 Eckles Avenue, St. Paul, MN 55108 (612-624-3491; fax 612-625-5789; twelsh@umn.edu, www.anisci.umn.edu/gradprogram/index.html). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Patricia Albers, American Indian Studies, ASM
William Beeman, SM
Guy E. Gibson, SM
Stephen F. Gudeman, SM
John M. Ingham, SM
David M. Lipset, SM
Riv-Ellen Prell, American Studies, ASM
Gloria G. Raheja, SM
Degree Programs and Faculty

Anthropology 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 histories of healing, 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 specialization includes 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 semantics; 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 hominid 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 specialization includes 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 studies (CRM). Regional specialization includes Europe, Southwest Asia, Central Asia, and North America.

See the Graduate Student Handbook in the graduate section of the department's Web site and faculty profiles on that Web site for more detail about these programs and specialties (www.anthropology.umn.edu).

Prerequisite for Admission—A B.A. degree or equivalent is required for admission.

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, except for the master's only programs; the deadline for all materials is January 5.

Courses—Refer to Anthropology (ANTH) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx anthropology courses may be included on the degree program form if they are taught by members of the graduate faculty.

M.A. Degree Requirements

For Plan A and Plan B, 30 semester credits, with at least 14 in anthropology and 6 in a minor or related field. Students should consult the Graduate Student Handbook for special requirements for sociocultural anthropology, linguistic anthropology, archaeology, and biological anthropology.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The minor program is individually designed by the student and the director of graduate studies. Minimally, students must take 6 credits in anthropology (5xxx courses or above).

Ph.D. Degree Requirements

Requirements include 36 credits of coursework; 24 in anthropology and 12 in a minor or supporting program. Students should consult the Graduate Student Handbook for special requirements for sociocultural anthropology, linguistic anthropology, archaeology, and biological anthropology.

Language Requirements—Requirements depend upon student's special area of research.

Minor Requirements for Students Majoring in Other Fields—The minor program in anthropology is individually designed by the student and the director of graduate studies. A minimum of 12 credits in anthropology (5xxx courses or above) must be completed for the minor.

Applied Developmental Psychology

Postbaccalaureate Certificate

Contact Information—Applied Developmental Psychology Certification Program, Institute of Child Development, 51 East River Road, Minneapolis, MN 55455. (612-624-2576; fax 612-624-6373; bord022@umn.edu; http://education.umn.edu/fields/Appdev.htm). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

Herbert L. Pick, Jr., M
Anne D. Pick (emeritus), M
Richard Weinberg, M

Curriculum—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.

Admission—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. Admission is based primarily on the applicant's academic record, GRE scores, and research experience.
Applied Economics

Contact Information—Applied Economics Graduate Program, University of Minnesota, 231 Classroom-Office Building, 1994 Buford Avenue, St. Paul, MN 55108 (612-625-3777, apecdgs@umn.edu or www.apec.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Vernon W. Ruttan (emeritus), ASM
G. Edward Schuh (emeritus), SM

Professor
Jeffrey D. Apland, SM
Ragui A. Assaad, SM
Avner Ben-Ner, SM
John Budd, SM
Brian L. Buhr, SM
Jon B. Christianson, SM
Bryan E. Dowd, SM
K. William Easter, SM
Vernon R. Eidman, ASM
Roger D. Feldman, SM
William C. Gartner, SM
Paul W. Glewwe, SM
Robert P. King, SM
Jean D. Kinsey, SM
Morris M. Kleiner SM
Robert T. Kudrle, SM
William F. Lazarus, SM
Donald J. Liu, SM
Ann R. Markusen, SM
Hamid Mohradian, M2
George W. Morse, U of M Extension, SM
Samuel L. Myers, JR., SM
John A. Nyman, SM
Kent D. Olson, SM
Philip G. Pardey, SM
Claudia A. Parliament, SM
Glenn D. Pederson, SM
Stephen Polsky, SM
Terry L. Roe, SM
C. Ford Runge, SM
Benjamin H. Senauer, SM

Associate Professor
Jay S. Coggins, SM
Elizabeth E. Davis, SM
Jeremiah E. Friun, SM
Maria J. Hanratty, SM
Frances R. Homans, SM
Terrance M. Hurley, SM
Laura T. Kalamokidis, SM
Deborah Levison, SM
Gerald McCullough, SM
Joseph A. Ritter, SM
Pamela J. Smith, SM
Rodney B. Smith, SM
Thomas F. Stinson, SM
Steven J. Taff, SM
Judy Temple, SM
Robert J. Town, SM

Assistant Professor
Jean M. Abraham, M2
Caroline Carlin, M2
Qiukong Huang, M2
Stephanie C. Lluis, M2
Clarissa A. Yeap, M2

Research Associate
Naomi Zeitzouani, M2

Other
Margaretha V. Rudstrom, U of M Extension Regional Center, Morris, M

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

Curriculum—Graduate study 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.

Prerequisites for Admission—A GPA of 3.00 in an undergraduate program and in graduate level work is preferred. Applicants without a master's degree are, except in a few special cases, considered only for admission to the M.S. program. The following coursework is considered the minimum preparation for admission to the M.S. program: intermediate-level microeconomic and macroeconomic theory, statistics, calculus, and linear algebra.

Applicants to the Ph.D. program should also have completed courses in microeconomic and macroeconomic theory at the master's level. Students lacking background in economics or quantitative methods may be required to complete deficiencies before being accepted into the program.

Special Application Requirements—GRE scores are required for all students, domestic and foreign. A TOEFL score of 550 (paper), 213 (computer), or 79 (Internet) is also required for all international applicants whose native language is not English. This requirement is waived for applicants who completed a degree within the last two years from a recognized institution of higher learning in the United States. Applicants should provide evidence of superior scholarship, professional experience, and general aptitude for graduate study. Students are admitted any semester but should keep in mind that most assistantships are allocated by the end of February for the following fall semester. Applicants seeking fellowships should submit all application materials by December 15.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is not permitted.

M.S. Degree Requirements

The M.S. prepares students for employment opportunities in the public and private sector and for further graduate study. M.S. students are required to complete graduate level courses in microeconomic theory, macroeconomic theory, and econometrics or statistics, or to have completed equivalent courses prior to entry into the program. Students are also required to participate in a 1 credit M.S. seminar. Both Plan A and 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. A preferred minimum GPA of 3.00 in program courses is preferred for graduation.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—M.S. students must complete at least 9 credits of 5xxx or 8xxx courses in applied economics. Courses for the minor are approved by the director of graduate studies in the Applied Economics Graduate Program. All courses in the minor must be taken A-F and completed with a GPA of 3.00 or higher.

Ph.D. Degree Requirements

The Ph.D. degree program in applied economics prepares students for research, teaching, and extension positions, and for research and administrative posts in public and private sector organizations. 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; health economics; labor economics; policy analysis; production and marketing economics; trade and development economics; and resource and environment economics.
### Degree Programs and Faculty

Applicants for the Ph.D. degree should have completed an M.S. degree in economics, agricultural economics, or a related field. Prior training should include micro- and macro-economic theory at the master’s level, calculus 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.

All students must complete a set of core courses in micro and macro theory, econometrics, and welfare economics totaling 23 credits. They must also complete two additional “methods” courses and the Ph.D. seminar.

All Ph.D. students must include a “supporting field” or a “minor” program of 12 to 18 credits.

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 on 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 the minor or major examination in microeconomic theory (offered by the Department of Economics) and field examinations in two of the seven Ph.D. fields (offered by the Applied Economics Graduate Program). The 8xxx courses in the Applied Economics Graduate Program prepare students for field exams. An approved minor in another graduate program (e.g., economics or health policy) 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 member of the graduate faculty not from the Applied Economics Graduate Program. At the conclusion of the thesis research, a final oral examination is taken. The final oral exam consists of a public seminar (in which the candidate presents the thesis) and a closed meeting between the candidate and the appointed examining committee.

### Language Requirements

None.

### Minor Requirements for Students

#### Majoring in Other Fields

Ph.D. students must complete at least 15 credits of 5xxx or 8xxx courses in applied economics. Courses for the minor are approved by the director of graduate studies in the Applied Economics Graduate Program. All courses in the minor must be taken A-F and completed with a GPA of 3.00 or higher.

### Applied Plant Sciences

**Contact Information**—Director of Graduate Studies, University of Minnesota, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108 (612-625-6282; fax 612-625-1268). [psych@umn.edu](mailto:psych@umn.edu).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Regents Professor**

Ronald L. Phillips, SM

**Professor**

James A. Anderson, SM

Roger L. Becker, SM

Rex N. Bernardo, SM

Jerry D. Cohen, SM

Beverly R. Durgan, SM

Nancy J. Ehlke, SM

John E. Erwin, SM

Vincent A. Fritz, SM

Susan M. Galatowitsch, SM

Gary M. Gardner, SM

Jeffrey L. Gunsolus, SM

Emily E. Hoover, SM

Robert J. Jones, SM

Nicholas R. Jordan, SM

James J. Luby, SM

Albert H. Markhart III, SM

Mary H. Meyer, SM

Thomas E. Michaels, SM

James H. Orf, SM

Paul M. Porter, SM

Carl J. Rosen, Soil, Water, and Climate, SM

Ruth G. Shaw, SM

Craig C. Sheaffer, SM

Steve R. Simmons, SM

Joseph R. Sowokinos, SM

Deon D. Stuthman, SM

Donald L. Wyse, SM

Nevin D. Young, Plant Pathology, SM

**Adjunct Professor**

John W. Gronwald, SM

Hans-Joachim G. Jung, SM

Howard W. Rines, SM

Carroll P. Vance, SM

**Associate Professor**

Neil O. Anderson, SM

Jeffrey H. Gillman, SM

Stan C. Hokanson, SM

Brian P. Horgan, SM

Gregg A. Johnson, SM

Gary J. Muchelbauer, SM

Paul Peterson, SM

Alan G. Smith, SM

Kevin P. Smith, SM

Christian A. Thill, SM

Cindy B. Tong, SM

**Adjunct Associate Professor**

Frank Forcella, SM

JoAnn F. Lamb, SM

**Assistant Professor**

Helene Murray, SM

Seth L. Naeve, SM

Eric Watkins, SM

Jochem J. Wiersma, SM

**Adjunct Assistant Professor**

David Francis Garvin, SM

### Other

Raynie A. Porter, M2

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

#### Curriculum

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. Graduates of the program are able to provide innovative leadership and contribute to problem solving in their discipline 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 a broad familiarity with all 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 Pathology; Soil, Water, and Climate; and Landscape Architecture; and related departments. Students choose from among four specialization tracks—agronomy/ agroecology, applied plant sciences, horticulture, or plant breeding/plant molecular genetics.

#### Agroecology/Agronomy Specialization

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.

#### Applied Plant Sciences Specialization

Students create an integrated, individualized program combining a breadth of courses from several disciplines or areas including plant biology at the organismal level, genetics and plant breeding, cropping systems and communities, and courses relating to the production of agronomic and/or horticultural commodities.

#### Horticulture Specialization

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.

**Plant Breeding/Plant Molecular Genetics Specialization**—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 and fiber systems.

**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 sciences. 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 (Apartment) 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 1 is strongly encouraged to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year. Students can be admitted any term.

**Courses**—Refer to Agronomy and Plant Genetics (AGRO), Applied Plant Sciences (APSC), Horticultural Science (HORT) and Sustainable Agricultural Systems (SAGR) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on the degree program form is subject to adviser and director of graduate studies approval.

**M.S. Degree Requirements**
The M.S. is offered under Plan A (with thesis) and Plan B (without 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 encouraged 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.

**Language Requirements**—None.

**Ph.D. Degree Requirements**
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.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—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.

**Arabic**
No new students are currently being accepted to this program. Contact the Graduate School for information on the status of the program.

**Contact Information**—Arabic Program, Department of African American and African Studies, University of Minnesota, 808 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455 (612-624-9847).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Professor**
Cæsar E. Farah, M2

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

**Curriculum**—The program focuses on the Arabic language and the literature and culture of the Arabic-speaking world.

**M.A. Plan B Degree Requirements**
The M.A. is offered under Plan B only. The minimum requirement is 33 credits, including 27 course credits and 6 credits for the Plan B research paper. The coursework must include 15 credits in Arabic literature or culture, including ARAB 5001 (3 cr) and one 8xxx seminar (3 cr). Students also take 6 credits (2 courses) in related fields outside Arabic, depending on the student’s academic goals and subject to the approval of the director of graduate studies.

**Language Requirements**—Students must complete ARAB 5102—Advanced Arabic or its equivalent, and must demonstrate reading knowledge of a classical or modern language appropriate to the field.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A minimum of 12 graduate credits for a master’s minor is required. Students must possess an acceptable knowledge of Arabic, but may not apply language-specific courses toward the minor. A program of study must be arranged with the director of graduate studies of Arabic. No written exam is required for the minor.

**Architecture**

**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 612-624-5743; [http://arch.cdes.umn.edu/](http://arch.cdes.umn.edu/)).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Professor**
Thomas Fisher, M2
Lance A. LaVine, M2
Julia Robinson, M2
Leon G. Sakowski, M2

**Adjunct Professor**
John C. Carmody, AM2
Robert Mack, FAIA, AM2
Dale M. Mulftinger, AIA, AM2
Duane Thorbeck, FAIA, AM2

**Associate Professor**
Lee B. Anderson, M2
Arthur H. Chen, M2
Renée Cheng, AIA, M2
William F. Conway, AIA, AM2
Gunter Dittmar, M2
Mary M. Guzowski, M2
Cynthia Jara, M2
Andrzej Piotrowski, M2
Katherine M. Solomonson, M2
Leslie Van Duzer, M2
I. Stephen Weeks, AIA, M2

**Adjunct Associate Professor**
Charles L. Lazor, AIA, AM
Douglas Lew, AM
Thomas A. Meyer, FAIA, AM2
Ralph K. Nelson, AIA, AM
Todd J. Rhodes, AIA, AM
Mark Tambornino, AM

**Assistant Professor**
Ritu Bhatt, M2
John Comazzi, M2
Ozzy Saloje, M2
Mark Swackhamer, M2

**Adjunct Assistant Professor**
William Anthony Blanski, AIA, AM
Steven K. Buetow, AIA, AM
Richard A. Carter, AIA, LEED-AP, AM
Dave Dimond, AIA, LEED-AP, AM
Walid H. El-Hindi, AIA, AM
Jay Isenberg, AIA, AM
Mic Johnson, AIA, AM
Lee E. Tollefson, FAIA, AM2
Thomas Westbrook, AM
Jennifer A. Yoos, AIA, AM

**Lecturer**
Jim Dozier, AM
Robert Ferguson, AM2
Bruno Franck, M2
Sharon Roe, AM2

Adjunct Teaching Instructor
Lucas Alm, AIA, AM
Christian Dean, AIA, M
Kristen S. Paulsen, AM
Douglas Pierce, AM
Sazi Srothman, AM
Marcelo Valdes, AM

Research Associate
Louise Goldberg, AM
Kathleen Harder, AM

Research Fellow
Jonee K. Brigham, AIA, LEED-AP, M
Virajita Singh, M
Richard B. Strong, AM
William Weber, M

Director
Janet Abrams, M

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

Curriculum—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 department offers an accredited professional degree, the M.Arch., and an academic degree, the M.S. in architecture with a sustainable design track.

The master’s of architecture degree is an accredited three-year professional program that prepares students for the practice and 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: 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 is required.

The master of science in architecture is a nonprofessional degree offering advanced studies and research methods in a sustainable design track with four concentrations in metropolitan design, digital design, heritage preservation, and history-theory of criticism. The M.S. seeks students from architecture, landscape architecture, environmental design, or related disciplines to pursue interdisciplinary graduate study and research in sustainable practices and careers in sustainable design. The M.S. offers students a wide range of topics and research methods within sustainable and green building practices, including energy and indoor air quality; site, water, and climate design; waste and environmental factors; innovative materials technology; and high performance building design applications. The School of Architecture also offers a dual degree program (M.Arch./M.S.–S.D.).

Prerequisites for Admission—All applicants to the M.Arch. or M.S. programs are expected to have basic computer skills before beginning the program, including familiarity either with Macintosh or Windows operating systems, word processing, basic drawing or painting programs, and use of e-mail.

Students entering the three-year M.Arch. program have varied educational backgrounds that add to a diverse student body. There are several different paths into and through the M.Arch. program. Students who have a B.A. or B.S. degree in architecture or environmental design, generally enter the three-year M.Arch. program.

Students who have earned a bachelor degree in a field other than architecture and little or no background in architecture apply for the 3+ Option, enrolling in a summer semester to establish the foundation needed to succeed in the professional program. A limited number of students with a rigorous background in architecture studies may be granted advanced standing (see below) in the master’s program, usually completing two years of studies. And those with a professional bachelor’s degree in architecture, who are seeking additional professional education, apply for advanced standing in the M.Arch. program and complete coursework for the degree. Information about each of these paths and the requirements for admission appears below.

The 3+ Option—This option is designed for students with a broad range of academic backgrounds in undergraduate fields other than architecture. Students who are admitted to the 3+ program receive graduate level preparation through an rigorous summer semester of studies in drawing, architectural history-theory, technologies, and design studio. The ensuing fall semester, 3+ students merge with all other M.Arch. 3-year program candidates for the remaining complement of design studios and courses. Physics and pre-calculus are required; drawing and architectural/art history are preferred.

Advanced Standing—Though the core program is three years in length, students who have completed a pre-professional degree in architecture (B.S. or B.E.D.) may apply for advanced standing, which enables them to enter directly into the second year of the 3-year program. Admission with advanced standing is evaluated on a case-by-case basis. In addition to the prerequisites indicated for the 3-year program, advanced standing applicants must have completed at least one course in structures, environmental science and building systems, with at least four semesters of architecture design studios.

Post-professional—Students who already hold a professional degree (B.Arch. or M.Arch.) participate in the master of architecture program as advanced standing students. The director of graduate studies tailors the program to post-professional students’ specific needs, insuring that they have met NAAB requirements upon graduation. The reduced course requirements allows completion of advanced electives or cross-disciplinary courses in studio, technology, representation, digital design, history, theory or metropolitan design, or undertake coursework towards a master of science degree or a certificate in metropolitan design. They must be in residence a minimum of 3 semesters and complete 33 semester credits plus a thesis (an additional 12 credits).

Master of science in architecture sustainable design track applicants must have a bachelor’s degree in architecture, environmental science, or a related field. Application requirements include a written statement, a sample portfolio of related works or design projects, transcripts of all coursework, and three faculty recommendations. The 2-3 page statement should outline a probable research agenda, topics or themes that the applicant wishes to pursue, including information about the applicant’s preparation for the field and career goals by January 15 directly to the department.

Special Application Requirements—Admission to the M.Arch. program is highly competitive. In addition to meeting Graduate School application requirements, all M.Arch. students applying to the program must submit all of the following: a portfolio that demonstrates design talent, transcripts of all coursework, three faculty recommendations, responses in English to two of three questions posted on the electronic application, GRE scores and the optional department financial aid form. The portfolio should be no larger than 8.5” x 11”. International students must submit scores from the TOEFL or the MELAB. For all applicants, the department may waive requirements for required courses when they are equivalent to those offered by the department.

Accreditation and Licensing—Preparation for the profession of architecture requires both formal education and practical experience followed by a professional examination and registration. In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the
sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes two types of degrees: the bachelor of architecture and the master of architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards. Master’s degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree, which, when earned sequentially, comprise an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree. The master of architecture degree program at the School of Architecture, University of Minnesota College of Design is fully accredited by the NAAB.

Courses—Refer to Architecture (ARCH) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses cannot be included on degree program forms without the permission of the adviser and director of graduate studies.

M.Arch. Degree Requirements

The professional M.Arch. curriculum requires completion of 78 course credits and a 12 credit design studio Plan A Thesis. M.Arch. students can expect to complete the program in six semesters (three years), including the pre-thesis research phase and the thesis studio design proposal. The first three semesters include an integrated core curriculum in studio, building and environmental technologies, history-theory and digital methods. The core curriculum is followed by three semesters of “options” studios and elective courses in urbanism, practice, representation and the integrated studio. A study abroad option is available for qualified students in the fourth semester.

Language Requirements—None.

Final Exam—An oral presentation, a visual presentation of the thesis, and the submission of the written thesis document are required for the M.S. Plan A. The Plan B or Plan A M.S. – S.D. requires an oral examination.

Art

Contact Information—Department of Art, University of Minnesota, E201 Regis Center for Art, 405 21st Avenue S., Minneapolis, MN 55455 (612-625-8096; fax 612-625-7881; artdept@umn.edu; www.art.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Curts C. Hoard, M2
M. Diane Katsiaficas, M2
Clarence E. Morgan, M2
Mark Pharis, M2
Wayne E. Potratz, M2
Thomas A. Rose, M2

Associate Professor

Jan Estep, M2
David Feinberg, M2
Lynn A. Gray, M2
Gary L. Hallman, M2
James V. Henkel, M2
Jerald A. Krepps, M2
Alexis Kuhr, M2
Thomas J. Lane, M2
Lynn T. Lukkas, M2
Joyce Lyon, M2

Assistant Professor

Christine A. Baemler, M2
Jenny Schmid, M2
Andrea Stanislav, M2
Diane Willow, M2
Tetsuya Yamada, M2

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

Curriculum—The master of fine arts program places major emphasis on creative studio work of high quality. It promotes not only the conceptual and technical education of the professional artist in the context of the studio environment, 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 time and interactivity. 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.

Prerequisites for Admission—An undergraduate degree is required.

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 a visual 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. Admission is in fall semester only. Ceramics, painting, and sculpture applicants must submit from 10 to 20 images of work in a digital portfolio completed in their chosen medium. Printmaking applicants must submit a minimum of four original prints in addition to the digital portfolio. Time and interactivity applicants must submit a portfolio in the medium appropriate to the work being submitted for review. Photography applicants may submit 10 to 20 slides or a minimum of ten finished prints. Instructions for creating the digital portfolio may be found at the department’s Web site www.art.umn.edu. Completed Graduate School applications (including official transcripts) must reach the Graduate School by January 5. The visual portfolio, letters of recommendation, and the statement of purpose must reach the director of graduate studies in the Department of Art also by January 5. Incomplete files will not be reviewed.

Courses—Refer to Art (ARTS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses in the related field (other than art history) on the degree program form is subject to the adviser and director of graduate studies approval.

M.F.A. Degree Requirements

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 visual research. The program requires that coursework be completed prior to 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 three courses in the history of art (or two courses
Curriculum—Areas of specialization: American art, architecture, and popular culture; 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 nineteenth through twenty-first century art; and South Asian art and architecture.

Language Requirements—None.

Minor Requirements for Students

Majoring in Other Fields—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.

Art Education

See Education, Curriculum and Instruction

Art History

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; arthist@umn.edu www.arthist.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

W. John Archer, ASM
*Catherine B. Asher, SM
Frederick M. Asher, SM
*Frederick A. Cooper, SM
Gail Lee Dubow, ASM
*Karal Ann R. Marling, SM
Sheila J. McNally, SM
Steven F. Ostrow, SM
*Robert J. Poor, SM
Leon G. Satkowski, ASM
Gabriel P. Weisberg, SM

Associate Professor

Jane M. Blocker, SM
Lyndel J. King, AM
Elizabeth Kotz, AM
Robert B. Silberman, SM
Katherine M. Solomonon, ASM
*John W. Steyaert, SM

Assistant Professor

Ritu Bhatt, AM
Michael Gaudio, SM
Other

Diane Mullin, Weisman Art Museum, AM
Colleen J. Sheehy, Weisman Art Museum, AM

*Not accepting new students.

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

M.A. Plan B Degree Requirements

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 art historical in content and drawn from courses in at least three of the following areas: American, ancient, early modern, East Asian, Islamic, medieval, modern and contemporary, 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 are not art historical in content. The remaining 9 credits may be either in art history or outside the discipline; this is decided in consultation with the adviser and the director of graduate studies. Two Plan B papers are required, the first of which should be completed by the end of the first year of full-time study.

Language Requirements—Students must attain reading proficiency in a second language directly related to their course of study.

Final Exam—The final exam is written. See the department’s Graduate Student Handbook for details.

Minor Requirements for Students

Majoring in Other Fields—For an M.A. degree, a minimum of 11 graduate credits in art history is required for a minor.

Ph.D. Degree Requirements

A minimum of 54 course credits (about 18 courses) is required. At least 18 credits (about six courses) must be in an area of primary concentration within art history, while a minimum of 9 credits (about three courses) must be in an area of secondary concentration in art history. In addition, at least 6 credits (about two 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.

Language Requirements—Students must attain reading proficiency in at least two foreign languages. Contact the director of graduate studies for details.
Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits in art history.

Asian Literatures, Cultures, and Media

Contact Information—Department of Asian Languages and Literatures, University of Minnesota, 453 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-6534; fax 612-624-5513; aclmdgs@umn.edu; www.all.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Joseph R. Allen, SM
Catherine B. Asher, Art History, ASM
Daniel Brewer, French and Italian, ASM
Richa Nagar, Gender, Women, and Sexuality Studies, ASM
Arlene A. Teraoka, German, Scandinavian, and Dutch, ASM
Ann B. Walner, History, ASM

Associate Professor
Jeffrey Broadbent, Sociology, ASM
Jigna Desai, Gender, Women, and Sexuality Studies, ASM
Keya Ganguly, Cultural Studies and Comparative Literature, ASM
Christine Marran, SM
Michael Molasky, SM
Maki Isaka Morinaga, SM
Paul Rouzer, SM
Simona Sawhney, SM
Ajay Skaria, History, ASM

Assistant Professor
Mark Anderson, SM
Jason McGrath, SM
Hiromi Mizuno, History, ASM
Guirgilal Sahota, SM

Lecturer
Ravi Prasad, AM
Ling Wang, AM

Other
Zhen Zou, Degree and Credit Programs, AM

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

Curriculum—The Asian literatures, cultures, and media (ALCM) program is organized around three intersecting categories of knowledge: 1) language of concentration, 2) focus of study, and 3) theory or problematic. Students must designate a language of concentration on their ALCM Program Application Form. Currently, students may select Chinese, Japanese, 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 Web site at www.all.umn.edu.

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.

Special Application Requirements—The following are required by the department: completed ALCM application form, official transcripts, three letters of recommendation, personal statement, a writing sample, GRE scores, and for international applicants, IELTS or TOEFL scores. Applications (including all supporting materials) must reach the ALCM Graduate Studies Committee and the Graduate School by January 10.

Courses—Refer to www.all.umn.edu for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses may not normally be included on degree program forms for the ALCM graduate major or minor.

M.A. Degree Requirements

The M.A. is offered under Plan B only, which requires 30 credits (including at least 12 from other departments). 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.

Language Requirements—Advanced knowledge in the chosen language of concentration.

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); (4) Oral exam (in English) by the above committee, based on the submitted papers.

Ph.D. Degree Requirements


Language Requirements—Advanced reading ability and spoken competence in the language of concentration, as assessed by the Ph.D. qualifying exam. Some students may require additional foreign language study, depending on the dissertation topic.

Minor Requirements for Students Majoring in Other Fields—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.

Astrophysics

Contact Information—Department of Astronomy, University of Minnesota, 356 Tate Laboratory of Physics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-0211; fax 612-626-2029; grad-req@astro.umn.edu; www.astro.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Cynthia A. Cattell, Physics, ASM
Kris D. Davidson, SM
Robert D. Gehrz, SM
Roberta M. Humphreys, SM
Terry J. Jones, SM
Thomas W. Jones, SM
Robert L. Lysak, Physics, ASM
Keith A. Olive, Physics, ASM
Robert O. Pepin, Physics, ASM
Lawrence Rudnick, SM
Evan D. Skillman, SM
Charles E. Woodward, SM
Paul R. Woodward, SM
John R. Wygant, Physics, ASM

Associate Professor
Shaull Hanany, Physics, ASM
Yong-zhong Qian, Physics, ASM
Liliya L. R. Williams, SM

Adjunct Associate Professor
Kim A. Venn, ASM

Assistant Professor
Michael DuVernois, Physics, ASM

Senior Research Associate
David H. Porter, SM

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

Curriculum—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 and 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.

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.

Special Application Requirements — 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. Applications are accepted for entry into fall semester only.

Facilities — The Department of Astronomy has purchased a 5 percent share in the Large Binocular Telescope (LBT) on Mt. Graham in southeastern Arizona. The LBT is currently completing construction through a consortium of universities and research institutes led by the University of Arizona. First light Images were obtained in the fall of 2005; initial science projects began in early 2007. This purchase also allows the department to trade time on the LBT for time on several other telescopes — including the 6.5 meter upgraded Multiple Mirror Telescope, the two 6.5 meter Magellan telescopes in the southern hemisphere, and the 10 meter Heinrich Hertz millimeter radio telescope — as well as other smaller telescopes in Arizona, providing guaranteed access to multi-wavelength capabilities.

The University also operates a 60-inch telescope on Mt. Lemmon, near Tucson, Arizona, which is well equipped for both optical and infrared observations. A 30-inch telescope with a CCD camera and infrared instruments is maintained at the O’Brien Observatory about 40 miles from the Twin Cities campus. Excellent shop facilities support our instrument development for the telescopes at O’Brien and Mt. Lemmon and for major national observatories such as the NASA Infrared Telescope Facility (IRTF) in Hawaii and for the LBT.

The Automated Plate Scanner has been used to digitize the entire Palomar Sky Survey resulting in a massive catalog of over 89 million objects, including star and galaxy positions, magnitudes, and colors. The catalog of the first epoch survey is available on the Web, with data from the second epoch survey available in the department.

The astronomy department maintains a large network of Linux-based computers used for the reduction and analysis of X-ray, ultraviolet, optical, and radio observations. The department is connected through an ethernet backbone to clusters of supercomputers and super-workstations at the University’s Digital Technology Center and the Laboratory for Computational Science and Engineering. These facilities are available to faculty and students for their research.

In addition, members of the department regularly use such national facilities as the Kitt Peak National Observatory; Cerro Tololo Inter-American Observatory in Chile; National Radio Astronomy Observatory’s facilities in Green Bank and the VLA; Arcetri Radio Observatory; the IRTF In Hawaii; and the NASA space based facilities such as the Hubble Space Telescope, the Far Ultraviolet Space Explorer, the Spitzer Infrared Telescope Facility, the Chandra X-ray Space Telescope.

Courses — Refer to Astronomy (AST) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses — A 4xxx astrophysics course may be counted toward the M.S. or Ph.D. degree programs.

M.S. Degree Requirements

The master’s degree requires a minimum of 30 credits, including one semester of classical physics (PHYS 5011). 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.

Language Requirements — None.

Final Exam — The final exam is oral.

Minor Requirements for Students Majoring in Other Fields — For the master’s minor, 8 credits in astrophysics are required.

Ph.D. Degree Requirements

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.

Language Requirements — None.

Minor Requirements for Students Majoring in Other Fields — For the Ph.D. minor, 12 credits in astrophysics are required.

Audiology

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.

Courses—Refer to Biochemistry (BIOC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted with written approval from a director of graduate studies.

M.S. Plan A Degree Requirements

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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—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.

Ph.D. Degree Requirements

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.

Language Requirements—None.

Minor Requirements for Students

Majoring in Other Fields—A doctoral minor requires BIOC 8002 (4 cr) plus additional courses (8 credits), approved by the director of graduate studies, to meet the minimum requirement of 12 total credits. In extenuating cases, students may petition the director of graduate studies for substitution of a required course.

Bioethics

Minor Only

Contact Information—Graduate Minor in Bioethics, Center for Bioethics, University of Minnesota, N504 Boynton, 410 Church Street, SE, Minneapolis MN 55455 (612)-624-9440; fax 612-624-9108; bioethx@umn.edu, www.bioethics.umn.edu.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

Muriel Bebeau, Preventive Sciences, M
Dan Burk, Law School, M
Norman Dahl, Philosophy, M
Carl Elliott, Pediatrics, M
John Eyler, History of Medicine, M
Iasper Hopkins, Philosophy, M
Jeffrey Kahn, Medicine, M
Rosalie Kane, Public Health, M
Joan Liaschenko, Nursing, M
Mary Faith Marshall, Medicine, M
Steven Miles, Medicine, M
Naomi Scheman, Philosophy, M
Susan M. Wolf, Law School, M

Associate Professor

Gregory Plotnikoff, Medicine, M
Edward Ratner, Medicine, AM
Michael Root, Philosophy, M
Karen-Sue Tausig, Anthropology, M
Beth Virnig, Health Policy and Management, M

Assistant Professor

Dianne Bartels, Center for Bioethics, M
Debra DeBruin, Medicine, M
John Song, Medicine, M
Maryam Valapour, Medicine, M

Curriculum—The Center for Bioethics, in close cooperation with the Department of Philosophy, offers a minor in bioethics for master’s (M.A. and M.S.) and doctoral students with approval of the director of graduate studies in bioethics. The minor provides a structured program of study as well as formal recognition for academic accomplishments in the field.

While recognizing that philosophy is the focal discipline for the study of bioethics, the minor offers numerous opportunities for multidisciplinary study, including in history and philosophy of medicine, health law
and public policy, health-care economics, professional ethics, clinical ethics, medical humanities, and moral development.

**Prerequisites for Admission**—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School. Students are encouraged to have some previous exposure to philosophy or biomedicine or both. Graduate students in philosophy are expected to have successfully completed at least one graduate course in ethical theory.

**Special Application Requirements**—Contact the director of graduate studies in bioethics for an Intent to Enroll form, which should be submitted by the middle of the spring semester the year before initiating coursework in the minor. The form is also available in a PDF of the Graduate Minor in Bioethics Brochure at [www.bioethics.umn.edu/education/grad_minor.pdf](http://www.bioethics.umn.edu/education/grad_minor.pdf). Enrollment is contingent upon approval by the director of graduate studies for bioethics.

**Courses**—Please contact the minor program office or the Center for Bioethics Web site at [www.bioethics.umn.edu/education](http://www.bioethics.umn.edu/education) for information on relevant coursework.

**Use of 4xxx Courses**—Some 4xxx courses are allowed as indicated in the guidelines for the bioethics minor, available from the director of graduate studies or the Center for Bioethics Web site at [www.bioethics.umn.edu/education](http://www.bioethics.umn.edu/education).

**Minor Only Requirements**

**Students Majoring in Philosophy**—Master’s students (M.A. and M.S.) must complete a minimum of 8 graduate credits in bioethics consisting of 6 credits of required courses and 2 credits of electives outside the Department of Philosophy.

Doctoral students must complete a minimum of 8 graduate credits in bioethics consisting of 8 credits of required courses and 6 credits of electives outside the Department of Philosophy.

**Students Majoring in a Field Other Than Philosophy**—Master’s students (M.A. and M.S.) must complete a minimum of 8 graduate credits in bioethics outside the student’s major consisting of 6 credits of required courses and 2 credits of electives. Master’s students are not required to take electives in bioethics but may choose to do so, but are encouraged to do so.

Doctoral students must complete a minimum of 14 graduate credits in bioethics outside the student’s major consisting of 8 credits of required courses and 6 credits of electives.

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### Bioinformatics

**Minor Only**

**Contact Information**—Graduate Minor Program in Bioinformatics, Department of Laboratory Medicine and Pathology, University of Minnesota, MMC 511, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-8440; fax 612-625-7166; [www.binf.umn.edu](http://www.binf.umn.edu)).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Professor**

Daniel Boley, Computer Science, M

John Carlis, Computer Science, M

Lynda B. M. Ellis, Laboratory Medicine and Pathology, M

Scott Fahrenkrug, Animal Science, M

Alexander Grosberg, Physics, M

Vivek Kapur, Microbiology, M

Claudia Neuhauser, Ecology, Evolution, and Behavior, M

Hans Othmer, Mathematics, M

Wei Pan, Biostatistics, M

Lawrence P. Wackett, Biochemistry, Molecular Biology, and Biophysics, M

Nevin Dale Young, Plant Pathology, M

**Associate Professor**

Colin Campbell, Pharmacology, M

Yung Da, Animal Science, M

George Karypis, Computer Science, M

Yiannis Kaznessis, Chemical Engineering and Materials Science, M

Arkady Khodursky, Biochemistry, Molecular Biology, and Biophysics, M

Georgia May, Ecology, Evolution, and Behavior, M

Cavan Reilly, Biostatistics, M

**Curriculum**—The bioinformatics minor is available to master’s (M.A. and M.S.) and doctoral students. The minor includes core coursework in computer and biological sciences and opportunities to interact with others interested in bioinformatics. The curriculum encourages interdisciplinary interaction, communication, and synthesis. The minor is intended to provide graduate-level biological or computer science students with basic training in bioinformatics as a complement to their major science background and broaden their professional abilities. The program of study is tailored by advance consultation between the student and the director of graduate studies for the bioinformatics minor. All courses taken to fulfill minor requirements must be graded A-F.

**Prerequisites for Admission**—Admission to a master’s or doctoral degree-granting program within the Graduate School and preparation of a minor program of coursework approved by the director of graduate studies in bioinformatics is required. Potential programs must be discussed with the director of graduate studies.

**Courses**—Courses are taken from a designated course list available online at [www.binf.umn.edu/courses/index.php](http://www.binf.umn.edu/courses/index.php).

**Use of 4xxx Courses**—BIOL 4003—Genetics and CSCI 4707—Practice of Database Systems are the only 4xxx courses that may be included on degree program forms.

**Minor Only Requirements**

The master’s and doctoral minors are developed in consultation with, and must be approved in advance by, the director of graduate studies for bioinformatics. The master’s minor requires at least 9 credits, including CSCI 5481—Computational Techniques for Genomics, one of several genomics or sequence analysis courses, and a third designated course. Other courses may be substituted upon the recommendation of the director of graduate studies.

The doctoral minor requires at least 15 credits, including the master’s courses, one of several courses in statistical genomics, and an elective. Other courses may be substituted upon the recommendation of the director of graduate studies.

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### Biological Science

**Contact Information**—Master of Biological Science, Professional Program, College of Biological Sciences, 123 Snyder Hall, 1475 Gortner Avenue, St. Paul, MN 55108 (612-625-3133; fax 612-624-2785; biolink@bios.umn.edu; [www.bios.umn.edu/biolink/mbs/](http://www.bios.umn.edu/biolink/mbs/)).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Professor**

Karen Ashe, AM2

Henry H. Balfour, Jr., Laboratory Medicine and Pathology, AM2

Jay Bell, Soil, Water, and Climate, AM2

Judith G. Berman, Molecular, Cellular, Developmental Biology and Genetics, M2

David A. Bernlohr, Biochemistry, Molecular Biology, and Biophysics, M2

Gregory Jose Bellman, Surgery, AM2

Linda J. Brady, Food Science and Nutrition, AM2

Robert M. Brambl, Plant Biology, M2

Paul P. Cleary, Microbiology, AM2

Gary M. Dunny, Microbiology, AM2

Leonard C. Ferrington, Entomology, AM2

James A. Fuchs, Biochemistry, Molecular Biology, and Biophysics, M2

Susan M. Galatowitsch, Horticultural Science, AM2

Daniel D. Gallaher, Food Science and Nutrition, AM

Marc A. Hillmeyr, Chemistry, AM2

Ralph W. Holzenthal, Entomology, AM2

Paul A. Iaizzo, Surgery, AM2

Stephen Jameson, Laboratory Medicine and Pathology, AM2

Ronald R. Jemmerson, Microbiology, AM2

Ross G. Johnson, Molecular, Cellular, Developmental Biology and Genetics, AM2

Romas J. Kazlauskas, M2

John H. Kersey, Laboratory Medicine and Pathology, AM2

Youngki Kim, Pediatrics, AM2

Richard King, Pediatrics, AM2

Nevil Dale Young, Plant Pathology, M2

Arkady Khodursky, Biochemistry, Molecular Biology, and Biophysics, M

Gary M. Dunny, Microbiology, AM2
Degree Programs and Faculty

Mindy S. Kurzer, Food Science and Nutrition, AM2
Jack L. Lewis, Orthopedic Surgery, AM2
Paul T. Magee, Microbiology, M2
Michael Mauer, Pediatrics, M2
Gary L. Nelesen, Biochemistry, Molecular Biology, and Biophysics, AM2
Harry T. Orr, Laboratory Medicine and Pathology, M2
Lisa A. Peterson, Environmental Health Sciences, AM2
Laura P. W. Ranum, Genetics, Cell Biology, and Development, M2
Gary A. Reineccius, Food Science and Nutrition, AM2
Michael J. Sadowsky, Soil, Water, and Climate, AM2
Leslie A. Schiff, Microbiology, AM2
Patrick M. Schliefert, Microbiology, AM2
Michael J. Simmons, Molecular, Cellular, Developmental Biology and Genetics, M2
Donald B. Siniff, Ecology, Evolution, Behavior, ASM
Joanne L. Slavin, Food Science and Nutrition, AM2
D. Peter Snustad, Plant Biology, M2
George R. Spangler, Fisheries, Wildlife, and Conservation Biology, AM2
Clifford J. Steer, Medicine, SM
David Thomas, Biochemistry, Molecular Biology, and Biophysics, M2
Howard Towe, Biochemistry, Molecular Biology, and Biophysics, M2
Daniel A. Vailera, Therapeutic Radiology, AM2
Brian G. Van Ness, Laboratory Medicine and Pathology, M2
Lawrence P. Wackett, BioTechnology Institute, M2
Chester B. Whitley, Pediatrics, AM2

Adjunct Professor
Bruce Vondracek, Fisheries, Wildlife, and Conservation Biology, AM2
Vivian J. Bardwell, Genetics, Cell Biology, and Development, M2
Richard W. Bianco, Surgery, AM2
Wei Chen, Pediatrics, AM2
Kathleen F. Conklin, M2
Joellen Feirtag, Food Science and Nutrition, AM2
Craig A. Hassel, Food Science and Nutrition, AM2
Stephen A. Katz, AM2
David A. Largaespada, Genetics, Cell Biology, and Development, AM2
Christopher A. Pennell, Laboratory Medicine and Pathology, AM2
Mark S. Rutherford, AM2
Daniel A. Saltzman, AM2
Peter Southern, AM2
John M. Ward, M2

Adjunct Associate Professor
Frank H. Burton, Pharmacology, AM2
David C. Fulton, Fisheries, Wildlife, and Conservation Biology, AM2
Robert C. Venette, AM2

Assistant Professor
Vincent A. Barnett, Physiology, AM2
Daniel R. Bondbaum, AM2
Cheryl A. Gale, Pediatrics, AM2
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, AM2
Anna Petryk, Pediatrics, AM2
Nikunj V. Somia, AM2

Adjunct Assistant Professor
Nicole Kirchhof, Surgery, AM2

Research Associate
Kevin A. Silverstein, Plant Biology, M2

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

Curriculum—A 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. It is a multicollege, cooperative degree program among the Colleges of Biological Sciences; Veterinary Medicine; and Food, Agricultural and Natural Resource Sciences. The program is administered by the College of Biological Sciences and the degree is conferred by the Graduate School.

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.

Courses—Please contact the program office for information on relevant coursework.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.B.S. Coursework Only Degree Requirements

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 8 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 curriculum in the participating colleges, 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 I’s are completed.

Language Requirements—None.

Final Exam—A capstone project is required.

Biomedical Engineering

Contact Information—Department of Biomedical Engineering, University of Minnesota, 7-105 BSBE, 312 Church Street S.E., Minneapolis, MN 55455 (612-624-8396; fax 612-626-6583; bmeeng@umn.edu; www.umn.edu/bme)

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
Robert P. Hebel, Medicine, SM

Professor
James Ashe, Neuroscience, SM
Robert J. Bache, Medicine, SM
Joan E. Bechtold, Orthopaedic Surgery, M2
David G. Benditt, Medicine, SM
John C. Bischof, Mechanical Engineering, SM
Frank B. Cerra, Surgery, SM
Wei Chen, Radiology, SM
Jay N. Cohn, Medicine, SM
William K. Durfee, Mechanical Engineering, SM
Timothy J. Ebner, Neuroscience, SM
Arthur G. Erdman, Mechanical Engineering, SM
Stanley M. Finkelstein, Laboratory Medicine and Pathology, SM
Martha Flanders, Neuroscience, SM
John E. Foker, Surgery, SM
Lorraine F. Francis, Chemical Engineering and Materials Science, SM
Michael G. Garwood, Radiology, M2
Bruce E. Hammer, Radiology, SM
Ramesh Harjani, Electrical and Computer Engineering, M2
Bin He, Biomedical Engineering, SM
Goran Hellekant, Physiology and Pharmacology, M2
Duluth, SM
Wei-Shou Hu, Chemical Engineering and Materials Science, SM
Paul A. Isaizzo, Anesthesiology, SM
Kenneth H. Keller, Public Affairs, SM
Robert LaPrade, Orthopaedic Surgery, M
Paul C. Letourneau, Cell Biology and Neuroanatomy, SM
David G. Levitt, Physiology, SM
Jack L. Lewis, Orthopaedic Surgery, SM
Keith G. Lurie, Medicine, M2
James B. McCarthy, Laboratory Medicine and Pathology, SM
Jeffrey McCullough, Laboratory Medicine and Pathology, M2
David J. Odde, SM
Robert P. Patterson, Physical Medicine and Rehabilitation, SM
Dennis L. Polla, SM
Richard E. Poppele, Neuroscience, SM (emeritus)
Rajesh Rajaman, Mechanical Engineering, SM
Ronald A. Siegel, Pharmacuetics, SM
Ephraim M. Sparrow, Mechanical Engineering, SM
Doris Taylor, Physiology, SM  
Gerald Timm, Urological Surgery, ASM  
Robert T. Tranquillo, Biomedical Engineering, SM  
Charles L. Truwit, Neurology, M2  
Kamil Ugurbil, Radiology, SM  
J. Thomas Vaughan, Radiology, SM  
Neal F. Viemeister, Psychology, SM  
Timothy S. Wiedmann, Pharmaceutics, SM  
Robert F. Wilson, Medicine, M2  
Jay Zhang, Medicine, SM

**Associate Professor**  
Jerome H. Abrams, Surgery, SM  
Edgar A. Arriaga, Chemistry, SM  
Alan J. Bank, Medicine, M2  
Victor H. Barocas, Biomedical Engineering, SM  
Michael Bowser, Chemistry, SM  
Emad S. Ebbini, Electrical and Computer Engineering, SM  
William B. Gleason, Laboratory Medicine and Pathology, SM  
James E. Holte, Electrical and Computer Engineering, SM  
Allison Hubel, Laboratory Medicine and Pathology, SM  
Paula Ludewig, Physical Med/Rehabilitation, M  
Tom Novacheck, Orthopaedic Surgery, AM  
A. David Redish, Neuroscience, M2  
Kenneth P. Roberts, Urologic Surgery, SM  
Sang-Hyun Oh, Electrical and Computer Engineering, SM  
Taner Akkin, Biomedical Engineering, SM  
Euisik Yoon, Electrical and Computer Engineering, SM  
Klearchos K. Papas, Surgery, SM  
Michel Garwood, Radiology, SM  
Kamil Ugurbil, Radiology, SM  
Charles L. Truwit, Neurology, M2  
Robert T. Tranquillo, Biomedical Engineering, SM

**Assistant Professor**  
Taner Akkin, Biomedical Engineering, SM  
Alpettekin Aksan, Mechanical Engineering, M2  
Michel Cramer-Bornemann, M.D., Neurology, AM2  
Geoffrey M. Ghose, Neuroscience, M2  
Susanta K. Hui, Therapeutic Radiology, M  
Efrosini Irinokaki, Chemical Engineering and Materials Science, M  
Tay Netoff, Biomedical Engineering, SM  
Sang-Hyun Oh, Electrical and Computer Engineering, SM  
Klearchos K. Papas, Surgery, SM  
Osha Roopnarine, Biochemistry, Molecular Biology, and Biophysics, SM  
Jonathan N. Sachs, Biomedical Engineering, SM  
Wei Shen, Biomedical Engineering, SM  
Chun Wang, Biomedical Engineering, SM

**Adjunct Assistant Professor**  
Carl S. Smith, Urologic Surgery, M2  
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

**Curriculum**—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.

**Prerequisites for Admission**—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.

**Special Application Requirements**—Three letters of recommendation and GRE scores are required of all applicants. For international students, the preferred performance minimum for the TOEFL is 575 (paper), 230 (computer), or 89 (Internet).

**Courses**—Refer to Biomedical Engineering (BMEN) in the course section of this catalog for courses pertaining to the program.

**Use of 4XXX Courses**—No more than 3 credits of 4xxx courses may be included. These courses require approval of the adviser and director of graduate studies.

**M.S. Degree Requirements**  
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 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.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—The master’s minor requires at least 6 course credits, including one BMEN core course (5001, 5101, 5201, 5311, 5351or 5401), and one other BMEN course at 5xxx or higher.

**Ph.D. Degree Requirements**  
The Ph.D. program requires coursework in mathematics, biology, biomedical engineering, and relevant areas of science and engineering (typically 40 credits, including those satisfying a minor field or supporting program), a written preliminary exam, an oral preliminary exam, a dissertation, and a final oral exam.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—The doctoral minor requires at least 12 credits, including one BMEN core course (5001, 5101, 5201, 5311, 5351or 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.

**Biophysical Sciences and Medical Physics**

**Contact Information**—Biophysical Sciences and Medical Physics Program, Department of Radiology, University of Minnesota, MMC 292, Room B272 Mayo Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-6638; hanse032@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

**Professor**  
Victor A. Bloomfield, Biochemistry, Molecular Biology, and Biophysics, SM  
Bianca M. Conti-Fine, Biochemistry, Molecular Biology, and Biophysics, SM  
Ralph DeLong, Oral Sciences, M2  
Stanley M. Finkelstein, Laboratory Medicine and Pathology, SM  
John E. Foker, Surgery, SM  
Michael G. Garwood, Radiology, SM  
Bruce J. Gerbi, Therapeutic Radiology, SM  
Rolf Gruetter, Radiology, SM  
Alan J. Bank, Medicine, M2  
Michael H. Schwartz, Orthopaedic Surgery, SM  
Euisik Yoon, Electrical and Computer Engineering, SM  
Parham Alaei, Therapeutic Radiology, M2  
David D. Thomas, Biochemistry, Molecular Biology, and Biophysics, SM  
Kamil Ugurbil, Radiology, SM  
Robert H. Margolis, Otolaryngology, SM  
Scott M. O’Grady, Animal Science, SM  
Richard P. Patterson, Physical Medicine and Rehabilitation, SM  
Richard E. Poppele (emeritus), Neuroscience, SM  
E. Russell Ritenour, Radiology, SM  
Chang W. Song, Therapeutic Radiology, SM  
David Thomas, Biochemistry, Molecular Biology, and Biophysics, SM  
Warren J. Warwick, Pediatrics, SM

**Associate Professor**  
Alan J. Bank, Medicine, M2  
Nelson Christensen, Radiology, AM2  
James E. Holte, Electrical Engineering, SM  
Michael Jerosch-Herold, Radiology, M2  
Richard A. Geise, Radiology, ASM  
Robert H. Margolis, Otolaryngology, SM  
Daniel A. Valleria, Therapeutic Radiology, M2  
Warren J. Warwick, Pediatrics, M2

**Adjunct Associate Professor**  
Richard A. Geise, Radiology, ASM  
Parham Alaei, Therapeutic Radiology, M2  
Vincent A. Barnett, Physiology, M2  
Susanta K. Hui, Therapeutic Radiology, M2  
Dae-Shik Kim, Radiology, AM2  
Osha Roopnarine, Biochemistry, Molecular Biology, and Biophysics, M2  
Essa S. Yacoub, Radiology, M2  
Jie Zhang, Radiology, M2  
Richard S. Ziegler, Pediatrics, M2

**Senior Research Associate**  
David H. Live, Biochemistry, Molecular Biology, and Biophysics, M2

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

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.

Courses—Refer to Biophysical Sciences (BPHY) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements

The M.S. is offered under two plans: Plan A, (with thesis), and Plan B, (without a thesis). 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—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. At least 6 credits of BPHY courses are required.

Ph.D. Degree Requirements

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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.

Biostatistics

Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax 612-626-6931; spb-ssc@umn.edu (www.sph.umn.edu) or www.biostat.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Bradley P. Carlin, SM
John E. Connett, SM
Chap T. Le, SM
James D. Neaton, SM
Wei Pan, SM

Associate Professor

Sudipto Banerjee, SM
Lynn E. Eberly, SM
Patricia M. Grambsch, SM
Birgit Grund, ASM
Timothy E. Hanson, SM
James S. Hodges, SM
Andrew Magginli, M2
Cavan S. Reilly, SM
William Thomas, M2
Melanie M. Wall, SM

Assistant Professor

Saonli Basu, M2
Tracy L. Bergemann, M2
Susan Duval, M2
Hongfei Guo, M2
Na Li, M2
Xianghua Luo, M2
Baolin Wu, M2

Adjunct Assistant Professor

Judith A. Punyk0, AM2

Research Associate

Katherine Huppler Hullsiek, M2
Robert E. Leduc, M2

Other

Daniel J. Sargent, AM2

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

For application procedures, see the School of Public Health Web site at www.sph.umn.edu/students/application/home.html.

Curriculum—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.

Prerequisites for Admission—For the M.S., multivariable calculus and linear algebra, an introductory course in applied statistics, and programming in C, Fortran, or other high-level programming language are required. For the Ph.D., a bachelor’s or master’s degree in mathematics, statistics, or biostatistics.

Three letters of recommendation and the GRE are required. Applicants should have an overall GPA of 3.10. Applicants to the M.S. program should have a GPA of 3.40 in quantitative courses, 450 on the verbal GRE, and 550 on the quantitative and analytical GRE. Applicants to the Ph.D. program should have a GPA of 3.70 in quantitative courses, 550 on the verbal GRE, and 650 on the quantitative and analytical GRE. Applicants to either program who are not native speakers of English should have a TOEFL score of 600 (paper), 250 (computer), or 100 (Internet), or a score of 7.0 on IELTS.

Special Application Requirements—Students should apply for admission during fall semester only. New students generally are not admitted in spring semester.

Courses—Refer to Public Health (PUBH), where most biostatistics courses are numbered 64xx, 74xx, or 84xx, or online at http://onestop2.umn.edu/courses/index.html.

Use of 4xxx Courses—No 4xxx courses may be used to satisfy any graduate degree program requirements in biostatistics.

M.S. Degree Requirements

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 in the Student Handbook at www.biostat.umn.edu. 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.  

**Language Requirements**—None.  

**Final Exam**—The final exam is oral.  

**Minor Requirements for Students Majoring in Other Fields**—The master’s minor in biostatistics requires two courses from the following list: PUBH 7420, 7430, 7435, 7440, 7445, 7450. Details for minor requirements at www.biostat.umn.edu.  

**Ph.D. Degree Requirements**  
The Ph.D. program requires five core courses (including mathematical statistics, linear models, probability models, and Bayesian methodology) and four 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.  

**Language Requirements**—None.  

**Minor Requirements for Students Majoring in Other Fields**—A doctoral minor for students majoring in statistics consists of two required courses: either PUBH 7405, 7406, or PUBH 7400 Fundamentals of Biostatistical Inference, PUBH 7400 Biostatistical Modeling and Methods and two courses from the following: PUBH 7407, 7420, 7430, 7435, 7440, 7445, 7450. Details for minor requirements at www.biostat.umn.edu.  

**Biosystems and Agricultural Engineering**  

**Contact Information**—Director of Graduate Studies, Department of Bioproducts and Biosystems Engineering, University of Minnesota, 1390 Eckles Avenue, St. Paul, MN 55108-6005 (612-625-7733; fax 612-624-3005; bbe@umn.edu. For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.  

**Professor**  
Miral Bhattacharya, SM  
Charles J. Clanton, SM  
Forrest T. Izuno, SM  
Larry D. Jacobson, SM  
Kevin A. Janni, SM  
Theodore P. Labuza, Food Science and Nutrition, SM  
R. Vance Morey, SM  
John L. Nieber, SM  
Rongsheng R. Ruan, SM  
John M. Shatske, SM  
William F. Wilecke, SM  
Bruce N. Wilson, SM  

**Associate Professor**  
James J. Boedicker, M2  
Jonathan Chaplin, SM  
Philip R. Goodrich, SM  
Gary R. Sands, SM  
Ulrike W. Tschirner, SM  
Ping Wang, SM  
Jun Zhu, SM  

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

**Note:** The biosystems and agricultural engineering program will change its name in 2007 and admit students for fall 2008 under its new name. At the time this catalog was published, the new name had not been finalized.  

**Curriculum**—Areas of emphasis include focusing on bioprocessing and food topics such as, renewable energy, biofuels, bioproducts, bioprocessing, biorefining, food engineering, packaged food shelf life extension, and grain quality; environment topics such as water quality, surface and subsurface flow, contaminant transport, animal environment and air quality, waste and manure management, and resource utilization; and machinery systems design topics such as precision agriculture, biosensors, urban land care, BSE (bovine spongiform encephalopathy, or “mad cow disease”) and slaughter equipment, and safety engineering. Programs usually include study in at least one other engineering discipline as well as study or research in a biological or agricultural discipline. Students have flexibility in planning individualized programs to support their research interests, and courses from other disciplines may be included for credit in the major area.  

The program offers the following degrees: M.B.A.E., M.S.B.A.E. Plan A or Plan B, and Ph.D.  
The master of biosystems and agricultural engineering (M.B.A.E.) is primarily a design-oriented professional degree intended for students who are already employed in engineering design positions, but the degree is also open to students who are not currently employed and students may select a coursework only option. The M.B.A.E. is normally considered to be a terminal degree; students who think they might pursue a Ph.D. would usually take the M.S., Plan A.  
Graduate education in biosystems and agricultural engineering develops a strong foundation in engineering principles that are applied to problems in biological and agricultural systems. The master of science in biosystems and agricultural engineering (M.S.B.A.E.) degree is for students with a bachelor’s degree in a biological, biosystems, agricultural, or related engineering field. Emphases are outlined above. Programs usually include study in at least one other engineering discipline as well as study or research in a biological or agricultural discipline. Students can select a Plan A, or thesis program, or Plan B without a thesis.  
The Ph.D. degree is for students with exceptional research and problem-solving capabilities. It should build upon a strong undergraduate program in engineering, biology, and agricultural systems, and progress in rigor to prepare the student to research advanced biosystems and agricultural engineering problems. Emphases are outlined above. Programs usually include study in at least one other engineering discipline as well as study or research in a biological or agricultural discipline.  

**Prerequisites for Admission**—Students having lower grade point averages or having non-engineering degrees may be admitted subject to conditions agreed upon by the adviser and the Biosystems and Agricultural Engineering Graduate Program Committee.  

**Special Application Requirements**—The GRE is not required, but GRE scores are highly recommended for students who do not have engineering degrees, have degrees from institutions outside the United States, or have a low GPA. Students are admitted each semester.  

**Courses**—Refer to Bioproducts and Biosystems Engineering (BBE) in the course section of this catalog for courses pertaining to the program.  

**Use of 4xxx Courses**—Degree programs are expected to include mostly 5xx and 8xxx courses. If the program contains more than three 4xxx courses in the M.S. program, or more than two 4xxx courses beyond the courses taken for the master’s degree in the doctoral program, students and their advisers are asked to include a letter of explanation when the degree program is submitted for approval.
M.B.A.E Degree Requirements

Students are required to complete a minimum of 14 course credits in the major field, 6 course credits in a related field or a minor, and a design project of a minimum of 10 credits. The design project is expected to be of professional caliber. As an alternative, students may opt for a coursework (30 credits) only program. The coursework program must be approved by the biosystems and agricultural engineering director of graduate studies and the chair of the graduate program committee.

Language Requirements—None.

Final Exam—Students must present a seminar and pass a final oral exam. Students must also meet all Graduate School requirements regarding the final exam.

Minor Requirements for Students

Majoring in Other Fields—A minor consists of at least 6 credits of BBE courses numbered 4xxx or higher.

M.S.B.A.E. Degree Requirements

The M.S.B.A.E. may be completed as either a Plan A (thesis) or Plan B (project). Plan A students must complete a minimum of 14 course credits in the major field, 6 course credits in a related field or a minor, and 10 thesis credits. Plan B students must complete a minimum of 14 course credits in the major field, 6 course credits in a related field or a minor, 10 other credits, and at least one Plan B project. All coursework programs must be approved by the biosystems and agricultural engineering director of graduate studies and the chair of the graduate program committee.

Language Requirements—None.

Final Exam—Students must present a seminar and pass a final oral exam. Students must also meet all Graduate School requirements regarding the final exam.

Minor Requirements for Students

Majoring in Other Fields—A minor consists of at least 6 credits of BBE courses numbered 4xxx or higher.

Ph.D. Degree Requirements

This degree is intended to move students to the cutting edge of research in their subject matter area. Students develop skills that enable them to define problems or research questions, plan research, conduct research and/or lead research efforts, analyze data, and 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. 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.

Language Requirements—None.

M.B.A.E Degree Requirements

Students are required to complete a minimum of 14 course credits in the major field, 6 course credits in a related field or a minor, and a design project of a minimum of 10 credits. The design project is expected to be of professional caliber. As an alternative, students may opt for a coursework (30 credits) only program. The coursework program must be approved by the biosystems and agricultural engineering director of graduate studies and the chair of the graduate program committee.

Language Requirements—None.

Final Exam—Students must pass preliminary written and oral exams, write a dissertation, and pass a final oral exam. Students must also meet all Graduate School requirements regarding the final exam.

Minor Requirements for Students

Majoring in Other Fields—A minor consists of at least 12 credits of BBE courses numbered 4xxx or higher.

Business Administration

Contact Information—Ph.D. Program in Business Administration, Carlson School of Management, Suite 4-201, 321 19th Avenue S., University of Minnesota, Minneapolis, MN 55455 (612-624-0875 or 612-624-5065; fax 612-624-8221). http://grad.umn.edu/faculty_rosters/faculty.htm

Master of Business Administration—Graduate School students who wish to take MBA courses must contact the Carlson School of Management MBA Office, 2-210 Carlson School of Management, Minneapolis, MN 55455 (612-625-5555; fax 612-626-7785).

For latest graduate faculty listings, see http://www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

Carl R. Adams, Information and Decision Sciences, SM
Gordon J. Alexander, Finance, SM
John C. Anderson, Operations and Management Science, SM
Frederick J. Beier, Marketing and Logistics Management, SM
Mark E. Bergen, Marketing and Logistics Management, SM
Norman E. Bowie, Strategic Management and Organization, SM
John H. Boyd, Finance, SM
Philip Bromiley, Strategic Management and Organization, SM
John M. Bryson, Public Affairs, Strategic Management and Organization, AM2
Rajesh Chandy, Marketing and Logistics Management, SM
Norman L. Chervany, Information and Decision Sciences, SM
Shawn P. Curley, Information and Decision Sciences, SM
Gordon B. Davis, Information and Decision Sciences, (emeritus), ASM
John W. Dickhaut, Accounting, SM
W. Bruce Erickson, Strategic Management and Organization, SM
Murray Z. Frank, Finance, SM
Frank B. Gigler, Accounting, SM
Alok Gupta, Information and Decision Sciences, SM
Arthur V. Hill, Operations and Management Science, SM
Thomas R. Hoffman, (emeritus), Information and Decision Sciences, SM
Michael J. Houston, Marketing and Logistics Management, SM
Deborah R. John, Marketing and Logistics Management, SM
George John, Marketing and Logistics Management, SM
Paul E. Johnson, Information and Decision Sciences, SM
Edward J. Joyce, Accounting, SM
Chandra S. Kanodia, Accounting, SM
John H. Kareken (emeritus), Finance, ASM
Robert J. Kauffman, Information and Decision Sciences, SM
Ross Levine, Finance, SM
Barbara J. Loken, Marketing and Logistics Management, SM
Erzo Luttmann, Economics, Finance, ASM
Ian H. Maitland, Strategic Management and Organization, SM
Alfred A. Marcus, Strategic Management and Organization, SM
Joan Meyers-Levy, Marketing and Logistics Management, SM
Christopher J. Nachtegelm, Operations and Management Science, SM
Timothy J. Nantell, Finance, SM
Mary L. Nichols, Strategic Management and Organization, SM
Akhay R. Rao, Marketing and Logistics Management, SM
Judy Rayburn, Accounting, SM
Kenneth J. Roering, Marketing and Logistics Management, SM
Robert W. Ruekert, Marketing and Logistics Management, SM
Harry J. Sapienza, Strategic Management and Organization, SM
Roger G. Schroeder, Operations and Management Science, SM
Myles Shaver, Strategic Management and Organization, SM
Kingshuk K. Sinha, Operations and Management Science, SM
Andrew H. Van de Ven, Strategic Management and Organization, SM
Jan Werner, Economics, Finance, ASM
Andrew F. Whitman, Human Resources and Industrial Relations, ASM
Andrew Winton, Finance, SM
Akbar Zahir, Strategic Management and Organization, SM
Srilata Zaheer, Strategic Management and Organization, SM
Mahmood A. Zaidi, Human Resources and Industrial Relations, ASM

Associate Professor

Gediminas Adomavicius, Information and Decision Sciences, M2
Rajesh K. Aggarwal, Finance, SM
Rohini Ahluwalia, Strategic Management and Logistics Management, SM
Stuart Albert, Strategic Management and Organization, SM
Karen L. Donohue, Operations and Management Science, SM
Gordon L. Duke, Accounting, SM
Gordon C. Everest, Information and Decision Sciences, SM
Robert Goldstein, Finance, SM
Susan Meyer Goldstein, Operations and Management Science, SM
Robert A. Hansen, Marketing and Logistics Management, SM
William Li, Operations and Management Science, SM
Degree Programs and Faculty

Kevin Linderman, Operations and Management Science, M2
Thomas P. Murtha, Strategic Management and Organization, SM
Om Narasimhan, Marketing and Logistics Management, M2
J. David Naumann, Information and Decision Sciences, SM
Stephen T. Parente, Finance, SM
Paul E. M. Powel, Finance, M2
Manus J. Rungtusanatham, Operations and Management Science, SM
Priti P. Shah, Strategic Management and Organization, SM
Pervin Shroff, Accounting, SM
Rajdeep Singh, Finance, SM
Mani R. Subramani, Information and Decision Sciences, SM
Mary E. Zellmer-Bruhn, Strategic Management and Organization, SM

Assistant Professor
Frederico Belo, Finance, M2
Luca Benzoni, Finance, M2
Tony H. Cui, Marketing and Logistics Management, M2
Michael DeVaughn, Strategic Management and Organization, M2
Yan Dong, Marketing and Logistics Management, M2
Jane E. Ebert, Marketing and Logistics Management, M2
Daniel Forbes, Strategic Management and Organization, M2
Jeremy Graveline, Finance, M2
Thomas Issaevitch, Accounting, M2
Arik Lifschitz, Strategic Management and Organization, M2
Selin A. Malkoc, Marketing and Logistics Management, M2
Felix Meschke, Finance, M2
Prokriti Mukherji, Marketing and Logistics Management, M2
Frederick J. Riggins, Information and Decision Sciences, M2
Rachna Shah, Operations and Management Science, M2
Rangopal Venkataraman, Accounting, M2
Kathleen D. Voll, Marketing and Logistics Management, M2
Yue T. Wang, Finance, M2
Weidong Xia, Information and Decision Sciences, M2
Ivy Zhang, Accounting, M2

Lecturer
Maria Carkovic, AM2
Gary W. Carter, AM2
James M. Gahlon, AM2
Frederick R. Jacobs, AM2
Thomas D. Legg, AM2
Terry Tranter, AM2

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

Curriculum—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 and logistics management; operations and management science; and strategic management and organization (covering the subfields of strategy, organization behavior, entrepreneurship and business-government-society, all of which include an international focus).

Prerequisites for Admission—Applicants must have completed a four-year undergraduate degree in any field of study. Admission depends on the applicants grades, test scores (GMAT or GRE), and strength of the letters of recommendation and statement of purpose.

Special Application Requirements—Applicants must submit a copy of the Graduate School application, GMAT or GRE scores taken no more than five years prior to application, TOEFL or IELTS scores (international applicants), three letters of recommendation, complete official transcripts from each college or university attended, and a clearly written statement of purpose. These materials are to be sent directly to the program office to ensure proper processing. Graduate study begins in fall semester only. Application deadline is December 31 each year for fall admission consideration. Applications are evaluated on a rolling basis beginning late January and continuing through March.

Courses—Refer to Accounting (ACCT); Business Administration (BA); Finance (FINA); Information and Decision Sciences (IDSC); Insurance and Risk Management (INS); Logistics Management (LM); Management (MGMT); Marketing (MKTG); and Operations and Management Science (OMS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to the approval of the adviser and director of graduate studies.

Ph.D. Degree Requirements

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.

Accounting—This area of concentration requires a minimum of 12 credits from accounting Ph.D. seminars. In addition, students 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 relevant fields (minimum of two courses from any one area). Students are expected to supplement these required credits with coursework in fields related to their research interests, e.g., finance, economics, statistics, or psychology. There is no minimum requirement.

Finance—Students must take all finance Ph.D. seminars, plus supporting and methodology coursework. Supporting coursework typically consists of a doctoral level sequence in microeconomic theory and econometric analysis. In addition, students should complete a minimum of 8 additional elective credits in economics, statistics, accounting, or a related field.

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 8801 sections 1 and 2. Research methods courses that students can take include regression, experimental design, multivariate statistics, and econometric modeling.

Marketing and Logistics Management—The department requires students to take its five seminars (20 credits total) 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).

Operations and Management Science—Students must complete 6 OMS Ph.D. seminars (OMS 8651, 8652, 8711, 8721, 8735, and 8745). Students supplement this with at least 16 credits from outside the department for a minor or supporting program, plus methodology coursework in math or statistics. The department also recommends that students take MGMT 8302—Seminar in Organization Theory and one course in linear programming.

Strategic Management and Organization—Students are required to take at least five core MGMT Ph.D. seminars (20 credits), which must include one course from each of three areas (strategic, organization studies, ethics-international management-entrepreneurship), plus all remaining Ph.D. seminars in the student’s area of specialization (strategy, organization studies). Alternatively, students may choose to combine two areas as their major area of concentration (e.g., strategy/international management, organization studies/entrepreneurship). It is highly recommended that students take the department’s theory building seminar. As part of the supporting field requirement (16 credits), 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).

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—For a doctoral minor, students must complete a cohesive program of at least 16 credits (at least four courses) of graduate work in one of the six areas of concentration. This program of study is developed in consultation with an adviser who is a full member of the graduate faculty in business administration.

**Business Taxation**

**Contact Information**—Master of Business Taxation Degree Program, Department of Accounting, University of Minnesota, 3-108 Carlson School of Management, Minneapolis, MN 55455 (612-624-7511; fax 612-626-7795; hbst@csom.umn.edu; www.carlsonschool.umn.edu/mbst). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Professor**
W. Bruce Erickson, Strategic Management and Organization, M2

**Lecturer**
Charles Caliendo, M2
Gary W. Carter, M2
Paul G. Gutterman, M2
Frederick R. Jacobs, M2
Mark Sellner, M2

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

**Curriculum**—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.

**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.

**Courses**—Refer to Accounting (ACCT); Finance (FINA); Information and Decision Sciences (IDSC); Insurance (INS); Logistics Management (LM); Management (MGMT); Marketing (MKTG); Master of Business Taxation (MBT); and Operations and Management Science (OMS) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.B.T. Plan B Degree Requirements**
The M.B.T. requires 30 credits, including 6 credits in specified courses dealing with accounting and business and economic tax policy, 10 credits in specified tax courses, and 14 credits of elective tax courses. All students must have completed coursework in finance, marketing, accounting, economics, statistics, management, business law, operations management, information and decision sciences, and strategic management. Although not prerequisites for admission to the M.B.T. program, these courses must be completed before the degree is granted. They can be taken concurrently with M.B.T. program courses. Usually students who enter the program with business degrees have completed most, if not all, of this coursework.

**Language Requirements**—None.

**Cell and Developmental Biology**

See Molecular, Cellular, Developmental Biology and Genetics.

**Cellular and Integrative Physiology**

**Contact Information**—Cellular and Integrative Physiology Program, Department of Integrative Biology and Physiology, University of Minnesota, 6-125 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-9178; fax 612-625-5149; physio@umn.edu; http://physiology.med.umn.edu/grad/ge_idx.htm). Additional information concerning the Duluth campus (master’s program) is available by contacting the Associate Director of Graduate Studies, Department of Physiology and Pharmacology, University of Minnesota, 308 & 345 School of Medicine, 1035 University Drive, Duluth, MN 55812 (218-726-7934; cbsh@umn.edu; www.catalogs.umn.edu/umd/colleges/146.html).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Regents Professor**
Robert P. Hebbel, Medicine, ASM

**Professor**
Mustafa N. Al’Absi, Medical School Duluth, AM2
David A. Bernlohr, Biochemistry, Molecular Biology, and Biophysics, ASM
Peter G. Bitterman, Medicine, ASM
Frank B. Cerra, Surgery, AM
William C. Engeland, Surgery, AM
John E. Foker, Surgery, AM
Goran B. Hellekant, Medical School Duluth, SM
Lois J. Heller, Medical School Duluth, SM
Paul A. Izazgo, Surgery, SM
David H. Ingbar, Medicine, SM
Arthur S. Leon, Kinesiology, ASM
David G. Levitt, Integrative Biology and Physiology, SM
Walter C. Low, Neurosurgery, SM
Scott M. O’Grady, Animal Science, SM
John W. Osborn, Integrative Biology and Physiology, SM
Doris A. Taylor, Integrative Biology and Physiology, SM
Gerald W. Tinn, Urologic Surgery, ASM
O. Douglas Wangensteen, Integrative Biology and Physiology, SM
Jianyi Zhang, Medicine, ASM

**Adjunct Professor**
Victor S. Koscheyev, SM

**Associate Professor**
W. Dale Branton, Neuroscience, ASM
Janet L. Fizakeryler, Medical School Duluth, M2
Jurgen F. Fohlmeister, Integrative Biology and Physiology, SM
Stephen A. Katz, Integrative Biology and Physiology, SM
David E. Mohrman, Medical School Duluth, M2
Edward K. Stauffer, Medical School Duluth, M2
LaDora V. Thompson, Physical Medicine and Rehabilitation, SM
Lorenz E. Wittmers, Jr, Medical School Duluth, SM
Kathleen R. Zahs, Integrative Biology and Physiology, M2

**Assistant Professor**
Vincent A. Barnett, Integrative Biology and Physiology, M2
Glenn H. Nordehn, Medical School Duluth, AM2
Anthony J. Weinhaus, Integrative Biology and Physiology, M2

**Lecturer**
Lisa Carney Anderson, Integrative Biology and Physiology, AM

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

**Curriculum**—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
Degree Programs and Faculty

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.

Areas of specialization include cardiovascular, respiratory, membrane and transport processes, cell physiology, and to a limited extent, exercise, gastrointestinal physiology, and endocrinology.

Students enter the M.S. program from one of two sites. On the Duluth campus, students may enroll in coursework and participate in research in several basic areas. Students may pursue studies in muscle, cardiovascular, respiratory, and endocrine physiology, as well as in membrane transport, temperature regulation, and several areas of neuroscience.

In addition, the Twin Cities campus has a special masters program that focuses on training people working in various biotechnology, biomedical, and bioengineering companies in the Twin Cities area. Such individuals working on relevant physiological projects may benefit from this formal training. The curriculum can be blended into a part-time graduate program, allowing continued employment while working for the M.S. degree.

Students enter the Ph.D. program only from the Twin Cities campus: although a Ph.D. may be pursued on the Duluth campus in some circumstances. Highly qualified individuals with solid quantitative backgrounds are encouraged to apply. This includes 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, as well as people already affiliated with physiology graduate faculty such as appropriate undergraduate students or others working in a graduate faculty member’s laboratory.

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.

Prerequisites for Admission—For the major, 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 M.S. and 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 or spring semester.

Courses—Refer to Physiology (PHSL) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to both adviser and director of graduate studies approval.

M.S. Degree Requirements

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—a degree for individuals involved in research and employed at local companies 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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—a minimum of 6 graduate credits in physiology is required.

Ph.D. Degree Requirements

The Ph.D. program requires courses in medical physiology and human neuroscience. No other specific courses are required, although some graduate level courses in cellular or molecular biology must be completed. The coursework is tailored to the student’s interests with input from the director of graduate studies and the adviser. During the first year, students rotate through three laboratories, pick an adviser, and begin a research project. A preliminary written exam in physiology and neuroscience is taken before the preliminary oral exam. The preliminary oral exam is given to test 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.

Language Requirements—None.

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.

Chemical Engineering and Materials 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; cemsgrad@umn.edu; www.cems.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor

Frank S. Bates, SM
H. Ted Davis, SM
Lanny D. Schmidt, SM

Professor

Eray S. Aydil, SM
Roberto Ballarini, Civil Engineering, ASM
Raul Caretta, SM
C. Barry Carter, SM
Edward L. Cussler, SM
Prodomotos Daoutidis, SM
Jeffrey J. Derby, SM
Lorraine F. Francis, SM
C. Daniel Frisbie, SM
William W. Gerberich, SM
Steven L. Girshick, Mechanical Engineering, ASM
Wayne L. Gladfelter, Chemistry, ASM
J. Woods Halley, Physics and Astronomy, ASM
Marc A. Hillmyer, Chemistry, ASM
We-Shou Hu, SM
Kenneth H. Keller, SM
David L. Kohlstedt, Geology and Geophysics, ASM
Uwe R. Kortshagen, Mechanical Engineering, ASM
Timothy P. Lodge, SM
Christopher W. Macosko, SM
Alon V. McCormick, SM
David J. Norris, SM
David J. Odde, Biomedical Engineering, ASM
Hans G. Othmer, Mathematics, ASM
Christopher J. Palmstrom, SM
David A. Shores, SM
Ronald A. Siegel, Pharmacy, ASM
J. Hja Siepmann, Chemistry ASM
William H. Smyrl, SM
Friedrich Sierens, SM
Robert T. Tranquillo, SM
Michael Tsapatsis, SM
Renata M. Wentczowick, SM

Associate Professor

Victor H. Barocas, Biomedical Engineering, ASM
Marcio D. Carvalho, ASM
Yiannis Kaznessis, SM
Satish Kumar, SM
Christopher Leighton, SM
David C. Morse, SM
Prerequisites for Admission

A bachelor’s degree in chemical engineering, materials science, metallurgy, ceramics, polymer engineering, chemistry, physics, mechanical engineering, or electrical engineering is required. Applicants may be accepted without this prerequisite, but may be required to complete additional preparatory studies prescribed by their advisor or the director of graduate studies after admission. An M.S. is not a prerequisite for admission to the Ph.D. program. Students requesting a research assistantship from the department should apply directly to the Ph.D. program. Only under special circumstances will the department admit students requesting a research assistantship to the M.S. program.

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 scores of at least 550 (paper), 220 (computer), or 83 (Internet, including 21 on writing and 19 on reading) for the TOEFL. 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.

Research Centers and Facilities, Professional Courses, and Major Collaborating Programs—A number of outstanding interdisciplinary centers supplement the department, including the National Science Foundation Materials Research Science and Engineering Center, the Nanofabrication Center, the Materials Characterization Facility, the Corrosion Research Center, the Industrial Partnership for Research in Interfacial and Materials Engineering, the Army High Performance Computing Research Center, the BioTechnology Institute, the Institute for Theoretical Physics, the Minnesota Supercomputer Institute, and the Institute for Mathematics and its Applications. Department faculty and students participate in all of these centers, creating powerful facilities and many opportunities to explore interdisciplinary research interests.

Courses—Refer to Chemical Engineering (CHEN) and Materials Science (MATS) in the course section of this catalog for courses pertaining to these programs.

Use of 4xxx Courses—Chemical engineering allows MATS 4214 to be taken for graduate credit. Materials science allows MATS 4212, 4214, 4221, 4301, and 4511 to be taken for graduate credit. All other uses of 4xxx courses must have adviser and director of graduate Studies approval.

M.Ch.E. or M.Mat.S.E. Design Project Degree Requirements

This professional masters in engineering degree is designed for employees of local industries who wish to pursue their studies on a part-time basis. It is intended to provide a fifth year of professional work and is offered under the design project track. No financial support is available from the program. The M.Ch.E. and M.Mat.S.E. are terminal degrees. Only under exceptional circumstances is a student allowed to transfer to an M.S. program.

Both degrees require a minimum of 14 course credits in the major field and a minimum of 6 credits in the minor or related fields. The 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 for an M.S. thesis, the project can contain elements that the thesis would not, such as economic considerations, design consultation, and social relevance.

Language Requirements—None. Final Exam—A final oral exam focused on the design project is required.

Minor Requirements for Students Majoring in Other Fields—Approval of the chemical engineering or materials science director of graduate studies is required for a master’s minor.

M.S.Ch.E. and M.S.Mat.S.E. Plan A Degree Requirements

The M.S.Ch.E. and M.S.Mat.S.E. are offered only under Plan A (with thesis). The degrees require a minimum of 14 course credits in the major and a minimum of 6 credits in a minor or in one or more related fields. The program normally is completed in about 18 months. Students interested in a degree without a thesis should consider the professional master’s in chemical engineering or materials science outlined above.

Many students entering these programs change to the Ph.D. program before or after completing the M.S. degree. Application for a change of status is done in consultation with the adviser and the director of graduate studies.

Language Requirements—None. Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—Approval of the chemical engineering or materials science director of graduate studies is required for a master’s minor.

Ph.D. Degree Requirements

The Ph.D. is primarily a research degree and performance that leads to a research thesis is emphasized. Supporting coursework is planned in consultation with the adviser. The Ph.D. requires a minimum of 21 course credits within the major, and 12 course credits in a minor or supporting program.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—For a minor in chemical engineering or materials science, students must successfully complete at least four of the core graduate courses in the minor program and obtain approval by the director of graduate studies.
Chemical Physics

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; inquiry@chem.umn.edu; www.chem.umn.edu/chemphys).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
H. Ted Davis, Chemical Engineering and Materials Science, SM
Lanny D. Schmidt, Chemical Engineering and Materials Science, SM
Donald G. Truhlar, Chemistry, SM

Professor
Barry C. Carter, Chemical Engineering and Materials Science, SM
Christopher J. Cramer, Chemistry, SM
Jiali Gao, Chemistry, SM
David M. Ferguson, Medicinal Chemistry, Pharmacognosy, SM
Allen M. Goldman, Physics, SM
J. Woods Halley, Physics, SM
Cheng-Cher Huang, Physics, SM
Kenneth R. Leopold, Chemistry, SM
Sanford Lipsky, Chemistry, SM
Jeffrey T. Roberts, Chemistry, SM
J. Ija Siepmann, Chemistry, SM
David D. Thomas, Biochemistry, SM
Renata M. Wentzowitch, Chemical Engineering and Materials Science, SM
Xiaoyang Zhu, Chemistry, SM

Associate Professor
David A. Blank, Chemistry, SM
Doreen G. Leopold, Chemistry, SM
David C. Morse, Chemical Engineering and Materials Science, SM
Gianluigi Veglia, Chemistry, SM
Darrin M. York, Chemistry, SM

Assistant Professor
Aaron Massari, Chemistry, SM
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—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.

Prerequisites for Admission—Applicants should have adequate preparation in mathematics, physics, and chemistry. For financial support, applicants should apply either to the Department of Chemistry or the Department of Physics. Applicants not requiring financial support have their academic qualifications reviewed by the director of graduate studies in chemical physics.

Special Application Requirements—Three letters of recommendation are required.

Courses—Refer to Chemistry (CHEM), Physics (PHYS), Chemical Engineering (CHEN), Materials Science (MATS), Mathematics (MATH), Chemical Physics (CHPH) and Scientific Computation (SCIC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Only 4xxx courses from departments other than chemistry or physics are allowed. Approval is not needed for one 4xxx course; a second course may be allowed subject to director of graduate studies and adviser approval.

M.S. Plan A Degree Requirements
The M.S. degree is offered only under Plan A (with thesis) and requires at least 20 course credits and 10 or more thesis credits. 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
A proficiency exam in physical chemistry is required. The Ph.D. program ordinarily consists of at least 24 course credits that include coursework in chemistry and/or physics with options for coursework in quantum mechanics, thermodynamics, statistical physics, and chemical dynamics. Students must also complete 24 thesis credits.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—Ph.D. minor requirements are determined by the director of graduate studies, the student, and the adviser.

Chemistry

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; inquiry@chem.umn.edu; www.chem.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Frank S. Bates, Chemical Engineering and Materials Science, ASM
H. Ted Davis, SM
Donald G. Truhlar, SM

Professor
George Barany, SM
Victor A. Bloomfield, Biochemistry, ASM
Peter W. Carr, SM
Christopher J. Cramer, SM
John E. Ellis, SM
C. Daniel Frisbie, ASM
Jiali Gao, SM
Wayne L. Gladfelter, SM
Gary Roland Gray, SM
Marc A. Hillmyer, SM
Thomas R. Hoye, SM
Steven R. Kass, SM
Kenneth R. Leopold, SM
John D. Lipscomb, Biochemistry, ASM
Sanford Lipsky, SM
Timothy P. Lodge, SM
Kent R. Mann, SM
Wayland E. Noland, SM
Louis H. Pignolet, SM
Lawrence Que, Jr., SM
Jeffrey T. Roberts, SM
J. Ija Siepmann, SM
Marian Stankovich, SM
Andreas Stein, SM
William B. Tolman, SM
Carston R.Wagner, Pharmacy, ASM
Xiaoyang Zhu, SM

Associate Professor
Edgar A. Arriaga, SM
David A. Blank, SM
Michael T. Bowser, SM
Philippe Bühlmann, SM
Mark D. Distefano, SM
William B. Gleason, Laboratory Medicine and Pathology, ASM
Doreen G. Leopold, SM
Kristopher McNeill, SM
T. Andrew Taton, SM
Gianluigi Veglia, SM
Darrin M. York, SM

Assistant Professor
Christy L. Haynes, SM
Aaron Massari, SM
R. Lee Penn, SM
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—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.

Prerequisites for Admission—Applicants must offer the substantial equivalent of the courses in analytical, inorganic, organic, and physical chemistry 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 79 (Internet) on the TOEFL, as well as GRE scores.

Proiciency Examinations—Student 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, they are offered two more times during the academic year.

Courses—Refer to Chemistry (CHEM) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Only 4xxx courses from other departments are allowed. Approval is not needed for one 4xxx course; a second course may be allowed subject to director of graduate studies and adviser approval.

M.S. Degree Requirements

M.S. students are expected to pass the proficiency exam in their specialty area in their first academic year in residence. Plan A requires 20 course credits and 10 thesis credits; Plan B requires 30 course credits, which would include 8 credits for the two Plan B papers.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—Six course credits from graduate-level chemistry courses are required for a master’s minor.

Ph.D. Degree Requirements

The Ph.D. program requires 24 course credits and 24 thesis credits. Students are also required to pass four out of five proficiency exams (see above) by the end of their first academic year in residence.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—Twelve course credits from graduate-level chemistry courses are required for a Ph.D. minor.

Child Psychology

Contact Information—Child Psychology Program, University of Minnesota, 204 Child Development Building, 51 East River Road, Minneapolis, MN 55455 (612-624-4127; fax 612-624-6373; www.education.umn.edu/sec).

See the College of Education and Human Development Professional Studies Web site for information on the master of education (M.Ed.) program in early childhood education: www.education.umn.edu/fields [Default.html]. For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor

Megan R. Gunnar, SM

Professor

Dale A. Blyth, 4H Youth Development Center, AM2
Sandra L. Christenson, Educational Psychology, AM2
Dante Cicchetti, SM
Andrew Collins, SM
Nicki R. Crick, SM
Byron Egeland, SM
Xiaoia Ge, SM
Michael K. Georgieff, Pediatrics, SM
Harold D. Grotevant, Family Social Science, AM2
Susan C. Hupp, Educational Psychology, AM2
William Iacono, Psychology, ASM
Robert Krueger, AM2
Gloria R. Leon, Psychology, ASM
Michael P. Maratos, SM
Ann S. Masten, SM
Scott R. McConnell, Educational Psychology, AM2
Anne D. Pick (emeritus), ASM
Herbert L. Pick, Jr., SM
Arthur J. Reynolds, SM
Maria D. Sera, SM
Elsa G. Shapiro, Pediatrics, AM2
L. Alan Sroufe, SM
Auke Tellegen, Psychology (emeritus), AM2
Paulus W. van den Broek, Educational Psychology, AM2
Richard A. Weinberg, SM
Albert Yonas, SM
Steven R. Yussen, SM
Philip David Zelazo, SM

Associate Professor

Canaan Karatekin, SM
Monica Luciana, Psychology, ASM
Charles Oberg, Epidemiology, AM2
Kathleen Thomas, SM

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

Curriculum—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 APA-approved 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.

Prerequisites for Admission—The equivalent of three semester (or four quarter) courses in psychology and one course in statistics are required.

Special Application Requirements—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.

Courses—Refer to Child Psychology (CPSY) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Child psychology Ph.D. students may include 4xxx courses as part of their supporting program coursework with director of graduate studies’ approval and if the course is taught by a member of the graduate faculty in the supporting program.
**M.A. Degree Requirements**
The Institute of Child Development does not offer an 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. Requirements for the M.A. are met through either Plan A or Plan B. Both require a full academic year of coursework.

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.

**Language Requirements**—None.

**Final Exam**—The final exam for Plan A is oral; typically, the final exam for Plan B is written.

**Ph.D. Degree Requirements**
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, 8303, 8304, 8311, 8321, 8360, 8888, 8994, and statistics through EPSY 8263 or equivalent.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—A Ph.D. 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.

**Chinese**
See Asian Literatures, Cultures, and Media.

**Civil 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; kradsed@ce.umn.edu, www.ce.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Professor**
Roger E. A. Arndt, SM
Roberto Ballarini, SM
Patrick L. Brezkonik, SM

Steven L. Crouch, SM
Gary A. Davis, SM
Emmanuel M. Detournay, SM
Andrew Drescher, SM
Eli Foufoula-Georgiou, SM
Catherine E. French, SM
Theodore Galambos (emeritus), ASM
John S. Gulliver, SM
Miki Hondzo, SM
Joseph F. Labuz, SM
Panos Michalopoulos, SM
John L. Nieber, Bioproducts and Biosystems Engineering, ASM
Arturo E. Schultz, SM
Michael J. Semmens, SM
Carol K. Shield, SM
Karl A. Smith, SM
Fotis Sotiropoulos, SM
Heinz G. Stefan, SM
Henryk K. Stolarski, SM
Otto D. L. Strack, SM
Vaughn R. Voller, SM
Bruce N. Wilson, Bioproducts and Biosystems Engineering, AM2

**Adjunct Professor**
Peter A. Cundall, ASM

**Associate Professor**
William A. Arnold, SM
Randall J. Barnes, SM
Bojan B. Guzina, SM
Raymond M. Hozalski, SM
Gerald Johnson, M2
Lev Khazanovich, M2
Kevin J. Krizek, Urban and Regional Planning, AM2
Timothy M. LaPara, SM
David M. Levinson, SM
Mihai O. Marasteanu, SM
Paige J. Novak, SM
Fernando Porté-Agel, SM
Matt Simcik, Environmental Health Services, AM2

**Assistant Professor**
Kimberly Hill, SM
Henry Liu, SM
Julian Marshall, SM
Taichiro Okazaki, SM
Sangwon Suh, Bioproducts and Biosystems Engineering, AM2
Steven F. Wojtikiewicz, SM

**Adjunct Assistant Professor**
Paul D. Capel, AM2

**Senior Research Associate**
John Hourdouz, AM2
Sofía G. Mogilevskaya, ASM
Omid Mohseni, AM2
Eugene Skok, AM2
Venugopal Varuputur, AM2

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

**Curriculum**—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).

**Prerequisites for Admission**—A bachelor’s degree in an engineering, basic science, or mathematics program is preferred. 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.

**Special Application Requirements**—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 31 in order to begin the following fall semester.

**Courses**—Refer to Civil Engineering (CE) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx department courses is subject to adviser and director of graduate studies approval. Students from other majors may include such courses subject to their own program’s approval. 4xxx courses can not be required courses for undergrad civil or geological engineering undergraduate majors.

**M.C.E. Coursework Only and Design Project Degree Requirements**
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 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 12 to 18 months to complete on a full-time basis. The M.C.E. degree requires 30 credits and is offered under two plans. One requires a minimum of 20 course credits and preparation of a design project (10 credits); the design project must be carried out by the student in consultation with a faculty adviser. The other plan is a coursework-only degree program and requires 30 course credits. At least 6 of the course credits must be taken outside the department for either plan. **Language Requirements**—None. **Final Exam**—A final oral exam is required of all M.C.E. candidates. **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. **M.S. Degree Requirements** The master of science (M.S.) degree balances education in engineering fundamentals and design with research and development. The M.S. degree provides preparation for students wishing to pursue a career in industry or to continue studies toward a Ph.D. degree. Students are expected to follow a coherent program of coursework and research in one of the following subareas: 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 and typically takes 18 to 24 months to complete. The M.S. degree requires 30 credits and is offered under two plans. Plan A emphasizes research and preparation of a thesis and Plan B emphasizes coursework. The thesis must be written on a research project carried out in consultation with a faculty adviser and should result in a scientific or technical contribution to the field. Under Plan B, students must demonstrate the ability to work independently and present the results of such work effectively by completing one to three Plan B papers as determined by the faculty adviser. A wide variety of studies have been submitted as Plan B papers, including computer programs, annotated bibliographies, field or laboratory investigations, and the analysis/design of special engineering problems. Plan A requires 20 course credits and 10 thesis credits. Plan B requires 30 course credits. At least 6 of the course credits must be taken outside the department for either Plan A or Plan B. **Language Requirements**—None. **Final Exam**—The final exam is oral. **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. **Ph.D. Degree Requirements** 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 normally after completing the M.S. degree. The Ph.D. program is typically completed in five 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. 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. **Language Requirements**—None. **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. **Classical and Near Eastern Studies** **Degree Programs and Faculty** **Contact Information**—Department of Classical and Near Eastern Studies, University of Minnesota, 245 Nicholson Hall, 216 Pillsbury Avenue S.E., Minneapolis, MN 55455 (612-625-5353; fax 612-624-4894; cla.umn.edu; http://cnes.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html. **Regents Professor** Thomas S. Clayton, English, ASM **Professor** Elizabeth Belfiore, SM Andrea Berlin, SM Frederick Cooper, Art History, ASM Sheila McNally, Art History, ASM S. Douglas Olson, SM Sandra Peterson, Philosophy, ASM Calvin J. Roetzkl, SM Theofanis G. Stavrou, History, ASM Peter Wells, Anthropology, ASM **Associate Professor** Richard Graff, Rhetoric, ASM Nita Krevans, SM Bernard Levinson, SM Christopher Nappa, SM Oliver Nicholson, SM Philip Sellew, SM George Sheets, SM John Steyaert, Art History, ASM Eva Von Dassow, M2 **Assistant Professor** Andrew Gallia, History, AM2 **Graduate Coordinator** Sandra Peterson, Philosophy, ASM **Adjunct Professor** Peter Wells, Anthropology, ASM Elizabeth Belfiore, SM Theofanis G. Stavrou, History, ASM Peter Wells, Anthropology, ASM **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 appeals 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. **Prerequisites for Admission**—For the major track in ancient and medieval art and archaeology, a background in archaeology, art history, and history sufficient to begin graduate level studies in the discipline, and evidence of language-acquisition ability. For the major track in classics, sufficient knowledge to begin graduate reading courses in either Greek or Latin and at least intermediate ability in the other language. For the major tracks in Greek or Latin, sufficient knowledge to begin graduate reading courses in the language of the track. For the major in religions in antiquity, an undergraduate background in the field and sufficient knowledge to begin graduate reading courses in classical Hebrew, Greek, or Latin. Some course prerequisites can be made up on provisional admission.
Applications are welcome from students with undergraduate majors in fields such as ancient Near Eastern studies, art history, biblical studies, classical archaeology, classics, history, Jewish studies, linguistics, and religious studies.

**Special Application Requirements**—Applicants must send the following directly to the Department of Classical and Near Eastern Studies: department application; copy of all transcripts; writing sample; copy of the GRE; three letters of recommendation from persons well acquainted with the student’s academic work and professional experience; and a statement describing the student’s intended course of study and professional goals. For nonnative speakers of English, a copy of the TOEFL is required. Students may be admitted in any academic term, but financial assistance is normally available only to applicants admitted for fall semester (deadline: January 4).

**Courses**—Refer to Akkadian (AKKA), Aramaic (ARM), Classical and Near Eastern Studies (CNES), Coptic (COPT), Greek (GRK), Hebrew (HEBR), Latin (LAT), Religions in Antiquity (RELA), and Sumerian (SUM) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to prior approval by the adviser and the director of graduate studies.

**Ancient and Medieval Art and Archaeology Track**

**M.A. Degree Requirements**  
The degree 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. The minimum requirement for Plan A is 38 credits (including 10 thesis credits), and for Plan B, 30 credits.

**Language Requirements**—Reading knowledge of one modern foreign language appropriate to the student’s program is required (normally German or 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.

**Ph.D. Degree Requirements**  
The degree 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 71 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 Track**

**M.A. Degree Requirements**  
This program provides a 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 41 credits (including 10 thesis credits), and for Plan B, 31 credits.

**Language Requirements**—One modern research language as appropriate (normally French or German or Italian) and proficiency in reading 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 9 graduate credits of Greek (excluding GRK 8120).

**Ph.D. Degree Requirements**  
This program 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 or Plan B paper credits. A typical Ph.D. program is 77 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 Track**

**M.A. Degree Requirements**  
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 French or German 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 9 graduate credits of Greek or Latin (excluding GRK/LAT 8120) and 6 graduate credits in the other language (excluding LAT 8120).

**Greek Track**

**M.A. Degree Requirements**  
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 or German or Italian, and reading proficiency in ancient 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).

**Ph.D. Degree Requirements**  
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 M.A. course requirements. Students who continue from the M.A. program may apply those credits toward the degree, with the exception of Plan A thesis or Plan B paper credits. A typical Ph.D. program is 77 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).
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).

Ph.D. Degree Requirements
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 77 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).

Religions in Antiquity Track

M.A. Degree Requirements
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. The Plan A requires 22 credits in the major, 9 credits in a related field, plus 10 thesis credits. The Plan B requires 22 credits in the major plus 9 credits in a related field.

Language Requirements—Proficiency in one modern language (normally German) and M.A-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).

Classics
See Classical and Near Eastern Studies.

Clinical Laboratory Science

Contact Information—Clinical Laboratory Science Program, Center for Allied Health Programs, University of Minnesota, MMC 711, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-8952; fax 612-625-5901; cls@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
Robert P. Hebbel, Medicine, M2

Professor
Fred S. Apple, Laboratory Medicine and Pathology, M2
Henry H. Balfour, Jr., Laboratory Medicine and Pathology, M2
Paul P. Cleary, Microbiology, M2
Agustin P. Dalmasso, Laboratory Medicine and Pathology, M2
Gary M. Dunny, Microbiology, M2
John H. Eckfeldt, Laboratory Medicine and Pathology, M2
Patricia Ferrieri, Laboratory Medicine and Pathology, M2
Stephen S. Hecht, Laboratory Medicine and Pathology, M2
Marc K. Jenkins, Microbiology, M2
Russell C. Johnson, Microbiology, M2
Vivek Kapur, Veterinary Pathobiology, M2
John H. Kersey, Laboratory Medicine and Pathology, M2
Tucker W. LeBien, Laboratory Medicine and Pathology, M2
J. Jeffrey McCullough, Laboratory Medicine and Pathology, M2
R. Scott McIvor, Laboratory Medicine and Pathology, M2
Gary L. Nelsenstuen, Biochemistry, M2
Timothy W. Olsen, Ophthalmology, M2
Gundu H. R. Rao, Laboratory Medicine and Pathology, M2
Jagdev M. Sharma, Veterinary Pathobiology, M2
Amy P. Skubitz, Laboratory Medicine and Pathology, M2
Michael Y. Tsai, Laboratory Medicine and Pathology, M2
Dan N. Valleria, Therapeutic Radiology, M2
Carol L. Wells, Laboratory Medicine and Pathology, M2
Michael J. Wilson, Laboratory Medicine and Pathology, M2

Associate Professor
Ronald C. McGlennen, Laboratory Medicine and Pathology, M2
Angela Panoskaltsis-Mortari, Pediatrics, M2
William R. Swaim, Laboratory Medicine and Pathology, M2

Assistant Professor
Connie J. Gebhart, Veterinary Pathobiology, M2
Michael R. Verneris, Pediatrics, M2
Xinjing Wang, Laboratory Medicine and Pathology, M2

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

Curriculum—This program offers students with basic science or medical technology backgrounds the opportunity to gain competence in a specialized area of laboratory medicine. It provides training in the research, supervisory, and teaching aspects of the field. Students pursue investigative work in one of six specialty areas: clinical chemistry, genetics/molecular genetics, hematology, immunology, microbiology or laboratory management.

Prerequisites for Admission—A bachelor’s degree in a basic science or in medical technology, including standard college courses in organic/inorganic chemistry, biochemistry, physics, mathematics, and biology is required. Previous laboratory experience is desirable. M.D.s currently in a fellowship training program at the University of Minnesota are also eligible.

Special Application Requirements—Applicants must forward to the Clinical Laboratory Science Program three letters of recommendation, an autobiographical outline that includes a statement of career goals, and scores from the General Test of the GRE. A preferred TOEFL score of 550 (paper), 213 (computer), or 79 (Internet) is required for applicants whose native language is not English. For M.D. fellows at the University of Minnesota, the GRE and letters of recommendation are not required. However, the fellow’s division director should provide a letter of support for the applicant’s training program.

Courses—Please see Clinical Laboratory Science (CLS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—The program accepts MEDT 4xxx courses when cross-listed with CLS 5xxx courses and approved by the adviser and/or director of graduate studies, (e.g., MEDT 4104 and 4105—Principles of Diagnostic Microbiology: Lecture and Lab, MEDT 4251—Hematology I: Basic Techniques, MEDT 4310 and 4311—Clinical Chemistry I and II: Lecture and Lab). However, credit will not be granted if the CLS equivalent of these MEDT courses was taken as part of an undergraduate degree.

M.S. Plan A Degree Requirements
The M.S. is a multidisciplinary program that prepares the medical technologist or basic science undergraduate for a career in research, teaching, or industry within a specialized area of laboratory medicine. Students pursue investigative work in one of six specialty areas: clinical chemistry, genetics/molecular genetics, hematology, immunology, microbiology or laboratory management. Each area has required courses, but flexibility is maintained to allow students to choose some coursework that meets individual requirements and research interests.

Requirements include at least 17 credits in the specialty area, at least 6 credits in a minor area or in related fields outside
the specialty area, 10 thesis credits, and 2 student seminar credits.

Language Requirements—None.

Final Exam—The final exam is oral.

Clinical Research

Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax 612-626-6931; sph-ssc@umn.edu; www.sph.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Gregory J. Beilman, Surgery, M2
Carole J. Bland, Family Medicine and Community Health, M2
Donna Z. Bliss, Nursing, M2
Hanna Bloomfield, Medicine, M2
John Bond, Medicine, M2
Linda J. Burns, Medicine, M2
Linda F. Carson, Medicine, M2
Jay Cohn, Medicine, M2
Allan J. Collins, Medicine, M2
Daniel Duprez, Medicine, M2
Maurice Dysken, Psychiatry, M2
Kristine E. Ensrud, Medicine, M2
Richard H. Grimm, Medicine, M2
Dorothy Hatsukami, Psychiatry, M2
Timothy Henry, Medicine, M2
Bernhard J. Hering, Surgery, M2
Andrew J. W. Huang, Ophthalmology, M2
James R. Johnson, Medicine, M2
Jae H. Kahn, Bioethics, M2
Joseph M. Keenan, Family Medicine and Community Health, M2
Frank Lederle, Medicine, M2
Russell V. Luepker, Epidemiology and Community Health, M2
Robert Madoff, Surgery, M2
Philip McGlave, Medicine, M2
Antoinette Moran, Pediatrics, M2
Jim D. Neaton, Biostatistics, M2
Joseph Neglia, Pediatrics, M2
Thomas E. Nevin, Pediatrics, M2
Dennis Niewoehner, Medicine, M2
Mark S. Paller, Medicine, M2
Bruce A. Peterson, Medicine, M2
Julie Ross, Pediatrics, M2
David Rothenberger, Surgery, M2
Timothy W. Schacker, Medicine, M2
S. Charles Schulz, Psychiatry, M2
Elizabeth R. Seaquist, Medicine, M2
Alan R. Sinaiko, Medicine, M2
David E. Sutherland, Surgery, M2
Daniel J. Weisdorf, Medicine, M2
Karen L. Margolis, Medicine, M2
Ann C. Mertens, Pediatrics, M2
Mark A. Pereira, Epidemiology and Community Health, M2
Julia Steinberger, Pediatrics, M2
Marie E. Steiner, Pediatrics, M2
John William Thomas, Biostatistics, M2
Todd Tuttle, Surgery, M2

Adjunct Associate Professor

David R. Hardten, Ophthalmology, M2

Assistant Professor

Alan K. Berger, Medicine, M2
Hassan N. Ibrahim, Medicine, M2
Ajay Israni, Epidemiology and Community Health, M2
Anna Petryk, Pediatrics, M2
Carolyn Torkelson, Family Medicine and Community Health, M2
Mark W. Yezierski, Family Medicine and Community Health, M2

Senior Research Associate

John O. Look, Diagnostic and Surgical Science, M2

Other

Ishjot Ahluwalia, Medicine, M2

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

Curriculum—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 might better be served by seeking a master of public health (M.P.H.) degree.

Prerequisites for Admission—The program is designed for individuals interested in a research career in academia, industry, research institutes, health agencies, or regulatory agencies. Applicants must have an advanced health professional degree such as M.D., D.D.S., D.O., D.V.M., Pharm.D., Ph.D., or advanced doctoral degree in a clinical biomedical field; or advanced nursing degree (e.g., M.S. in nursing). Students must have completed or 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—In addition to the School of Public Health requirements listed in their catalog, the M.S. has specific application requirements including a health science professional degree, and training sufficient to be eligible for a license to practice as supported in the form of an official transcript. An official TOEFL score with a preferred performance level of at least 600 (paper), 250 (computer), or 100 (Internet) is required of international students who have earned all of their degrees from non-native English speaking countries. There are three exceptions: 1) students who have taken and successfully passed the ECFMG or USMLE exams do not need to submit a TOEFL score; 2) University of Minnesota Medical Fellows or Medical Fellow Specialists who have taken at least 24 credits as part of their University fellowship are exempt from providing an official TOEFL score if they provide a transcript of these credits; 3) the MELAB has been taken as an alternative exam to the TOEFL. The GRE is not required. One of the three required recommendation letters and a completed School of Public Health Recommendation form should be submitted to the clinical director of training supporting the applicant’s potential as a clinical researcher.

Note: faculty members at the University of Minnesota above the rank of instructor have additional administrative procedures required by the Graduate School. Contact the Graduate School Admissions Office early in the process.

For an online application, see the School of Public Health Web site at www.sph.umn.edu/students/application/home.html. Note: If you are or ever were a student in the University of Minnesota Graduate School and you are applying to any graduate or professional program at the University, you must complete a change of status application. See the Graduate School Web site for the appropriate form and fee at www.grad.umn.edu/current_students/forms/cos.pdf.

Courses—Refer to the clinical research program available on the School of Public Health Web site at www.sph.umn.edu/education and you are applying to any graduate or professional program at the University, you must complete a change of status application. See the Graduate School Web site for the appropriate form and fee at www.grad.umn.edu/current_students/forms/cos.pdf.

Use of 4xx Courses—Inclusion of any 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Plan A Requirements

The M.S. requires 36 credits, including 3 elective credits and 10 thesis credits. Coursework in biostatistics, epidemiology, clinical trials, data collection, grant writing, and ethics is provided. Elective courses are chosen in consultation with an adviser. The thesis requires an active role in an ongoing approved clinical research project, and has specific requirements which are clarified in the student guidebook.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The master’s minor requires at least 6 credits. Contact the major coordinator for more information at gradstudies@epi.umn.edu.
Cognitive Science

Minor Only

Contact Information—Center for Cognitive Sciences, University of Minnesota, 205 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-625-9367; fax 612-626-7253; cogsci@umn.edu; www.cogsci.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Maria Gini, Computer Science, M
Jeanette K. Gundel, Linguistics, ESL, and Slavic Languages and Literatures, M
Keith Gunderson, Philosophy, M
Paul E. Johnson, Information and Decision Sciences, M
Michael B. Kac, Philosophy, M
Daniel J. Kersten, Psychology, M
Gordon E. Legge, Psychology, M
Chad J. Marsolek, Psychology, M
J. Bruce Overmier, Psychology, M
Herbert L. Pick, Jr., Child Development, M
C. Wade Savage, Philosophy, M
Maria D. Sera, Child Development, M
Paulus W. van den Broek, Educational Psychology, M
Albert Yonas, Child Development, M

Associate Professor
Charles R. Fletcher, Psychology, M

Clinical Associate Professor
Mary Jo Nissen, Psychology, M

Curriculum—Cognitive science is a field of inquiry at the interface of cognitive psychology, computer science, linguistics, neuroscience, and philosophy. Cognitive science is concerned with the acquisition, representation, and use of knowledge by humans and machines. The curriculum provides students with a broad foundation in psychological, philosophical, and computational approaches to the study of cognition.

Prerequisites for Admission—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School. Admission is limited and only by permission of the director of graduate studies in cognitive science.

Special Application Requirements—Contact the director of graduate studies in cognitive science for an Intent to Enroll form that students are encouraged to submit by the end of fall semester the year before initiating coursework. Later submissions are considered as space permits.

Courses—Refer to the minor program office for coursework pertaining to the program.

Use of 4XXX Courses—4XXX courses may not be included on degree program forms for the cognitive science minor.

Minor Only Requirements

The minor in cognitive science is available to master’s (M.A. and M.S.) and doctoral students. Both a master’s and doctoral minor require the following core courses outside the student’s major department:

- CGSC 8000—Philosophy of Cognitive Science, CSCI 5511—Artificial Intelligence I, and PSY 5015—Cognition, Computation, and Brain. Substitutions for these courses are permitted only with prior permission from the director of graduate studies for cognitive science. In addition, CGSC 8001—Proseminar in Cognitive Science is required for the doctoral minor. The master’s minor requires a minimum of 8 graduate credits; the doctoral minor requires 14 graduate credits. Additional courses beyond those required must be taught by faculty in the minor program or approved in advance by the cognitive science director of graduate studies. Courses in the student’s major department do not count toward the minor.

Communication Disorders


Communication Studies

Contact Information—Department of Communication Studies, University of Minnesota, 225 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-624-5800; www.comm.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Donald R. Browne, SM
Karylin K. Campbell, SM
W. Andrew Collins, ASM
Alan G. Gross, ASM
Laura J. Gurak, ASM
Dean E. Hewes, SM
Edward Schiappa, SM
Mary M. Lay Schuster, ASM
Robert L. Scott (emeritus), ASM
Amy L. Sheldon, SM
Michael Sunnafrank, Communication, Duluth, AM2
Arthur E. Walzer, ASM

Associate Professor
Rosita D. Albert, SM
Richard J. Graff, Rhetoric, ASM
Ronald W. Greene, SM
Susanne M. Jones, M2
Ascan F. Koerner, SM
Laurie Ouellette, SM
David L. Rarick (emeritus), ASM
Gilbert Rodman, SM
Mary D. Varvun, SM
Kirt H. Wilson, SM

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

Curriculum—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: communication theory, 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 communication theory 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 political science, cultural studies, or women’s studies.

Prerequisites for Admission—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. All prerequisites must be completed before admission.

Special Application Requirements—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. A deadline of January 1 is recommended for students applying for teaching assistantships or University fellowships for the following academic year.

Courses—Refer to Communication Studies (COMM) in the course section of this catalog for courses pertaining to the program.
Use of 4xxx Courses—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.

M.A. Degree Requirements
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 COMM 5421 and 5615, a minimum of 6 course credits in a minor or related field, and 10 thesis credits. Plan B requires a minimum of 21 course credits in communication studies, including COMM 5421 and 5615, a minimum of 6 course credits in a minor or related field, an additional 6 credits in the field of students choice, and a paper.

Language Requirements—None.

Ph.D. Degree Requirements
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; COMM 5615 and 5421 or equivalents must be included); 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.

Language Requirements—None.

Comparative and Molecular Biosciences

Contact Information—Director of Graduate Studies, Comparative and Molecular Biosciences Graduate Program, College of Veterinary Medicine, 445VMC, 1365 Gortner Avenue, St. Paul, MN 55108-612-624-2744; fax 612-624-4734; cvmsphd@umn.edu; www.cvm.umn.edu/cmb.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Mitchell S. Abrahamsen, Veterinary and Biomedical Sciences, SM
Alvin J. Beitz, Veterinary and Biomedical Sciences, SM
Russell F. Bey, Veterinary and Biomedical Sciences, SM
David R. Brown, Veterinary and Biomedical Sciences, SM
Cathy Sue Carlson, Veterinary Population Medicine, SM
Michael Conzemius, Veterinary Clinical Sciences, SM
Stephen Ekker, Genomics, SM
Scott Fahrenkrug, Animal Science, SM
Douglas N. Foster, Animal Science, SM
Sagar Goyal, Veterinary Population Medicine, SM
Richard Isachsen, Veterinary and Biomedical Sciences, SM
Mathur S. Kannan, Veterinary and Biomedical Sciences, SM
Vivek Kapur, Microbiology, SM
Alice A. Larson, Veterinary and Biomedical Sciences, SM
Samuel K. Maheswaran, Veterinary and Biomedical Sciences, SM
James R. Mickelson, Veterinary and Biomedical Sciences, SM
Thomas W. Molitor, Veterinary Population Medicine, SM
Michael P. Murtaugh, Veterinary and Biomedical Sciences, SM
Scott M. O’Grady, Animal Science, SM
John W. Osborn, Physiology, SM
Randall Singer, Veterinary and Biomedical Sciences, SM
Stephanie J. Valberg, Veterinary Population Medicine, SM
Robert Washabau, Veterinary Clinical Sciences, SM
Douglas J. Weiss, Veterinary and Biomedical Sciences, SM

Associate Professor
John Collister, Veterinary and Biomedical Sciences, SM
Yang Da, Animal Science, SM
Kay S. Faaberg, Veterinary and Biomedical Sciences, SM
Sagrika Kanjial, Veterinary and Biomedical Sciences, SM
James R. Lokensgard, Medicine, SM
Laura J. Mauro, Animal Science, SM
Kent Reed, Veterinary and Biomedical Sciences, SM
Mark S. Rutherford, Veterinary and Biomedical Sciences, SM
Leslie Sharkey, Veterinary Population Medicine, SM
Srinand Sreevatsan, Veterinary Population Medicine, SM
Anthony Tobias, Veterinary Clinical Sciences, SM
Bruce K. Walcheck, Veterinary and Biomedical Sciences, SM
Scott Wells, Veterinary Population Medicine, SM

Assistant Professor
Maxim Cheeran, Medicine, SM
Rueben Harris, Biochemistry, Molecular Biology and Biophysics, SM
Yinduo Ji, Veterinary and Biomedical Sciences, SM
Kim Mansky, Dentistry, M2
Pratima Pakala, Surgery, M2
Ned Patterson, Veterinary Clinical Sciences, SM
Elizabeth Puhar, Veterinary Clinical Sciences, SM
Pam Skincer, Veterinary and Biomedical Sciences, SM
Catherine St. Hill, Veterinary Clinical Sciences, M2
Lucy Vulchanova, Veterinary and Biomedical Sciences, M2

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

Curriculum—The comparative and molecular biosciences (CMB) graduate program is interdisciplinary and intercollegiate, drawing faculty from the College of Veterinary Medicine; the Medical School; the College of Food, Agricultural and Natural Resource Sciences; and the School of Public Health. The mission of the CMB graduate program is to train outstanding researchers in the basic mechanisms of animal and human health and disease. The program brings together both basic and clinical scientists to provide students with individualized, cutting-edge research training on the causes, mechanisms, and manifestations of disease. Broad areas of research focus include genetic and infectious diseases, and comparative aspects of biology and pathology across various species. Specific research disciplines include immunology, microbiology, pathology, genetics and genomics, cellular and molecular biology, neuroscience, physiology, and pharmacology. The scientific training students experience lead to careers as independent investigators in academia, industry, and government.

Prerequisites for Admission—A bachelor’s degree in a biological or basic science is required.

Special Application Requirements—Applicants must submit scores from the GRE General Test, a CV or résumé, 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 research experience as well as career interests, goals, and objectives. International students are also required to submit official TOEFL scores. Students may apply at any time; however, submission of all application materials by January 15 is strongly encouraged to ensure priority consideration for fellowships and research assistantships awarded for the next academic year. Students are typically admitted for fall semester.

Courses—Refer to Comparative and Molecular Biosciences (CMB) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses is not permitted toward degree requirements.

M.S. Plan A Degree Requirements
The M.S. requires a core curriculum of fundamental course work 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.

Language Requirements—None.

Final Exam—The final exam is written and oral.
Degree Programs and Faculty

Ph.D. Degree Requirements
The Ph.D. requires a core curriculum of fundamental coursework and laboratory experiences as well as at least 12 credits of minor-sponsoring 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.

Language Requirements—None.

Comparative Literature
Contact Information—Department of
Cultural Studies and Comparative Literature,
University of Minnesota, 235 Nicholson
Hall, 216 Pillsbury Drive S.E. (612-624-8099);
fax 612-626-0228; complit@umn.edu; http://
complit.cla.umn.edu.
For latest graduate faculty listings, see www
grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Richard Leppert, SM

Professor
Timothy Brennan, SM
John Mowitt, SM
Harvey Sarles, SM
Jochen Schulte-Sasse, German, Scandinavian, and Dutch, SM
Nicholas Spadaccini, Spanish and Portuguese Studies, AM2
Arlene Teraoka, German, Scandinavian, and Dutch, ASM
Jack Zipes, German, Scandinavian, and Dutch, ASM

Associate Professor
Maria Brewer, French and Italian, ASM
Robert Brown, SM
Cesare Casarino, SM
Keya Ganguly, SM
Elizabeth Kotz, SM
Leslie Morris, German, Scandinavian, and Dutch, ASM
Thomas Pepper, SM
Simona Sawhney, Asian Languages and Literatures, AM2
Gary Thomas, SM

Assistant Professor
Shaden Tageldin, SM

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

Curriculum—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.

Prerequisites for Admission—Although most students in the program have undergraduate majors in language or literature, applicants with other undergraduate backgrounds are considered.

Special Application Requirements—Scores from the General (Aptitude) Test of the GRE are required. Applications for admission as well as applications for financial aid are generally due the first week in December. Please check department Web site for specific dates.

Courses—Refer to Comparative Literature (CL) in the course section of this catalog, the current Class Schedule, and flyers available in the department office for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses may be permitted in majors or minors for the M.A. or Ph.D. degree with the approval of the adviser and director of graduate studies.

M.A. Plan B Degree Requirements
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. One Plan B paper is required.

Language Requirements—In addition to English, high proficiency in one language and basic proficiency in another language are required. The choice of languages is made with respect to the student’s area of specialization and in consultation with, and approval of, the adviser. Language requirements must be completed before taking the preliminary examination.

Minor Requirements for Students Majoring in Other Fields—A minimum of 12 credits is required for a master’s minor, which must include CL 8001 and 8002.

Ph.D. Degree Requirements
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.

Language Requirements—In addition to high proficiency in English, the following language competencies are required: high proficiency in a second language (may include native tongue if not English) and basic proficiency in two additional languages. The choice of languages is made with respect to the student’s area of specialization and in consultation with, and approval of, the adviser. Language requirements must be completed before taking the preliminary examination.

Minor Requirements for Students Majoring in Other Fields—A minimum of 12 credits is required for the doctoral minor and must include CL 8001 and 8002.

Comparative Studies in Discourse and Society
Contact Information—Department of
Cultural Studies and Comparative Literature,
University of Minnesota, 235 Nicholson
Hall, 216 Pillsbury Drive S.E., Minneapolis,
MN 55455 (612-624-8099; fax 612-626-0228;
csds@umn.edu; http://csds.cla.umn.edu).
For latest graduate faculty listings, see www
grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Richard Leppert, SM

Professor
John Archer, SM
Timothy Brennan, SM
Ellen Messer-Davidow, ASM
John Mowitt, SM
Paula Rabinowitz, ASM
Harvey Sarles, SM
Jochen Schulte-Sasse, German, Scandinavian, and Dutch, SM
Arlene Teraoka, German, Scandinavian, and Dutch, ASM
Jack D. Zipes, German, Scandinavian, and Dutch, ASM
Prerequisites for Admission—Applicants are required to have a B.A. in a humanities or social science discipline or other relevant field with clear evidence of comparative work. Because the program involves broad, often interdisciplinary, courses of study and a variety of emphases, the graduate admissions committee carefully reviews each applicant’s background in terms of analytical skills, knowledge of subject matter, experience, language preparation, and especially, congruity with faculty interests and expertise.

Special Application Requirements—Scores from the General (Aptitude) Test of the GRE are required. Applications for admission as well as applications for financial aid are generally due the first week in December. Please check the department Web site for specific dates.

Courses—Refer to Comparative Studies in Discourse and Society (CSDS) in the course section of this catalog, the current Class Schedule, and the department Web site for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses may be included in majors or minors for the M.A. or Ph.D. degree with the approval of the adviser and director of graduate studies.

M.A. Plan B Degree Requirements

Students normally are not admitted to work toward the M.A. degree, 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 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.

Language Requirements—Reading knowledge of one foreign language appropriate to the student’s program is required.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—A minimum of 12 is required for a Ph.D. minor and must include CSDS 8001 and 8002.

Complementary Therapies and Healing Practices

Minor Only and Postbaccalaureate Certificate

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Associate Professor

Robert Brown, Jr., SM

Cesare Casarino, SM

Maria Damon, English, ASM

Keya Ganguly, Social Science, SM

Elizabeth Katz, SM

Roger P. Miller, Geography, ASM

Leslie Morris, German, Scandinavian, and Dutch, ASM

Thomas Pepper, SM

Katherine Solomonson, Architecture, ASM

Gary C. Thomas, SM

Jacquelyn N. Zita, Gender, Women, and Sexuality Studies, ASM

Assistant Professor

Hisham Bizri, SM

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

Curriculum—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.
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 health care 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.

Prerequisites for Admission—This graduate minor is available to masters and doctoral students. To have the minor formally designated on a transcript students must be enrolled in a major in the Graduate School and have completed—or concurrently be enrolled in—a graduate research course upon beginning the first course in the minor. Note that the research course is in addition to the specified credits required for the minor. Students should work out their program of study with the director of graduate studies for the minor early in their graduate study.

Courses—Refer to Center for Spirituality and Healing (CSPH) in the course section of this catalog. Contact the minor program office for the most current information on relevant coursework pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses in the degree program is permitted based on approval of the graduate faculty and the director of graduate studies.

Minor Requirements
Master’s: All students take CSPH 5101 (3 cr) and 8101 (1 cr). Master’s students must take an additional 4 credits for a total of 8 credits; doctoral students must take an additional 1 credit 8xxx CSPH elective course and 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.

Postbaccalaureate Certificate
Curriculum—The certificate program is open to graduate students both in a major at the master’s or doctoral levels or those not in a graduate program. The curriculum for the certificate program has three areas of focus: clinical applications, spirituality, and cross-cultural health and healing. The certificate program is individualized.

Prerequisites for Admission—Applicants must have a bachelor’s degree in a health-related field such as nursing or a graduate degree in medicine, public health, or pharmacy from an accredited U.S. institution or a foreign equivalent and a 3.00 GPA. Non-English speaking students need a TOEFL score of 550 (paper), 213 (computer), or 79 (Internet).

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 this question: What are your short- and long-term professional goals after you complete the postbaccalaureate certificate program in complementary therapies and healing practices? Please 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 CV is also requested. Goal statement, letters of support, and CV should be mailed to: Center for Spirituality and Healing, MMC 505, 420 Delaware Street SE, Minneapolis, MN 55455

The director of the Center for Spirituality and Healing assigns an adviser to each student as they are admitted to the certificate program. Advisers are any of the graduate faculty holding member status in the complementary therapies and healing practices minor. Students complete the Graduate School’s postbaccalaureate program form, have it signed by the adviser and director of graduate studies, and filed with the Graduate School. The program must be filed before completion of 6 credits. Eligible coursework includes a minimum of 12 CSPH graduate credits or those courses from other majors or minors in the Graduate School that the CSPH faculty has approved for use in the CSPH minor. Students may transfer in up to 3 credits after approved by the CSPH director of graduate studies. Twenty percent of total credits may be taken S-N. The student must complete the program in no more than four years if enrolled for certificate only. Registration is required every fall and spring semester.

Courses—Refer to the track requirements section.

Use of 4xxx Courses—Use of 4xxx courses is not permitted.

Track Requirements
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 track applicants 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.

Health Coaching Track Under the Post baccalaureate Certificate
Curriculum—This field of study is designed for health care professionals or those enrolled in a graduate health professions program such as nursing, social work, psychology, medicine, nutrition, pharmacy, chiropractic, or licensed acupuncture. The track’s four semesters prepare students to coach individuals on a path to greater health and healing. Coaches also serve within clinics and health care systems by being vehicles for communication between conventional and complementary practitioners and by holding a larger vision of holism and integration. Additionally, individuals who complete the track gain a greater understanding of and commitment to their own personal growth and healing.

Prerequisites for Admission—Applicants must have a bachelor’s degree in a health-related field such as nursing or a graduate degree in medicine, public health, or pharmacy from an accredited U.S. institution or a foreign equivalent and a 3.00 GPA. Non-English speaking students need a TOEFL score of 550 (paper), 213 (computer), or 79 (Internet).

Special Application Requirements—In addition to the certificate application requirements listed above, health coaching track applicants must submit an additional letter of support as well as a 2-5 page personal statement focusing on what led them to their current and future interest in health coaching as a professional activity. Students must complete the program in no more than four years if enrolled for certificate only. Registration is required every fall and spring semester.

Courses—Refer to the track requirements section.

Use of 4xxx Courses—Use of 4xxx courses is not permitted.
Composition, Literacy, and Rhetorical Studies

See Literacy and Rhetorical Studies.

Computer Science

Contact Information—Department of Computer Science and Engineering, University of Minnesota, 4-192 Electrical Engineering/Computer Science, 200 Union Street S.E., Minneapolis, MN 55455 (612-625-4002; fax 612-625-0572; <dgs@cs.umn.edu> <www.cs.umn.edu>);
For latest graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/faculty.html>.

Professor
Daniel L. Boley, SM
John V. Carlis, SM
Vladimir Cherkassky, Electrical and Computer Engineering, ASM
David H. Dru, SM
Maria Gini, SM
Caroline Hayes, AM2
Mats Heimdahl, SM
Wei Chung Hsu, SM
Ravi Jannardan, AM2
Paul E. Johnson, Information and Decision Sciences, AM2
Daniel J. Kersten, Psychology, ASM
Larry L. Kinney, Electrical and Computer Engineering, AM2
Joseph A. Konstan, SM
Vinip Kumar, SM
David J. Lilja, Electrical and Computer Engineering, ASM
Richard Maclln, Computer Science, Duluth, AM2
Gopalan Nadathur, SM
Nikolaos P. Papanikolopoulos, SM
John T. Riedl, SM
Yousef Saad, SM
Sachin Sapatnekar, Electrical and Computer Engineering, ASM
Shashi Shekhar, SM
Eugene B. Shragowitz, SM
Jaideep Srivastava, SM
Anand R. Tripathi, SM
Pen-Chung Yew, SM
Zhi-Li Zhang, SM

Associate Professor
Victoria Interrante, SM
George Karypis, SM
Gary Meyer, SM
Ted Pedersen, Computer Science, Duluth, AM2
Masha Sosonkina, Computer Science, Duluth, AM2
Loren Terveen, SM
Richard M. Voyles, SM
Jon Weissman, SM

Adjunct Associate Professor
Masha Sosonkina, Computer Science, Duluth, AM2

Assistant Professor
Arindam Banerjee, M2
Abhishek Chandra, M2
Tian He, M2
Nicholas Hopper, M2
Yongdae Kim, SM
Rui Kuang, M2
Mohamed Mokbel, M2
Stergios Roumeliotis, SM
Paul Schelter, SM
William Scheuer, SM
Erik Van Wyk, SM
Antonia Zhai, M2

Lecturer
John Collins, AM2

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

Curriculum—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 faculty of the graduate program 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.

The computer science degrees include an M.C.S., M.S. (Plan A with thesis, Plan B with project or Plan C—coursework only with coursework based projects), and a Ph.D. The M.C.S. is a coursework-only degree and is intended to be a terminal degree. The Department of Computer Science and Engineering also supports a master of science in software engineering (M.S.S.E.) degree. Many faculty from the Department of Computer Science and Engineering also participate in the graduate program in scientific computation.

Prerequisites for Admission—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.

Special Application Requirements—The program requires that all applicants complete the department online application as well as the Graduate School online application. The names and e-mails of three recommenders are required and they will be requested 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. and Ph.D. program applicants. The Subject Test is optional, although highly recommended, especially for those seeking financial assistance. If taken, it should be in

the undergraduate major field or, if it is not offered in that field, in computer science, mathematics, or engineering. Master's and Ph.D. students are accepted for full admission only. The application deadline is April 1. Students seeking financial aid must apply by December 15.

Research Facilities—Graduate students have access to a wide range of computing facilities and equipment from the powerful supercomputers in the Minnesota Supercomputer Institute and Army High Performance Computing Research Center to handheld and portable computers used in research on mobile and location-aware computing. Specialized laboratories provide support for advanced graphics and visualization, virtual reality, computer networking, and distributed robotics. More general-purpose dedicated laboratories support a wide range of research activities, and shared graduate student laboratories provide extra computing for class work and other studies.

Use of 4xxx Courses—Use of CSCI 4xxx courses on degree program forms is not permitted. Credits from 4xxx courses are not permitted from an outside department may be used for related field course requirements if the course grants graduate credit.

Courses—Refer to Computer Science (CSCI) in the course section of this catalog for courses pertaining to the program.

M.C.S. Coursework Only Degree Requirements

The M.C.S. is a coursework-only degree. It requires 31 credits of graduate work, with the following conditions: 1) at least 18 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.

Language Requirements—None.

M.S. Degree Requirements

The M.S. requires a minimum of 31 credits, with at least 14 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.

**Language Requirements**—None.

**Final Exam**—The final exam is oral for Plan A and B, no oral for Plan C.

**Minor Requirements for Students Majoring in Other Fields**—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.

**Ph.D. Degree Requirements**

The Ph.D. requires at least 43 course credits of which 13 must be in CSCI courses and at least 12 in a minor or supporting program. Students must also fulfill the breadth requirement of six 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.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—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.

**Conflict Management**

*No new students are currently being accepted to this program. Contact the Graduate School for information on the status of the program.*

**Minor Only**

**Contact Information**—Director of Graduate Studies, Graduate Minor in Conflict Management, Conflict and Change Center, University of Minnesota, Hubert H. Humphrey Center, 301 19th Avenue S., Minneapolis, MN 55455 (612-624-6500; fax 612-626-0002; huberra003@umn.edu).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Professor**

Eugene Borgida, Psychology, M
Mark S. Umbreit, Social Work, M

**Associate Professor**

Kristen Nelson, Forest Resources, M
Melissa Stone, Humphrey Institute, M

**Other**

Mario F. Bognanno, Industrial Relations, M
Thomas R. Fiutak, Independent Study, M

**Curriculum**—The conflict management minor, available to master’s (M.A. and M.S.) and doctoral students, promotes inquiry into the origins, processes, dynamics, and consequences of social conflict and its management through various forms of dispute resolution procedures. The origins of this multidisciplinary field include but are not contained by the disciplines of sociology, psychology, sociopsychology, anthropology, management, organizational behavior, and communication.

**Prerequisites for Admission**—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School.

**Special Application Requirements**—None.

**Courses**—Appropriate courses are selected in consultation with the minor adviser and the director of graduate studies for the minor.

**Use of 4xxx Courses**—Use of 4xxx courses toward degree requirements is permitted with the approval of the instructor, the adviser, and the conflict management minor director of graduate studies.

**Minor Only Requirements**

A master’s minor requires 9 credits, including 1 credit of the seminar in conflict management. A doctoral minor requires 15 credits, including 2 credits of the seminar in conflict management. It is recommended that courses be selected according to the need to develop theory, practical applications, and skills in conflict management.

**Conservation Biology**

**Contact Information**—Director of Graduate Studies, Conservation Biology Graduate Program, University of Minnesota, 187 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-624-7751; consbio@umn.edu; www.consbio.umn.edu).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

**Regents Professor**

Peter B. Reich, Forest Resources, SM
G. David Tilman, Ecology, Evolution, and Behavior, SM

**Professor**

Ira R. Adelman, Fisheries, Wildlife, and Conservation Biology, SM
Deborah L. Allan, Soil, Water, and Climate, SM
Dorothy H. Anderson, Forest Resources, SM
David A. Andow, Entomology, SM
Marvin E. Bauer, Forest Resources, SM
Jay C. Bell, Soil, Water, and Climate, M2
Charles R. Blinn, Forest Resources, SM
Paul V. Bolstad, Forest Resources, SM
Thomas E. Burk, Forest Resources, SM
Vernon B. Cardwell, Agronomy and Plant Genetics, SM

Yosef Cohen, Fisheries, Wildlife, and Conservation Biology, SM
James W. Curtsinger, Ecology, Evolution, and Behavior, SM
Francesca J. Cutbert, Fisheries, Wildlife, and Conservation Biology, SM
K. William Easter, Applied Economics, SM
Mohamed E. El Halwani, Animal Science, SM
Susan M. Galatowitsch, Horticultural Science, SM
Robert G. Haight, Forest Resources, SM
Nicholas R. Jordan, Agronomy and Plant Genetics, SM
Anne R. D. Kapuscinski, Fisheries, Wildlife, and Conservation Biology, SM
Scott M. Lanyon, Bell Museum of Natural History, SM
Robert McMaster, Geography, SM
L. David Mech, Fisheries, Wildlife, and Conservation Biology, SM
Richa Nagar, Gender, Women, and Sexuality Studies, SM
Claudia Neuhauser, Ecology, Evolution, and Behavior, SM
Raymond M. Newman, Fisheries, Wildlife, and Conservation Biology, SM
Gerald J. Niemi, Natural Resources Research Institute, Duluth, SM
Craig Packer, Ecology, Evolution, and Behavior, SM
John J. Pastor, Natural Resources Research Institute, Duluth, SM
James A. Perry, Fisheries, Wildlife, and Conservation Biology, SM
A. Stephen Polasky, Applied Economics, SM
Anne E. Pusey, Ecology, Evolution, and Behavior, SM
Patrick T. Redig, Veterinary Clinical Sciences, SM
Philip J. Regal, Ecology, Evolution, and Behavior, SM
Carlisle F. Runge, Applied Economics, SM
Abdi I. Samatar, Geography, SM
Ruth G. Shaw, Ecology, Evolution, and Behavior, SM
Donald B. Siniff, Ecology, Evolution, and Behavior, SM
J. L. David Smith, Fisheries, Wildlife, and Conservation Biology, SM
Peter W. Sorensen, Fisheries, Wildlife, and Conservation Biology, SM
George R. Spangler, Fisheries, Wildlife, and Conservation Biology, SM
Robert W. Sterner, Ecology, Evolution, and Behavior, SM
Robert M. Zink, Ecology, Evolution, and Behavior, SM

**Adjunct Professor**

David E. Andersen, Fisheries, Wildlife, and Conservation Biology, SM
Doug H. Johnson, Fisheries, Wildlife, and Conservation Biology, SM
Jeffrey W. Lang, Fisheries, Wildlife, and Conservation Biology, SM
Diane L. Larson, Ecology, Evolution, and Behavior, SM
Stephen J. O’Brien, Wildlife, and Conservation Biology, SM
Bruce C. Vondracek, Fisheries, Wildlife, and Conservation Biology, SM
David Western, Fisheries, Wildlife, and Conservation Biology, SM
Degree Programs and Faculty

Associate Professor
Neil Anderson, Horticultural Science, SM
Gerald T. Ankley, Fisheries, Wildlife, and Conservation Biology, SM
Todd Arnold, Fisheries, Wildlife, and Conservation Biology, SM
Robert B. Blair, Fisheries, Wildlife, and Conservation Biology, SM
Jeffrey Broadbent, Sociology, SM
Jay S. Coggins, Applied Economics, SM
Tamarra Giles-Vernick, History, SM
Jay T. Hatch, General Science, SM
Sarah Hobbie, Ecology, Evolution, and Behavior, SM
Frances R. Homans, Applied Economics, SM
Pamela Jakes, Forest Resources, ASM
Susan D. Jones, Ecology, Evolution, and Behavior, SM
Mike Kilgore, Forest Resources, SM
Katherine Klink, Geography, SM
John P. Loegering, Center for Ag/Natural Resources, Crookston, M2
Lauren R. Musacchin, Landscape Architecture, SM
Kristen C. Nelson, Forest Resources, SM
Daniel J. Philippon, Rhetoric, SM
Ingrid E. Schneider, Forest Resources, SM
Andrew M. Simons, Fisheries, Wildlife, and Conservation Biology, SM
Rodrick H. Squires, Geography, SM
Steven J. Taff, Applied Economics, SM
Ronald Tolison, Fisheries, Wildlife, and Conservation Biology, SM
George D. Weiblen, Plant Biology, SM

Adjunct Associate Professor
David C. Fulton, Fisheries, Wildlife, and Conservation Biology, SM
David L. Garshelis, Fisheries, Wildlife, and Conservation Biology, SM
Ullas K. Karanth, Fisheries, Wildlife, and Conservation Biology, SM

Assistant Professor
Charles S. Anderson, Fisheries, Wildlife, and Conservation Biology, AM2
Dennis R. Becker, Forest Resources, SM
Jeaninne M. Cavender-Bares, Ecology, Evolution, and Behavior, SM
Jacques Finlay, Ecology, Evolution, and Behavior, SM
Sharon A. Jansa, Ecology, Evolution, and Behavior, SM
Jennifer Kuzma, HHH Institute of Public Affairs, SM
Diane Larson, Ecology, Evolution, and Behavior, SM
Steven Manson, Geography, SM
Helene Murray, Agronomy and Plant Genetics, ASM
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, SM
Donald L. Pereira, Fisheries, Wildlife, and Conservation Biology, ASM
Shinya Sugita, Ecology, Evolution, and Behavior, SM
Edward Swain, Fisheries, Wildlife, and Conservation Biology, AM2
Susy Ziegler, Geography, SM

Adjunct Assistant Professor
David N. Bengston, Forest Resources, SM
Meredith W. Cornett, Forest Resources, SM
Frederick J. Jannett, Fisheries, Wildlife, and Conservation Biology, SM

Lecturer
Thomas R Fluitak, HHH Institute of Public Affairs, SM

Research Associate
Dean A. Current, Forest Resources, AM2
Lee E. Frelich, Forest Resources, SM
Loren M. Miller, Fisheries, Wildlife, and Conservation Biology, M2
Ronald Moen, Natural Resources Research Institute, Duluth, SM
Naomi Zeitouni, Applied Economics, SM

Clarence L. Lehman, Ecology, Evolution, and Behavior, SM

The conservation biology 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.

Prerequisites for Admission—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 expected first 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 only are admitted for fall semester.

Research Facilities—Faculty are involved in local, regional, national, and international programs of research and education. Local research facilities include Cedar Creek Natural History Area, Cloquet Forestry Center, Itasca Biological Station and Laboratories, the Bell Museum of Natural History. Fisheries and aquatic biology research is conducted in the many lakes, rivers, and streams that Minnesota is famous for and in 13,000 feet of wet-lab space on the St Paul campus with dedicated wells and water conditioning equipment. The program is strongly linked with on-campus institutes such as the Institute for Social, Economic, and Ecological Sustainability and the Interdisciplinary Center for the Study of Global Change.

Courses—Conservation biology students take courses offered by a variety of colleges and departments across the University, including but not limited to fisheries, wildlife, and conservation biology; ecology, evolution, and behavior; soil, water, and climate; forest resources; geography; sociology; applied economics; and public policy. Acceptable courses for the degree are chosen in consultation with the adviser.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements
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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—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.

Ph.D. Degree Requirements
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).

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.
Control Science and Dynamical Systems

Contact Information—Control Science and Dynamical Systems Center, University of Minnesota, 107 Akerman Hall, 110 Union Street S.E., Minneapolis, MN 55455 (612-625-3364; csys@umn.edu; www.csys.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Gary J. Balas, Aerospace Engineering and Mechanics, SM
Daniel L. Boley, Computer Science and Engineering, SM
Prodromos Daoutidis, Chemical Engineering and Materials Science, SM
Max Donath, Mechanical Engineering, SM
David P. Fan, Genetics and Cell Biology, SM
William L. Garrard, Aerospace Engineering and Mechanics, SM
Tryphon T. Georgiou, Electrical and Computer Engineering, SM
Maria Gini, Computer Science and Engineering, SM
Daniel D. Joseph, Aerospace Engineering and Mechanics, ASM
Mostafa Kaveh, Electrical and Computer Engineering, SM
John C. Kieffer, Electrical and Computer Engineering, SM
Larry L. Kinney, Electrical and Computer Engineering, SM
Walter Littman, Mathematics, ASM
Richard P. McGehee, Mathematics, SM
Peter Olver, Mathematics, SM
Nikolaos P. Papanikolopoulos, Computer Science and Engineering, SM
Ajay Rajamani, Mechanical Engineering, SM
George R. Sell, Mathematics, ASM
Marian Stachowicz, Electrical and Computer Engineering, Duluth, ASM
Kim A. Stelson, Mechanical Engineering, SM
Ahmed H. Tewfik, Electrical and Computer Engineering, SM
Yiyuan Zhao, Aerospace Engineering and Mechanics, SM

Associate Professor
Perry Y. Li, Mechanical Engineering, SM

Assistant Professor
Egziabher D. Gebre, Aerospace Engineering and Mechanics, SM
Mihailo Jovanovic, Electrical and Computer Engineering, SM
Bernard Mettler, Aerospace Engineering and Mechanics, SM

Other
Dale F. Enns, Aerospace Engineering and Mechanics, ASM

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

Curriculum—Student programs must emphasize modeling (mathematical and physical analyses of control or dynamical systems, with some computational or numerical expertise) and two areas selected from the following three: control theory for deterministic processes; stability theory and general analysis of dynamical systems; stochastic processes and information theory.

Prerequisites for Admission—Applicants must have completed a master’s degree in one of the related fields of engineering, computer science, mathematics, statistics, or physics. Master’s degrees with an emphasis in control science and/or dynamical systems can be earned in any of these fields at the University of Minnesota. An applicant with a master’s degree in another area whose scientific, mathematical, and/or engineering background is adequate to pursue the program also is considered. A high level of proficiency in mathematics is necessary to successfully complete the Ph.D. program. Applicants are strongly encouraged to establish contact with a potential faculty adviser before formally applying.

Special Application Requirements—Three letters of recommendation evaluating the applicant’s scholarship and a complete set of transcripts are required. At least one letter of recommendation must be from a faculty member familiar with the applicant’s previous graduate work. Because the faculty is drawn from a number of disciplines and students’ programs can reflect a variety of emphases, it is important for applicants to clearly specify career goals and program emphasis desired in their application materials. Submission of GRE scores is strongly encouraged.

Use of 4xxx Courses—No 4xxx courses may be used for this program.

Ph.D. Degree Requirements
Programs are designed by the student and the adviser. Coursework is usually selected from those science, mathematics, engineering, and related fields that are relevant to control science and dynamical systems. Students can prepare for the written preliminary exam by completing three 8xxx or suitably advanced courses in three of the four areas of emphasis. In addition, students typically take substantial coursework in advanced mathematics.

Language Requirements—None.

Counseling and Student Personnel Psychology
See Educational Psychology.

Creative Writing

Contact Information—Director of Graduate Studies, Department of English, University of Minnesota, 222 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3366; creatwriting@umn.edu; www.creativewriting.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Patricia M. Hampi, M2

Professor
Michael Dennis Browne, M2
Ray Gonzalez, M2
Madelon M. Sprengnether, M2

Adjunct Professor
Charles Baxter, M2

Associate Professor
Maria Damon, M2
M.J. Fitzgerald, M2
Julie Schumacher, M2
Charles J. Sugnet, M2
David Treuer, M2

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

Curriculum—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.

Courses—Refer to English: Creative Writing (ENGW), and English: Literature (ENGL), in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.F.A. Degree Requirements
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 credits), 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 credits); related field (6 credits); and a creative project, a book-length manuscript suitable for publication (12 credits, 8 of which are for thesis seminar and 4 for thesis credit registration).

Language Requirements—None.
Final Exam—The M.F.A. defense requires students to discuss their creative work as well as a literacy essay that they write in response to a self-selected list of 20 books.

Culture and Teaching
See Education, Curriculum, and Instruction.

Dentistry
Contact Information—School of Dentistry, University of Minnesota, 15-136 Malcolm Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612-624-7934; fax 612-624-0027; wegne009@umn.edu; www.dentistry.umn.edu)

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Professor
M. Bashar Bakdash, Developmental/Surgical Sciences, M2
Muriel J. Bebeau, Primary Dental Care, M2
Soraya M. Beiraghi, Developmental/Surgical Sciences, M2
David O. Born, Primary Dental Care, M2
Edward C. Combe, Restorative Sciences, M2
Ralph DeLong, Restorative Sciences, M2
Anthony J. DiAngelis, Primary Dental Care, AM2
Robert J. Feigal, Diagnostic and Biological Sciences, M2
James R. Fricton, Diagnostic and Biological Sciences, M2
Mark C. Herzberg, Diagnostic and Biological Sciences, M2
James E. Hinrichs, Developmental/Surgical Sciences, M2
William F. Liljemark, Developmental/Surgical Sciences, M2
Patrick M. Lloyd, Restorative Sciences, M2
Karlin T. Moller, Developmental/Surgical Sciences, M2
Nelson L. Rhodes, Diagnostic and Biological Sciences, M2
Charles F. Schachtele, Diagnostic and Biological Sciences, M2
James Q. Swift, Developmental/Surgical Sciences, M2
Michael J. Till, Developmental/Surgical Sciences, M2
Larry F. Wolff, Developmental/Surgical Sciences, M2

Associate Professor
Mansur Ahmad, Diagnostic and Biological Sciences, M2
Gary C. Anderson, Restorative Sciences, M2
Walter R. Bowles, Developmental/Surgical Sciences, M2
Mary E. Brosky, Restorative Sciences, M2
Darryl T. Hamamoto, Diagnostic and Biological Sciences, M2
James R. Holtan, Restorative Sciences, M2
Ramesh K. Kuba, Diagnostic and Biological Sciences, M2
Thomas D. Larson, Restorative Sciences, M2
Scott B. McClanahan, Developmental/Surgical Sciences, M2
Bryan S. Michalowicz, Developmental/Surgical Sciences, M2
Sandra L. Myers, Diagnostic and Biological Sciences, M2
Kathleen J. Newell, Primary Dental Care, M2
Paul Olin, Restorative Sciences, M2
Joy B. Osborn, Primary Dental Care, M2
Jorge M. Perdigão, Restorative Sciences, M2
Maria R. Pintado, Restorative Sciences, M2
Eric L. Schiffman, Diagnostic and Biological Sciences, M2
John K. Schulte, Restorative Sciences, M2
John P. Beyer, Developmental/Surgical Sciences, M2
Wook-Jin Seong, Restorative Sciences, M2

Adjunct Associate Professor
Kate M. Hathaway, Diagnostic and Biological Sciences, M2

Assistant Professor
Massimo Costalonga, Developmental/Surgical Sciences, M2
Donald R. Nixdorf, Diagnostic and Biological Sciences, M2

Senior Research Associate
John O. C. Look, Diagnostic/Surgical Sciences, M2
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—The M.S. program in dentistry prepares dentists and dental hygienists with clinical expertise for positions of leadership in education, research, and program administration in the oral health field. A multidisciplinary faculty of dental and dentistry hygiene educators, researchers, and clinicians teach the program, which is housed in the School of Dentistry. All students complete core coursework in teaching and evaluation in dentistry, research methods, and health care 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. American Dental Association-accredited programs in the School of Dentistry that enroll students for the M.S. degree include endodontics, orthodontics, pediatric dentistry, periodontics, prosthodontics, and dental hygiene (with baccalaureate degree).

Other dental school clinical and postdoctoral programs that enroll students for the M.S. degree include those in geriatric dentistry and TMJ disorders/orofacial pain.

Clinical Instruments—The School of Dentistry dental clinics maintain a centralized instrument usage and sterilization system that provides clinical instrumentation and related services for graduate students enrolled in advanced clinical training programs. Usage fees, where applicable, are listed in the Class Schedule.

Prerequisites for Admission—Applicants must have received a D.D.S. or D.M.D. degree from an accredited U.S. institution or completed a dental hygiene program along with a baccalaureate degree from an accredited U.S. institution. Students with comparable foreign degrees from recognized colleges or universities may also apply. Applications from individuals who have already completed or are enrolled in an advanced clinical training program (e.g., specialty residency program) are encouraged. A GPA of 3.00 or academic standing in the top one quarter of graduating class is the preferred performance level for admission. Applicants for whom English is a second language must also take the TOEFL, with a preferred performance level of 577 (paper), 233 (computer), or 90 (Internet).

Special Application Requirements—Applicants must submit three letters of recommendation directly to the department from persons familiar with their academic capabilities, along with a complete set of official transcripts and a clearly written, brief statement (under 500 words) which relates the applicant’s career goals to the goals of the program. Applicants who are planning concurrent studies in an advanced clinical training program (i.e., dental specialty residency) must contact that program for specific application deadlines and additional application requirements. (Official transcripts that have been submitted directly to a clinical residency program cannot be transferred to the Graduate School for application to the M.S. program.)

Courses—Refer to Dentistry (DENT) in the course section of this catalog for courses that pertain to this program. Information on additional 7xxx courses included in the M.S. curriculum can be obtained directly from the program office or School of Dentistry Web site. DENT 5xxx and 6xxx courses are designated for the School of Dentistry DDS program and are not considered for graduate credit.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval. Under no circumstances will courses below 4xxx be considered for graduate credit.
M.S. Degree Requirements
The M.S. degree, which usually requires at least 18 months to complete, is offered under Plan A (with thesis) and Plan B (without thesis). Students in both plans must complete 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. Additionally, Plan A students must complete 10 thesis credits; Plan B students must complete 10 additional credits of coursework and submit three Plan B papers, one of which must be oriented toward research. Students must maintain a cumulative GPA of at least 3.00 in the program.

Language Requirements—None.
Final Exam—The final exam is oral.

Design, Housing, and Apparel

Contact Information—Director of Graduate Studies, Design, Housing, and Apparel, University of Minnesota, 240 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-626-1219; fax 612-624-2750; dhagrad@umn.edu; http://dha.cdes.umn.edu/Grad.
For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Joanne B. Eicher (emeritus), ASM

Professor
William J. Angell, M2
Marilyn R. DeLong, SM
Edward G. Goetz, ASM
Denise A. Guerin, SM
Kim K. P. Johnson, SM
Karen L. LaBat, SM
Steven McCarthy, M2
Becky L. Yust, SM

Associate Professor
James Boyd-Brent, M2
Marilyn Bruin, SM
Elizabath Bye, SM
Sauman Chu, S.M.
Jeffrey R. Crump, SM
Sheri A. Gahring, M2
Delores A. Ginthner (emeritus), AM2
Brad Hokanson, SM
Barbara E. Martinson, SM
Gloria M. Williams, SM
Ann Ziebarth, SM
Stephanie A. Zollinger, SM

Assistant Professor
Tasoulla Hadjiyanni, M2
Daniel Jasper, M2
Caren S. Martin, M2
Carol C. Waldron, M2

Other
Lou Bunker-Helmich, AM
Kathleen E. Campbell, Goldstein Museum, AM
Mary Catherine Daly, AM
Lin Nelson-Mayson, Goldstein Museum, M

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

Curriculum—The design, housing, and apparel 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.

The M.A., M.S., and Ph.D. degrees are available with four areas of emphasis: apparel, design communication, housing studies, and interior design. The M.F.A. and M.A. degrees are available with an emphasis in interactive design. The emphasis in apparel advances both theoretical knowledge and applications for textile and apparel products related to human behavior. Students may focus on consumer behavior and behavioral aspects of dress; history and culture; product development and design. The emphasis in design communication 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; visual systems research; situational and transformative design; and interactive design. Students and faculty collaboratively have developed objects and information resources that will enhance people’s lives. The emphasis in housing studies 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 and technology, policy and community development, and housing for special populations such as the elderly or low-income families with children. Graduate study in interior design 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 facility design (educational, office, criminal justice, and residential). Advances in theoretical knowledge and study of the interactions of humans in interior environments prepare students for teaching and research positions as well as design specializations within the profession. The emphasis in interactive design provides students with experience in designing for the electronic environment. The program integrates theory with practice in the application of emergent and established technologies to digital design solutions. Students complete a creative thesis.

Prerequisites for Admission—Individuals must have adequate undergraduate education in the area of emphasis and background in the basic disciplines of art, social science, physical science, and biological science appropriate to the area of emphasis. To pursue a degree with interior design as the emphasis area, a first professional degree in interior design is required. Students interested in pursuing a Ph.D. must first complete a master’s degree. Specific requirements may be obtained by contacting the director of graduate studies.

Special Application Requirements—Consult the director of graduate studies; scores from the GRE are required. Students pursuing a degree in an emphasis related to design are required to submit a portfolio consisting of 15-20 examples of recent work. Students pursuing a Ph.D. are required to submit a writing sample. Students are admitted for fall semester only.

Courses—Refer to Design, Housing, and Apparel (DHA) in the course section of this catalog for courses that pertain to this program.

Use of 4xxx Courses—No more than 30 percent of a student’s official degree program may be comprised of 4xxx courses. Not all of the department’s 4xxx courses are available for graduate credit. Appropriate courses are selected in consultation with the student’s advisers.

M.A. and M.S. Degree Requirements
Minimum requirements include 4 credits in courses that focus on theory building and the theoretical and philosophical bases of inquiry in the discipline; 6 credits in courses on qualitative or quantitative methods of research and evaluation; 8 credits for Plan A students, and 18 credits for Plan B students in the area of emphasis; 10 thesis credits for Plan A students; and 6 credits in a related field. Required courses include DHA 8181—Ethics and Research or the equivalent, and DHA 8101—Philosophical Foundations of Design, Housing, and Apparel. Students may be required to complete additional credits upon recommendation of their committee.

Language Requirements—None.
Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—For a master’s minor, a minimum of 9 credits in design, housing, and apparel is required, including DHA 8101. Courses are selected in consultation with the director of graduate studies.
M.F.A. Degree Requirements
Minimum requirements for the M.F.A. include 7 credits in courses that focus on theory building and the theoretical and philosophical bases of inquiry in the discipline, including DHA 8101—Philosophical Foundations of Design, Housing, and Apparel and DHA 5399—Theory of Electronic Design; 6 credits in evaluation and analysis, including DHA 5388—Design Planning, Analysis, and Evaluation; 27 credits in the area of emphasis, including DHA 8114—Design Studio and DHA 8181—Ethics and Research or the equivalent; 12 credits of M.F.A. creative thesis; and 8 credits in a related field. Students may be required to complete additional credits upon recommendation of their committee.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
Minimum requirements for the Ph.D. include 6 credits in courses that focus on theory building and the theoretical and philosophical bases of inquiry in the discipline; 9 credits in courses on qualitative and quantitative methods of research and evaluation; 12 credits in the area of emphasis; 24 thesis credits; and 12 credits in a supporting program. Required courses include DHA 8181—Ethics and Research or the equivalent and DHA 8101—Philosophical Foundations of Design, Housing, and Apparel. Students may be required to complete additional credits upon recommendation of their committee.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—For a doctoral minor, a minimum of 12 credits in design, housing, and apparel is required, including DHA 8101—Philosophical Foundations of Design, Housing, and Apparel. Courses are selected in consultation with the director of graduate studies.

Development Studies and Social Change

Minor Only
Contact Information—Interdisciplinary Center for the Study of Global Change, University of Minnesota, 537 Heller Hall, 271 19th Avenue S., Minneapolis, MN 55455 (612-624-0832; fax 612-625-1879; macarthur@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Allen Isaacman, History, M
G. Edward Schuh, Public Affairs, M
Kathryn A. Sikkink, Political Science, M

Professor
Ronald R. Aminzade, Sociology, M
Dorothy H. Anderson, Forest Resources, M
Ragui A. Assaad, Public Affairs, M
Michael Barnett, Public Affairs, M
Rose Brewer, African American and African Studies, M
Francesca J. Cuthbert, Fisheries, Wildlife, and Conservation Biology, M
Lisa J. Disch, Political Science, M
Raymond D. Duval, Political Science, M
Ana Paula Ferreira, Spanish and Portuguese, M
Amy K. Kaminsky, Gender, Women, and Sexuality Studies, M
Anne R. D. Kapuscinski, Fisheries, Wildlife, and Conservation Biology, M
Sally Kenney, Public Affairs, M
Helga Leitner, Geography, M
John W. Mowitt, Cultural Studies and Comparative Literature, M
Richa Nagar, Gender, Women, and Sexuality Studies, M
August H. Nimtz, Jr., Political Science, M
Ruth Okediji, Law School, M
James A. Perry, Fisheries, Wildlife, and Conservation Biology, M
Terry L. Roe, Applied Economics, M
Abdi I. Samatar, Geography, M
Eric S. Sheppard, Geography, M
James L. Smith, Fisheries, Wildlife, and Conservation Biology, M
George R. Spangler, Fisheries, Wildlife, and Conservation Biology, M
John S. Wright, African American and African Studies, M

Associate Professor
Fernando E. Arenas, Spanish and Portuguese Studies, M
Elizabeth H. Boyle, Sociology, M
Bruce P. Braun, Geography, M
Cesare Casarino, Cultural Studies and Comparative Literature, M
Sarah C. Chambers, History, M
Jay S. Coggins, Applied Economics, M
Susan Craddock, Gender, Women, and Sexuality Studies, M
Jigna Desai, Gender, Women, and Sexuality Studies, M
Vinay Gidwani, Geography, M
Tamura Giles-Vernick, History, M
Michael Goldman, Sociology, M
Ian Greaves, Environmental Health Services, AM
Douglas R. Hartmann, Sociology, M
Qadri Ismail, English, M
Daniel Kelliher, Political Science, M
Deborah Levison, Public Affairs, M
Louis Mendoza, Chicano Studies, M
Kristen Nelson, Forest Resources, M
Joanna O’Connell, Spanish and Portuguese Studies, M
Tade Okediji, Applied Economics, M
Daniel J. Philippson, Rhetoric, M
Simona Sawhney, Asian Languages and Literatures, M
Rachel Schurman, Sociology, M
Ajay Skaria, History, M
Charles J. Sugnet, English, M

Assistant Professor
Katy Gray Brown, Postsecondary Teaching and Learning, M
Barbara Frey, Human Rights Program, M
Keith Mayes, African American and African Studies, M
Helene Murray, Agronomy and Plant Genetics, M
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, M
Shaden M. Tageldin, Cultural Studies and Comparative Literature, M
Elizabeth J. Wilson, Public Affairs, M

Other
Karen Brown, International Center for Global Change, M

Curriculum—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 developing world, 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 developing world; 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 developing world.

Prerequisites for Admission—Admission is contingent upon prior admission to a doctoral degree-granting program within the Graduate School and upon affiliation with ICGC.

Special Application Requirements—Students enrolled in a doctoral degree-granting program may apply for the minor at any time during the academic year; acceptance will take effect the following term.

Courses—Please contact the minor program office for information on relevant coursework pertaining to the program.

Use of 4xxx Courses—Courses used to fulfill minor requirements must be 5xxx or above.

Minor Only Requirements
The doctoral minor requires a sequence of three core seminars (DSSC 8111, 8211-12, 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 School curriculum that are relevant to the field of development studies and social change.
Early Childhood Policy

Postbaccalaureate Certificate

Contact Information—Scott McConnell, Early Childhood Policy Certificate, Center for Early Education and Development, University of Minnesota, 215 Pattee Hall, 150 Pillsbury Drive S.E., Minneapolis, MN 55455; 612-625-3058; Ecpolicy@umn.edu. http://education.umn.edu/SPS/programs/certificates/ECPolicy.html.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Barbara Leonard, Nursing, M
Scott McConnell, Educational Psychology, M
Richard Weinberg, Child Development, M

Associate Professor
Elizabeth Davis, Applied Economics, M
Dan Kellher, Political Science, M
Charles Ober, Public Health, M

Lecturer
Marcie Jeffeys, Social Work, M

Curriculum—The early childhood policy postbaccalaureate certificate gives students expertise in the 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 be part of a cohort, gain a similar set of skills, and foster connection between the University and the community.

Admission Requirements—The ECP certificate uses a quasi-cohort model and admission is for fall semester only. Applications are due on April 15 and can be completed online at http://education.umn.edu/SPS/programs/certificates/ECPolicy.html. Students should have a bachelor’s degree from an accredited U.S. university or its foreign equivalent. A GPA of 3.00 is required. Students must apply for the certificate, and to the Graduate School if not already enrolled, after completing no more than one course (one appropriate course may be transferred in with faculty approval). Note that the Graduate School application deadlines are fall semester—June 15, spring semester—October 15, summer session—March 15. Deadlines that fall on a holiday or weekend are extended through the next regular workday. For an online application or more information about Graduate School admissions see the General Information section in this catalog, or visit the Graduate School Web site.

Certificate Requirements—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.

East Asian Studies

See Asian Literatures, Cultures, and Media.

Ecology, Evolution, and Behavior

Contact Information—Department of Ecology, Evolution and Behavior, Director of Graduate Studies, University of Minnesota, 100 Ecology Building, 1987 Upper Buford Circle, St. Paul, MN 55108-6097; 612-625-5700; fax 612-624-6777; EEBGrad@chbs.umn.edu; www.chbs.umn.edu/eeb/gradprogram.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Peter B. Reich, Forest Resources, SM
G. David Tilman, SM

Professor
Donald N. Alstad, SM
David A. Andow, Entomology, SM
Franklin H. Barnwell, SM
Patrick L. Brezonik, Civil Engineering, SM
James W. Curtsinger, SM
Antony M. Dean, SM
Susan M. Galatowitsch, Horticultural Science, SM
Thomas C. Johnson, Geology, Duluth, SM
Linda L. Kinkel, Plant Pathology, SM
Scott M. Lanyon, SM
L. David Mech, Fisheries, Wildlife and Conservation Biology, SM
Patrice A. Morrow, SM
Claudia Neuhauser, SM
Raymond M. Newman, Fisheries, Wildlife and Conservation Biology, SM
Craig Packer, SM
John Pastor, Duluth, SM
Stephen Polasky, SM
Anne E. Pusey, SM
Philip J. Regal, SM
Michael J. Sadowsky, Soil, Water, and Climate, SM
Ruth G. Shaw, SM
Peter W. Sorensen, Fisheries, Wildlife and Conservation Biology, SM
Marla Spivak, Entomology, SM
Anthony M. Starfield (emeritus), AM2
David W. Stephens, SM
Robert W. Sterner, SM
Robert M. Zink, SM

Adjunct Professor
Roberta Denison, SM

Associate Professor
James B. Cotner, SM
David Fox, Geology and Geophysics, SM

George Heimpel, Entomology, SM
Sarah E. Hobbie, SM
Susan D. Jones, SM
Georgiana May, SM
Andrew M. Simmons, Fisheries, Wildlife, and Conservation Biology, SM
Michael Travisono, SM
George Weiblen, Plant Biology, SM
Susan J. Weller, Entomology, SM

Assistant Professor
Mark Bee, SM
Mark Borrello, SM
Jeannine Cavender-Bares, SM
Jacques Finlay, SM
Jeffrey A. Grafen, Biotechnology Institute, SM
Sharon Jansa, SM
Jennifer King, SM
Diane L. Larson, SM
Jeffrey L. Metz, SM
Joseph McCauley, SM
Rebecca Montgomery, Forest Resources, SM
Helene Muller-Landau, SM
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, SM
Jennifer Powers, SM
Shinya Sugita, SM
Peter Tiffin, Plant Biology, SM

Other
F. Keith Barker, Bell Museum of Natural History, AM2
Lee E. Frolich, Forest Resources, SM
Clarence Lehman, SM

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

Curriculum—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, paleoecology, ecology of vegetation, and theoretical ecology. Opportunities for field research are available in Africa, Alaska, Central America, and other parts of the world, as well as in local ecosystems. Seminars and individually designed tutorials are an important part of student programs and provide an exciting intellectual environment.

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 15. Three letters of recommendation evaluating the applicant’s scholarship are required, plus GRE scores (the Subject Test in biology is recommended, though not required).

Courses—Refer to Ecology, Evolution, and Behavior (EEB) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—As preparation for their preliminary examinations, Ph.D. students are expected to acquire basic knowledge in ecology, evolution, behavior, and organismal biology by taking graduate courses or 4xxx courses that are approved by the director of graduate studies. One of these courses can be a graduate seminar or reading course, and one of these courses can be substituted by an advanced undergraduate course taken prior to entering into the EEB graduate program.

M.S. Degree Requirements
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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—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.

Ph.D. Degree Requirements
A minimum of 3 course credits and 24 thesis credits are required for either a minor in another field or a supporting program from several related fields. 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 50 percent time. Degree programs are planned by the student and an advisory committee of three to five faculty members.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.

Economics

Contact Information—Director of Graduate Studies, Department of Economics, University of Minnesota, 1035 Heller Hall, 271 19th Avenue S., Minneapolis, MN 55455 (612-625-6833; fax 612-624-0209; econgrad@econ.umn.edu; www.econ.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
John S. Chipman, SM
G. Edward Schuh, Public Affairs, ASM

Professor
Beth E. Allen, SM
Patrick Bajari, SM
Varadarajan V. Chari, SM
Zvi Eckstein, SM
Roger D. Feldman, Public Health, ASM
Edward M. Foster, SM
Thomas J. Holmes, SM
Larry E. Jones, SM
Patrick J. Kehoe, SM
Timothy Kehoe, SM
Narayana Kocherlakota, SM
Erzo G. J. Luttmer, SM
Marcel K. Richter, SM
Aldo Rustichini, SM
Craig E. Swan, SM
Warren E. Weber, AM2
Jan Werner, SM

Associate Professor
George D. Green, History, AM2
Ellen McGrattan, AM2
Fabrizio Perri, SM
Christopher Phelan, AM2
James A. Schmitz, AM2

Assistant Professor
Christina Arellano, M2
Kyoo-II Kim, M2
Minjing Park, M2
David Rahman, M2
Itai Sher, M2

Other
Simran Sahi, M2

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

Curriculum—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.

Prerequisites for Admission—The general requirement is the capability to pursue Ph.D.-level work. Normally a student should have an undergraduate record from a recognized college that includes coursework in economic theory and mathematics (multivariate calculus and linear algebra).

Special Application Requirements—Students should submit their applications, including a record of GRE scores and three letters of recommendation, to the director of graduate studies. Applicants who would like financial aid should submit their materials no later than December 31. Students are admitted fall semester only.

Courses—Refer to Economics (ECON) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx or 5xxx economics courses may not be included on the degree program form for the economics Ph.D. program. Students may include 4xxx, 5xxx, and 8xxx courses outside economics. Approval of the student’s adviser and the director of graduate studies are needed to use 4xxx and 5xxx courses.

M.A. Degree Requirements
The M.A. is offered under Plan A (with thesis) or Plan B (without thesis). Coursework for the M.A. is drawn from the Ph.D. program and must include at least 10 credits of economic theory from the first-year Ph.D. sequences in theory (for majors) or microeconomic analysis (for minors) and macroeconomics. Beyond these restrictions, the general Graduate School requirements govern. For the Plan B degree, a Ph.D. student will have completed requirements for the M.A. when the written preliminary exams have been completed. 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.

Language Requirements—None.

Final Exam—The final exam is oral for Plan A, written for Plan B.

Minor Requirements for Students Majoring in Other Fields—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 include ECON 5151 and 5152 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 ECON 5151 and 5152, though the requirement to complete 6 credits would still stand.

**Ph.D. Degree Requirements**

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 program 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.

**Language Requirements**—None.

**Minor Requirements for Students**

**Majoring in Other Fields**—Requirements for a doctoral minor include five or more from among the following courses: ECON 8001-2-3-4 or 8101-2-3-4, and 8105-6-7-8; 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.

**Education—Recreation, Park, and Leisure Studies**

Advanced work leading to the professional degree of master of education (M.Ed.) is offered in several areas of study. For more information on these programs, see [http://education.umn.edu/fields/Default.htm](http://education.umn.edu/fields/Default.htm).

**Contact Information**—Marta Fahrenz, Coordinator of Graduate Studies, School of Kinesiology, University of Minnesota, 223B Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455; 612-625-2545; cigs@umn.edu; [http://education.umn.edu/cigs](http://education.umn.edu/cigs). For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.htm](http://www.grad.umn.edu/faculty_rosters/faculty.htm).

**Professor**

Dorothy H. Anderson, Forest Resources, ASM
William Gartner, Applied Economics, AM2
Mary Jo Kane, SM
Leo H. McAvoy, Jr. (emeritus), ASM
Michael G. Wade, SM

**Associate Professor**

Kenneth Bartlett, Work and Human Resource Education, AM2
Keith C. Russell, SM
Ingrid E. Schneider, Forest Resources, AM2
Carla E. S. Tabourne, SM
Diane M. Wiese-Bjornstal, SM

**Assistant Professor**

Lisa A. Kihl, M2
Stephen D. Ross, SM

**Lecturer**

Rayla Allison, M2
Jo Ann Bussey, M2
Robert Danforth, AM2

**Research Associate**

Carol A. Leitschuh, M2

**Other**

Stephan Paul Carlson, Forest Resources, AM2

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

**Curriculum**—Ph.D. students in education with an emphasis in recreation, park, and leisure studies (RPLS) pursue an individualized program specializing in park and recreation administration, outdoor education/recreation, sport management, or therapeutic recreation.

**Prerequisites for Admission**—Although prospective students generally have completed undergraduate and masters’ degrees in recreation, park, and leisure studies, others with a baccalaureate degree may be admitted who have related preparation and a significant background and interest in the subject. Admitted students may be required by their adviser to complete background preparation in undergraduate and graduate recreation and related coursework.

**Special Application Requirements**—Applicants must submit a completed University of Minnesota Graduate School application form including a clearly written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal and quantitative) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly paper; and photocopies of official transcripts. Students may apply at any time; however, submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for admission as well as teaching and research assistantships awarded for the next academic year. The three letters of recommendation must be sent directly to the department. Students can be admitted any term.

**Research Facilities**—Research facilities include Wilderness Inquiry, Outdoor Behavior Healthcare Cooperative, and the Tucker Center for Research on Girls and Women in Sport.

**Courses**—Refer to Recreation, Park, and Leisure Studies (REC) and Education (EDUC) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**Ph.D. Degree Requirements**

The Ph.D. requires at least 86 credits, which must include 12 credits in an RPLS common core [including one course from Educational Policy and Administration (EDPA) or the Preparing Future Faculty Program (GRAD)], 21 credits in an RPLS emphasis area, 17 credits in research development, 12 credits in a supporting program or minor, and 24 thesis credits (EDUC 8888). A minimum GPA of 3.00 is preferred to maintain good standing and to graduate.

**Language Requirements**—None.

**Minor Requirements for Students**

**Majoring in Other Fields**—A doctoral minor requires at least 12 credits of graduate level courses in RPLS, including REC 5101 (3 cr) and 8980 (2 cr).

**Education—Work and Human Resource Education**

See [Work and Human Resource Education](http://education.umn.edu/faculty_rosters/faculty.htm).

**Education, Curriculum, and Instruction**

**Contact Information**—Department of Curriculum and Instruction, University of Minnesota, 125 Peik Hall, 159 Pillsbury Drive S.E., Minneapolis, MN 55455; 612-625-2545; cigs@umn.edu; [http://education.umn.edu/cigs](http://education.umn.edu/cigs).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.htm](http://www.grad.umn.edu/faculty_rosters/faculty.htm).

**Professor**

Patricia G. Avery, SM
Richard W. Beach, SM
Deborah R. Dillon, SM
Lee Galda, SM
Roger T. Johnson, SM
Judith J. Lambrecht, Work and Human Resource Education, ASM
Frances P. Lawrenz, Educational Psychology, ASM
Cynthia Lewis, SM
S. Jay Samuels, Educational Psychology, ASM
Thomas R. Post, SM
S. Jay Samuels, Educational Psychology, ASM
Thomas Swiss, SM
Elaine E. Tarone, Linguistics, ESL and Slavic Languages and Literatures, AM2
Degree Programs and Faculty

Barbara M. Taylor, SM
Ruth G. Thomas, SM

Associate Professor
Lisa D. Albrecht, School of Social Work, AM2
Martha H. Bigelow, SM
Kathleen Cramer, SM
Fred N. Finley, SM
Joan E. Hughes, SM
Patricia James, Postsecondary Teaching and Learning, AM2
Murray S. Jensen, Postsecondary Teaching and Learning, AM2
Timothy Lensmire, SM
Jane Pilhal, SM
Gillian H. Roehrig, M2
Diane J. Tedick, SM
Constance L. Walker, SM

Assistant Professor
James W. Bequette, M2
Lesa Covington Clarkson, M2
Aaron H. Doering, SM
Lori A. Helman, M2
Benjamin M. Jacobs, M2
J. B. Mayo, Curriculum and Instruction, M2
Tamara J. Moore, M2
Bic Ngo, M2
Mistilina Sato, M2
Bhaskar Upadhyay, M2
Ross VeLure Roholt, School of Social Work, AM2

Lecturer
Faith M. Clover, M2
Theresa L. Johnson, M2
Terrence Wyberg, M2

Other
Mary Bents, Associate Dean, College of Education and Human Development, AM2
Tara W. Fortune, Center for Advanced Research on Language Acquisition, AM2
Michael Michlin, Center for Applied Research and Educational Improvement, AM
Donna D. Pearson, National Research Center for Career and Technical Education, M2
Debra Stevens Peterson, Minnesota Center for Reading Research, AM2
Joyce A. Walker, Center for 4-H Youth Development, M2

Curriculum—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, in postsecondary and research settings, in educational service agencies, and in business and industry. The M.A. and Ph.D. degrees include formal tracks in art education; elementary education; family, youth, and community (including education for community, parent and family education, and youth development and programming); learning technologies (including distance learning and education, multimedia design and development, and technology integration in K–12 settings); literacy education (including children’s and adolescent literature, critical literacy, English education, and reading and language arts education); mathematics education; science education; second languages and cultures education (including ESL, foreign language education, and immersion education); and social studies education. The Ph.D. degree includes an additional formal track in culture and teaching (including critical white studies, immigrant and urban education, popular culture, and teacher preparation and development).

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.

Prerequisites for Admission—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. A master’s degree is also generally required for admission to the Ph.D. program.

Special Application Requirements—Applicants must submit scores from the General Test of the Graduate Record Examination (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. Master’s and doctoral applications are reviewed by department faculty once per academic year, with December 1 as the deadline.

Courses—Refer to Curriculum and Instruction (CI), and Mathematics Education (MTHE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval. Students from other majors may include such courses subject to their own program’s approval.

M.A. Degree Requirements
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.

Language Requirements—Although language requirements for second languages and cultures (SLC) students are not specified in terms of degrees or coursework, each SLC student must give evidence of proficiency in communicating within the second language of choice. There is no language requirement for other tracks.

Final Exam—The final exam is oral.

Minor Requirements for Students
Majoring in Other Fields—A master’s minor requires a minimum of 6 credits selected in consultation with the director of graduate studies.

Ph.D. Degree Requirements
A total of 78 credits is required for the Ph.D. Requirements include three core courses (CI 8131, 8132, 8133 for 9 credits) and at least 15 other credits in the selected track. Students must also complete 12 credits in research methodology; 6 credits in educational foundations; 12 credits in a minor or supporting program; and 24 thesis credits.

Specific courses and additional work vary depending upon the track and are planned with the adviser.

Language Requirements—Although language requirements for second languages and cultures (SLC) students are not specified in terms of degrees or coursework, each SLC student must give evidence of proficiency in communicating within the second language of choice. There is no language requirement for other tracks.

Minor Requirements for Students
Majoring in Other Fields—A minimum of 12 credits is required for a minor. Requirements include a demonstrated understanding of foundational knowledge related to curriculum and instruction and consultation with the director of graduate studies.

Education Sciences

Minor Only

Contact Information—Minnesota Interdisciplinary Training in Education Research Program office, Education Sciences Building, 56 East River Parkway, Minneapolis, MN 55455 (612-626-8269; fax 612-626-8123; MITER@umn.edu; http://education.umn.edu/MITER). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Apostolos P. Georgopoulos, Neuroscience, M

Professor
Mark L. Davison, Educational Psychology, M
Christine Espin, Educational Psychology, M
Michael R. Harwell, Educational Psychology, M
David W. Johnson, Educational Psychology, M
Frances P. Lawrenz, Educational Psychology, M
Gordon E. Legge, Psychology, M
Geoffrey M. Maryama, Educational Psychology, M
Matt McGue, Psychology, M
Samuel L. Myers, Jr., HHH Institute of Public Affairs, M
J. B. Overmier, Psychology, M
Anthony D. Pellegrini, Educational Psychology, M
Michael D. Resnick, Pediatrics, M
Educational Policy and Administration

Contact Information—Department of Educational Policy and Administration, University of Minnesota, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006); fax 612-624-3377; edpagrad@umn.edu [http://education.umn.edu/edpa/].

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

Professor

Carole J. Bland, Family Medicine and Community Health, ASM
Robert H. Bruininks, Educational Psychology, SM
David W. Chapman, SM
Gerald W. Fry, SM
Jeanne L. Higbee, AM
David R. Johnson, SM
Jean A. King, SM
Robert B. Kvavik, Political Science, ASM
Theodore Lewis, Work and Human Resource Education, ASM
Linda Cleary-Miller, English, Duluth, AM2
Neal C. Nickerson (emeritus), ASM
R. Michael Paige, SM
Karen Rose Seashore, SM
Jennifer York-Barr, SM
James E. Ysseldyke, Educational Psychology, ASM

Associate Professor

Nicola A. Alexander, SM
Melissa S. Anderson, SM
Heidi L. Barajas, AM2
C. Cryss Brunner, SM
Frank A. Gulbrandsen, Duluth, ASM
Arthur M. Harris, SM
Darwin D. Hendel, SM
Mary Hermes, Duluth, ASM
Walt Jacobs, AM
Helen Mongan-Rallis, Duluth, AM2
Byron J. Schneider, M2
Joyce Strand, Duluth, AM
Catherine A. Wambach, AM

Assistant Professor

David R. Arrendale, AM
Rashe R. Jehangir, AM
Scott C. McLeod, SM
Karen L. Mirksh, AM
Stuart S. Yeh, SM

Lecturer

Noro R. Andriamanalina, AM2
Rusty Barceló, AM
Dale A. Blythe, AM2
Joan G. Delaetghere, M2
William P. Donohue, AM
Beverly J. Dretke, AM2
Amy S. Hewitt, AM2
Richard D. Howard, M
Deanne L. Magnusson, AM2
Joseph H. Nathan, Public Affairs, AM2
Richard D. Nunneley, ASM
Robert K. Poch, AM2
Kyla L. Wahlstrom, AM2
Ann Z. Werner, AM2

Other

Joyce Ann Walker, AM2
Kyla L. Wahlstrom, AM2

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

Curriculum—The Department of Educational Policy and Administration 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. Students in the M.A. and Ph.D. programs choose from one of four complementary but distinct program tracks: educational administration (EdAd), evaluation studies (ES), higher education (HiEd), and comparative and international development education (CIDE). In addition, the department offers a variety of Ed.D. programs for practicing professionals and four PK-12 administrative licensure programs.

The department also offers various certificate programs (including school technology leadership program evaluation, staff development, disability policy and services, and postsecondary developmental education), an individualized concentration in youth leadership development, and minors in international education, social and philosophic studies of education, and program evaluation. See the department Web site address above 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.

Prerequisites for Admission—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)) 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 (CID, ES and HiEd) and all tracks in the doctoral degree programs (Ed.D. 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, except those for the CID Ph.D., are reviewed twice per semester. CID Ph.D. applications are reviewed on January 15 only. Submission of all application materials for all tracks by January 15 is strongly encouraged to ensure priority consideration for assistantships awarded on March 1 for the next academic year. 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 sent directly to the department. The Graduate School application, GRE scores, transcripts (sent directly from the institution[s]), and TOEFL/IELTS score are sent to the Graduate School.

Centers—College centers directed by department faculty include the Institute on Community Integration (IC), the Minnesota Postsecondary Education Research Institute (Minnesota-PERI) and the Center for Applied Research and Educational Improvement (CAREI). The centers provide research and graduate assistantship opportunities for department graduate students.

Courses—Refer to Educational Policy and Administration (EDPA) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.A. Degree Requirements
The master’s is available under four program tracks: educational administration, evaluation studies, higher education, or comparative and international development education. The minimum total of course credits required for the degree program is 34-37 credits. The program emphasizes breadth of preparation in educational policy and administration and in related fields. 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 Ph.D. degree is offered in two areas in educational policy and administration: educational administration (PK-12 schools) and higher education. Cohorts include those in the metropolitan area, out state Minnesota, and international schools. The Ph.D. degree is offered only in the context of cohort programs of 20-30 students each.

Ph.D. Degree Requirements
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 10 credits in department core courses, 18 or more credits in program core courses, 12 or more credits of research methodology 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 Web site 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.

Language Requirements—None. Final Exam—The final exam is oral.

Ed.S. Certificate Requirements
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 thirty credits may be transferred from other programs outside the College of Education and Human Development or from other accredited universities. Registration for EDPA 5385—Licensure Seminar and EDPA 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.

Ed.D. Degree Requirements
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 in educational policy and administration: educational administration (PK-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 76-credit or more 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 Web site address above 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.

Language Requirements—None.

Final Exam—The final exam is an oral defense.

Educational Psychology

Contact Information—Director of Graduate Studies Assistant, Department of Educational Psychology, University of Minnesota, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-4156; fax 612-624-8241; epsy-adm@umn.edu; wwww.education.umn.edu/EdPsyeh).

For specific track materials, contact the tracks as follows:
Counseling and Student Personnel Psychology, University of Minnesota, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-6827; fax 612-624-8241; cpp-psych@umn.edu).

Psychological Foundations of Education, University of Minnesota, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-0042; fax 612-624-8241; epsy-adm@umn.edu).

Quantitative Methods in Education, University of Minnesota, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-0042; fax 612-624-8241; epsy-adm@umn.edu).

School Psychology, University of Minnesota, 344 Elliott Hall, 75 E. River Road, Minneapolis, MN 55455 (612-624-4156; fax 612-624-0879; chpsych@umn.edu).

Special Education, University of Minnesota, 206 Burton Hall, 178 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-0367; fax 612-624-8241; sped-adm@umn.edu).

For latest graduate faculty listings, see wwww.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
William M. Bart, SM
Robert H. Bruininks, SM
Sandra L. Christenson, SM
Eli Coleman, Family Medicine and Community Health, ASM
Nicki R. Crick, Child Development, ASM
Mark L. Davison, SM
Stanley L. Deno, SM
Byron Egeland, Child Development, ASM
Curriculum—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).

Prerequisites for Admission—There are no special prerequisites for admission at the M.A. level in any of the five tracks, or at the Ph.D level in school psychology, psychological foundations of education, or quantitative methods in education. Applicants to the CSPP doctoral track should hold either a bachelor's or master's degree with a major in psychology, education, counseling, or a related field. CSPP applicants interested in earning the specialist certificate should hold an M.A. degree; if not, they should apply to both the M.A. and specialist certificate programs.

Special Application Requirements—Applicants must submit a department application (with clear indication of the desired track), a statement of goals and interests, three letters of recommendation, and a Graduate School application 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. Please check directly with the program offices for current deadlines.

Courses—Refer to Educational Psychology (EPSY) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—None of the five tracks allow 4xxx or 6xxx coursework to be counted toward Graduate School degree program requirements.

Educational Psychology—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.

M.A. Degree Requirements

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.

Language Requirements—None.

Final Exam—The final exam is written; students must also submit a portfolio.

Minor Requirements for Students

Majoring in Other Fields—A master’s minor requires at least 6 credits of graduate-level EPSY courses.

Ph.D. Degree Requirements

Students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods); 51 credits in counseling theory and practice, practica, and internships; 12 credits in a supporting program or minor; and 24 thesis credits.

Language Requirements—None.

Minor Requirements for Students

Majoring in Other Fields—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.

Certificate of Specialist Requirements

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.

Language Requirements—None.

Final Exam—The final exam is oral.

K–12 School Counseling (for those seeking licensure only)

This licensure program is designed for professionals who already hold a master’s degree in counseling or a related field and want to broaden their career development with a K–12 school counseling license. It aligns with the licensing requirements of the Minnesota Department of Education and state licensing board.

Educational Psychology—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 M.A. and Ph.D. degrees with 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.

M.A. Degree Requirements
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.

Language Requirements—None.
Final Exam—The final exam is oral.
Minor Requirements for Students
Majoring in Other Fields—A master’s minor requires at least 6 credits of graduate-level EPSY courses.

Ph.D. Degree Requirements
Students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods), EPSY electives, 12 credits in a supporting program or minor, and 24 thesis credits. In consultation with their advisers, students develop a curriculum and select courses and practicum placements that are appropriate for their interests, prior experience, and career directions.

Language Requirements—None.
Minor Requirements for Students
Majoring in Other Fields—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.

Educational Psychology—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. Students 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.

M.A. Degree Requirements
School psychology does not offer the M.A. as a terminal degree; rather the M.A. is required to obtain the Ed.S. 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, 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).

Language Requirements—None.
Final Exam—The final exam is oral.
Minor Requirements for Students
Majoring in Other Fields—A master’s minor requires at least 6 credits of graduate-level EPSY courses.

Ph.D. Degree Requirements
The Ph.D. program educates future school-based researchers with emphases in family/school partnerships, accountability systems, school dropouts, and school outcomes and interventions for children/adolescents at risk. Students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods). In consultation with their advisers, students develop a curriculum and select courses and practica placements that are appropriate for their interests, prior experience, and career directions.

Language Requirements—None.
Minor Requirements for Students
Majoring in Other Fields—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.

Certificate of Specialist Requirements
The specialist program is designed for students who want to become practitioners. It meets the Minnesota certification requirements for school psychologists. 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).

Language Requirements—None.
Final Exam—The final exam is written.

Educational Psychology—Special Education
M.A., Ph.D., and certificate of specialist degrees are offered in special education in the following specializations: 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.
Certificate of Specialist Requirements  
Students must complete at least 60 credits, including credits in EPSY core courses (statistics, measurement, learning, social psychology, and research methods) and 6 credits of special education foundations. The remaining coursework usually focuses on two or more special education areas, determined in consultation with the adviser.

Language Requirements—None.

Final Exam—The final exam is oral.

Electrical Engineering

Contact Information—Director of Graduate Studies, Department of Electrical Engineering, University of Minnesota, 4-178 200 Union Street S.E., Minneapolis, MN 55455 (612-625-3564; fax 612-625-4583; graduate_studies@ece.umn.edu; www.ece.umn.edu).

For latest graduate faculty listings, see: www.grad.umn.edu/faculty_rosters/faculty.html.

Professor  
Mussaoud Amin, SM  
Stephen A. Campbell, SM  
Vladimir Cherkassky, SM  
Philip I. Cohen, SM  
E. Dan Dahlberg, Physics, ASM  
David H. Du, Computer Science and Engineering, ASM  
Tryphon T. Georgiou, SM  
Georgios Giannakis, SM  
Anand Gopinath, SM  
Bruce E. Hammer, Radiology, ASM  
Ramesh Harjani, SM  
Bin He, Biomedical Engineering, ASM  
Jack H. Judy (emeritus), ASM  
Mostafa Kaveh, SM  
John C. Kieffer, SM  
Richard A. Kiehl, SM  
Larry L. Kinney, SM  
K. S. P. Kumar (emeritus), ASM  
Vipin Kumar, Computer Science and Engineering, ASM  
James R. Leger, SM  
David J. Lilja, SM  
Zhi-Quan Luo, SM  
Ned Mohan, SM  
Jaekyun Moon, SM  
Hal Ottesen, Rochester, ASM  
Nikolaos P. Papanikolopoulos, Computer Science and Engineering, ASM  
Keshab K. Parhi, SM  
Robert P. Patterson, Physical Medicine and Rehabilitation, ASM  
William T. Peria (emeritus), SM  
Dennis L. Polla, SM  
William P. Robbins, SM  
P. Paul Ruden, SM  
Sachin Sapatnekar, SM  
Guilermo Sapiro, SM  
Marian S. Stachowicz, Duluth, ASM  
Ahmed H. Tewfik, SM  
J. Thomas Vaughan, Radiology, Magnetic Resonance Research, ASM  
Randall H. Victoria, SM  

Bruce F. Wollenberg, SM  
Paul R. Woodward, Astronomy, ASM  
Pen-Chang Yew, Computer Science and Engineering, ASM  
Ofer Zeitouni, Mathematics, ASM  
Zhi-Li Zhang, Computer Science and Engineering, ASM  

Associate Professor  
Kiarash Bazargan, SM  
Phonda Drayton, SM  
Emad Ebbini, SM  
Douglas W. Ernie, SM  
Ted K. Higman, SM  
James E. Holte, SM  
Allison Hubel, Mechanical Engineering, ASM  
Heinrich O. Jacobs, SM  
Thomas S. Lee (emeritus), ASM  
Thomas Alfred Posbergh, AM  
Jaijeet Roychowdhury, SM  
Gerald E. Sobelman, SM  
Bethanie J. Stadler, SM  
Joseph J. Talghader, SM  
Richard M. Voyles, Computer Science and Engineering, ASM  
Jian-Ping Wang, SM  
Euisik Yoon, SM  

Assistant Professor  
Tuner Akkin, Biomedical Engineering, ASM  
Demos Gebe Egzielahier, Aerospace Engineering and Mechanics, AM2  
Nihar Jindal, SM  
Mihailo Jovanovic, SM  
Chris Hyung-il Kim, SM  
San-Hyun Oh, SM  
Marc Riedel, SM  
Stergios Roumeliotis, Computer Science and Engineering, ASM  
Antonia B. Zhai, Computer Science and Engineering, ASM  

Adjunct  
Gregory T. Cibuzar, Microtechnology Laboratory, AM  
Gabriel C. Ebeje, Cargill, AM  
Barry K. Gilbert, Mayo Clinic, ASM  
Paul Jay Imberson, AM  
Jon Kindred, AM  
Matthew T. O’Keefe, Sistina Software, ASM  
Robert A. Sainati, 3M, ASM  
Frank G. Soltis, IBM, ASM  

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

Curriculum—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.

Prerequisites for Admission—Graduate work is open to students who have shown exceptional scholarship and ability in an accredited undergraduate curriculum in electrical engineering or physics. Consideration is given to students who have completed another curriculum in engineering, science, 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. Students whose training is in engineering technology will not be considered for admission.

Special Application Requirements—Scores from the GRE (General Test only) are required of all students, except graduates of the University of Minnesota and part-time students working in industry. International students applying from within the United States should furnish letters from U.S. faculty members attesting to their ability to understand technical instruction in English. Students submitting transcripts from non-American institutions should furnish letters of recommendation that verify their academic standing in a specific way (e.g., class rank). Very few students are accepted for enrollment in spring semester or summer term. Applicants for fall semester admission should file a completed admission application with the Graduate School by December 15 for admission the following September. All students applying for graduate study should submit online the Electrical Engineering Graduate Program Application form. Please read detailed information on the application requirements for applying to the program at www.ece.umn.edu/admissions/graduate.shtml.

Courses—Refer to Electrical Engineering (EE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4EE 4xxx courses acceptable for major field credit: EE 4301, 4541, 4701, 4721, and 4741. Non-EE 4xxx courses acceptable for supporting/related field credit: Math 4151, 4152, 4242, 4567, and 4606, and Stat 4101. All 4xxx physics courses are acceptable for graduate credit. No 4xxx computer science, mechanical engineering, or industrial engineering courses are acceptable for graduate credit.

M.S.E.E. Degree Requirements
Every M.S.E.E. degree program must include 30 credits including at least 14 credits from EE courses at 5xxx or higher (a few 4xxx EE courses can be used for the program) and at least 6 credits from courses outside EE at 4xxx or higher (normally from departments in the Institute of Technology or School of Statistics). These credits cannot come from colloquia or seminar registrations. A Plan A program (with thesis) cannot include more than 2 credits from projects, seminars, special investigations, or directed studies; in a Plan C program (coursework only), the limit is 2 credits. The Plan A program should include 10 thesis credits. 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 M.S.E.E. program. The department limits the number of GRAD 999 registrations.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—The 6 credits for the master’s minor must be from classroom and laboratory courses graded A-F. Colloquia, seminar, and special investigations credits do not count toward meeting the minor requirements.

Ph.D. Degree Requirements
The Ph.D. requires at least 40 course credits including at least 6 credits in 8xxx courses, at least 14 credits in EE courses, and at least 12 credits in the supporting program or minor, which cannot include EE courses. In addition, 24 thesis credits are required. The program may contain up to 2 credits from seminars or special investigations (excluding colloquia and practical training). and up to 8 credits of M.S. thesis registration, none of which can be used to meet the major requirements above. No credits can be included from colloquia or M.S. Plan B projects. At least 14 credits must be coursework taken at the University of Minnesota. 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 second year of the Ph.D. program. Each Ph.D. student must participate in one of the department research area seminars and make at least three oral paper presentations before the thesis proposal is approved.

Minor Requirements for Students

Majoring in Other Fields—The 12 credits for the Ph.D. minor must be from classroom and laboratory courses graded A-F. Colloquia, seminar, and special investigations credits do not count toward meeting the minor requirements.

Elementary Education
See Education, Curriculum, and Instruction.

English
Contact Information—Director of Graduate Studies, Department of English, University of Minnesota, 204 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-625-3882; fax 612-624-8228; gradeng@umn.edu; www.english.ela.umn.edu/grad).

For latest graduate faculty listings, see www.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Thomas S. Clayton, SM
Patricia M. Hampil, SM

Professor
Kent R. Biles, SM
Timothy Brennan, Cultural Studies and Comparative Literature, SM
Michael Dennis Browne, SM
Andrew Elfenbein, SM
Genevieve J. Escore, SM
Peter E. Firchow, SM
Shirley N. Garner, SM
Ray Gonzalez, SM
Edward M. Griffin, SM
Laura J. Gurak, Rhetoric, AM2
David B. Haley, SM
Michael Hancher, SM
Gordon D. Hirsch, SM
Karen A. Hoyle, Children’s Literature Research Collections, AM2
Ellen Messer-Davidow, SM
John W. Mowitt, Cultural Studies and Comparative Literature, SM
Paula Rabinsonowitz, SM
Donald J. Ross, Jr., SM
Geoffrey Sirc, SM
Madelon Sprengnether, SM
John A. Watkins, SM
Joel C. Weinsheimer, SM
John S. Wright, SM

Associate Professor
Robert L. Brown, Jr., Cultural Studies and Comparative Literature, ASM
Lois Cucullu, SM
Maria Damon, SM
Lianna H. Farber, SM
Maria J. Fitzgerald, SM
Lianna H. Farber, SM
Lois Cucullu, SM
Paula Rabinsonowitz, SM
Brian B. Goldberg, SM
Qadri Ismail, SM
Rebecca L. Krug, SM
Josephine D. Lee, SM
Evelyn Nien-Ming Ch’ien, M2
Daniel J. Philippin, Rhetoric, AM2
Janette Scandura, SM
Andrew Scheil, M2
Katherine W. Scheil, SM
Julie Schumacher, SM
Charles J. Sugnet, SM
David R. Teuer, SM
Michelle M. Wright, SM

Assistant Professor
Tony C. Brown, M2
Siobhan Craig, M2
Kirsten Jansen, Departmental Director, Writing Center, M2
David B. Luke, M2
Natasha Tinsley, M2
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—Over the past 20 years, the field of English studies has dramatically changed 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.

The department offers two master’s degrees, the master of arts in English language and literature, and the master of fine arts in creative writing (see listing under Creative Writing). 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 Ph.D. and M.A. programs are broadly defined, allowing the student to shape a personal program of study. The English program encourages and supports interdisciplinary work. The M.F.A. program requires coursework in English and writing and emphasizes intensive work on a creative project.

Admission to the Program—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.

Prerequisites for Admission—A minimum of four courses in English, three of which must be at the upper division level, is required for degree programs and the graduate minor. The courses should be widely distributed.

Special Application Requirements—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, are required. Applications to the M.F.A. in creative writing are reviewed by the Creative Writing faculty; these applications should include a substantial portfolio of writing. Candidates for all degrees are admitted fall semester only; all materials must be received by December 20.

Courses—Refer to English: Creative Writing (ENGW), and English: Literature (ENGL) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—A limited number of 4xxx courses may be included as appropriate for field and area requirements. Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.A. Plan B Degree Requirements
The minimum requirement for the M.A. is 30 credits. Coursework must include at least 24 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 sequence ENGL 5001-02 on methods and theory of literary study and three Plan B papers.

Language Requirements—A reading knowledge of one classical or modern language, approved by the director of graduate studies, is required.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The master’s minor consists of 9 credits in English. Course selection is determined in consultation with the director of graduate studies.

Ph.D. Degree Requirements
A minimum of 42 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 5002, preferably during the first year of doctoral study (6 credits); four English courses distributed among broad areas (minimum of 12 credits); four additional English courses in a focused area of emphasis (minimum of 12 credits); 12 credits in a supporting program. Students are encouraged to enroll in additional courses as appropriate.

Language Requirements—Proficiency in one language, classical or modern, or a reading knowledge of two, approved by the director of graduate studies, is required. Students specializing in medieval or early modern literature and culture are advised to include Latin as one of their languages.

Minor Requirements for Students Majoring in Other Fields—The Ph.D. minor consists of 12 credits in English. Course selection is determined in consultation with the director of graduate studies.

English as a Second Language

Contact Information—Director of Graduate Studies, English as a Second Language, University of Minnesota, 215 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3331; fax 612-624-4579; fleesumn.edu/www.iles
um.edu/esl).

For latest graduate faculty listings, see www.

Professor Andrew D. Cohen, M2
Carol Klee, AM
Elair T. Tawne, M2

Associate Professor
Martha Bigelow, AM
Kathryn Kohnert, AM
Anne Lazaraton, M2

Other
Jenise Rowekamp, AM

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

Curriculum—The program in English as a second language (ESL) 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 in language analysis, language acquisition, teaching methodology, materials development, and uses of technology in language teaching. 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 ESL today.

Prerequisites for Admission—A bachelor’s degree in the liberal arts or sciences with a strong academic record is required.

Special Application Requirements—Scores from the General (Aptitude) Test of the GRE and three letters of reference, are required. Nonnative speakers of English must submit either TOEFL scores (preferred 600 [paper], 250 [computer], or 100 [Internet]), or IELTS scores (preferred ?). Students may begin the program fall semester or first summer session. Applications for both admission dates are due on February 1.

Courses—Refer to Teaching English as a Second Language (TESL) in the course section of this catalog for courses pertaining to the program.
Degree Programs and Faculty

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.A. Degree Requirements

The M.A. program in ENSL normally takes at least two years to complete. The Plan A option 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. The Plan B option 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 28 credits in required coursework and 6 credits of elective coursework in related fields. Plan A students must complete an additional 10 thesis credits for a total of 44 credits and Plan B students must complete an additional 3 credits in elective coursework for a total of 37 credits. Elective and related field courses must be chosen with the help of an adviser to ensure the relevance of courses to students’ goals.

Language Requirements—Proficiency, demonstrated by exam or coursework, in one language not native to the student is required upon completion of the program. Nonnative speakers of English who are admitted to the program are considered to have fulfilled the language requirement.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—For a minor in ESL, students must take TESL 5721, 5401, and 5402, for a total of 11 credits.

Entomology

Contact Information—Director of Graduate Studies, Department of Entomology, University of Minnesota, 219A Hodson Hall, 1980 Folwell Avenue, St. Paul, MN 55108; 612-624-3636; fax 612-625-5299. www.entomology.umn.edu

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

David A. Andow, SM
Mark E. Ascerno, Jr., SM
Ann M. Fallon, SM
Leonard C. Ferrington, SM
Ralph W. Holzenthal, SM
William D. Hutchison, SM
Timothy J. Kurtti, SM
Karen A. Mesce, SM
Roger D. Moon, SM
Kenneth R. Ostlie, SM
Edward B. Radcliffe, SM
David W. Ragsdale, SM
Marla Spivak, SM

Adjunct Professor

William E. Miller, SM

Associate Professor

George E. Heimpel, SM
Vera A. Krischik, SM
Ian V. MacRae, SM
Uli Munderloh, SM
George D. Weinher, SM
Susan J. Weller, SM

Adjunct Associate Professor

Susan Palchick-Silver, M2
Robert C. Venette, M2

Assistant Professor

Stephen A. Kells, SM

Adjunct Assistant Professor

Luke Skinner, M2

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

Curriculum—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 the natural and urban environments.

Prerequisites 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 and letters of recommendation.

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 must be sent directly to the department. A 3.00 GPA (on a 4.00 scale) for undergraduate work, and 3.50 for prior graduate work are preferred for admission. GRE scores are required for admission. The preferred performance level on the GRE’s is about the 70th percentile in each of the Verbal and Quantitative exams; however, admissions decisions are not based solely on GRE scores. All credentials in the application packet are considered in reaching an individual admission decision for each applicant. For non-English speaking students, a minimum score on the TOEFL exam of 550 (paper), 213 (computer), or 79 (Internet) is preferred for admission. Deadline for application is December 15. Under exceptional circumstances, students may apply and be accepted at other times of year. Applications are reviewed individually when all materials are complete.

Courses—Refer to Entomology (ENT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is allowed but is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements

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. 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 6 credits in 4xxx, 5xxx, or 8xxx entomology courses.

Ph.D. Degree Requirements

Ph.D. requirements include a minimum of at least 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The doctoral minor requires a minimum of 12 credits in 4xxx, 5xxx, or 8xxx entomology courses.

Environmental Health

Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455; 612-626-3500 or 1-800-774-8636; fax 612-624-4498; sph-ssc@umn.edu (www.sph.umn.edu)

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

Timothy R. Church, SM
Susan G. Gerberich, SM
Sagar M. Goyal, Veterinary Population Medicine, ASM
Jordan L. Holtzman, Medicine, ASM
Patricia M. McGovern, SM
Lisa A. Peterson, SM
Gurumurthy Ramachandran, SM
Applicants must indicate an interest in one of the following specialties within the major: environmental chemistry, environmental health policy, infectious disease, environmental and occupational epidemiology, environmental toxicology, the general environmental health program, occupational health nursing, occupational injury epidemiology and control, or the industrial hygiene program. 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).

Prerequisites for Admission—Minimum requirements include a baccalaureate degree with coursework in the basic sciences. Each specialty requires slightly different preparation.

Special Application Requirements—GRE scores, a letter describing the applicant's professional objectives, and three letters of recommendation are required.

Courses—Refer to Public Health (PUBH), particularly numbers 81xx, in the course section of this catalog for courses pertaining to the program. See http://onestop2.umn.edu/courses/tc/designators.js for 61xx–71xx courses.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to the approval of the adviser and the director of graduate studies. Students from other majors may include such courses subject to their own program’s approval.

M.S. Degree Requirements
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 depends 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—Students completing a minor in environmental health must complete 6 credits in environmental health, including PUBH 6103, 6104, and 6105.

Ph.D. Degree Requirements
The Ph.D. focuses on research, supplemented with advanced coursework developed under the guidance of a faculty adviser and a Ph.D. committee. Students are required to register for 24 thesis credits. Students usually need a minimum of two to three years beyond the master’s degree to complete a doctorate.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—Students are required to take a minimum of 12 credits in environmental health, including PUBH 6103, 6104, and 6105.

Epidemiology
Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax 612-626-6931; sph-ssc@umn.edu; www.sph.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Professor
Henry Blackburn, Jr. (emeritus), ASM
Timothy R. Church, M2
Richard S. Crow, M2
John R. Finnegan, Jr., SM
Aaron R. Folsom, SM
Jean L. Forster, M2
Simone A. French, M2
Laëll C. Gatewood, Laboratory Medicine and Pathology, M2
Richard H. Grimm, Medicine, SM
Myron D. Gross, Laboratory Medicine and Pathology, M2
Bernard L. Harlow, M2
John H. Himes, SM
David R. Jacobs, Jr., SM
Robert W. Jeffery, SM
Robert L. Kane, SM
Harry A. Lando, SM
Arthur S. Leon, Kinesiology, SM
Alan R. Lifson, M2
Russell V. Lupeker, SM
Leslie L. Lytle, SM
A. Marshall McBain, M2
Joseph P. Neglia, Pediatrics, M2
Dianne Neumark-Sztainer, M2
Michael T. Osterholm, SM
Marguerite Pappaioanou, M2
Cheryl L. Perry, SM
Julie A. Ross, Pediatrics, SM
B. R. Rossmer, M2
Pamela J. Schreiner, SM
Mary T. Story, SM

Associate Professor
Bruce H. Alexander, M2
Kristin E. Anderson, SM
Jeff B. Bender, Veterinary Population Medicine, M2
Lisa J. Harnack, M2
Craig W. Hedberg, M2
Wendy L. Hellerstedt, SM
Deborah J. Hennrikus, M2
Rhonda J. Jones-Webb, M2
DeAnn Lazovich, M2
George Maldonado, M2
Ann C. Mertens, Pediatrics, M2
J. Michael Oakes, M2
Charles N. Oberg, M2
James S. Pankow, SM
Mark A. Pereira, M2
Randall Singer, Veterinary Pathobiology, M2
Lyn M. Steffen, M2

Instructor
Debra K. Olson, SM
Kirk E. Smith, Veterinary Population Medicine, AM2

Other
Jeff B. Bender, ASM

Adjunct Associate Professor
Alan P. Bender, Epidemiology, AM2
Rita B. Messing, Pharmacology, AM2

Assistant Professor
L. Ronald French, Epidemiology, AM2
Nancy Nachreiner, SM
Peter Raynor, SM

Adjunct Assistant Professor
Beth A. Baker, Medicine, ASM
Hillary M. Carpenter, AM2
Nicole V. McCullough, AM2
John R. Mulhausen, ASM
Robert R. Roy, Veterinary Population Medicine, AM2
Allan N. Williams, ASM

Adjunct Professor
Debora Boyle, Veterinary Population Medicine, ASM

Special Application Requirements
GRE scores, a letter describing the applicant’s professional objectives, and three letters of recommendation are required.

Courses—Refer to Public Health (PUBH), particularly numbers 81xx, in the course section of this catalog for courses pertaining to the program. See http://onestop2.umn.edu/courses/tc/designators.js for 61xx–71xx courses.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to the approval of the adviser and the director of graduate studies. Students from other majors may include such courses subject to their own program’s approval.

M.S. Degree Requirements
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 depends 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—Students completing a minor in environmental health must complete 6 credits in environmental health, including PUBH 6103, 6104, and 6105.

Ph.D. Degree Requirements
The Ph.D. focuses on research, supplemented with advanced coursework developed under the guidance of a faculty adviser and a Ph.D. committee. Students are required to register for 24 thesis credits. Students usually need a minimum of two to three years beyond the master’s degree to complete a doctorate.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—Students are required to take a minimum of 12 credits in environmental health, including PUBH 6103, 6104, and 6105.

Epidemiology
Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax 612-626-6931; sph-ssc@umn.edu; www.sph.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Professor
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Myron D. Gross, Laboratory Medicine and Pathology, M2
Bernard L. Harlow, M2
John H. Himes, SM
David R. Jacobs, Jr., SM
Robert W. Jeffery, SM
Robert L. Kane, SM
Harry A. Lando, SM
Arthur S. Leon, Kinesiology, SM
Alan R. Lifson, M2
Russell V. Lupeker, SM
Leslie L. Lytle, SM
A. Marshall McBain, M2
Joseph P. Neglia, Pediatrics, M2
Dianne Neumark-Sztainer, M2
Michael T. Osterholm, SM
Marguerite Pappaioanou, M2
Cheryl L. Perry, SM
Julie A. Ross, Pediatrics, SM
B. R. Rossmer, M2
Pamela J. Schreiner, SM
Mary T. Story, SM

Associate Professor
Bruce H. Alexander, M2
Kristin E. Anderson, SM
Jeff B. Bender, Veterinary Population Medicine, M2
Lisa J. Harnack, M2
Craig W. Hedberg, M2
Wendy L. Hellerstedt, SM
Deborah J. Hennrikus, M2
Rhonda J. Jones-Webb, M2
DeAnn Lazovich, M2
George Maldonado, M2
Ann C. Mertens, Pediatrics, M2
J. Michael Oakes, M2
Charles N. Oberg, M2
James S. Pankow, SM
Mark A. Pereira, M2
Randall Singer, Veterinary Pathobiology, M2
Lyn M. Steffen, M2

Instructor
Debra K. Olson, SM
Kirk E. Smith, Veterinary Population Medicine, AM2

Other
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Peter Raynor, SM

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Hillary M. Carpenter, AM2
Nicole V. McCullough, AM2
John R. Mulhausen, ASM
Robert R. Roy, Veterinary Population Medicine, AM2
Allan N. Williams, ASM

Instructor
Debra K. Olson, SM
Kirk E. Smith, Veterinary Population Medicine, AM2

Other
Jeff B. Bender, ASM

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

Curriculum—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.
Degree Programs and Faculty

Traci L. Toomey, M2
Michelle van Ryn, Family Medicine and Community Health, M2
Beth A. Vining, M2
Jian-Min Yuan, M2

Adjunct Associate Professor
Alan P. Bender, M2
Kelli A. Komro, SM

Assistant Professor
Susan J. Duval, M2
Marla E. Eisenberg, Pediatrics, M2
Darin J. Erickson, M2
Andrew P. Flood, M2
Eileen M. Harwood, M2
Jennifer A. Linde, M2
Michael B. Miller, M2
Kathy L. Moser, Medicine, M2
Claudia A. Munoz-Zanzi, M2
Melissa Nelson, M2
Kimberly Robien, M2
John R. Sirad, M2
Logan G. Spector, Pediatrics, M2

Adjunct Assistant Professor
Sally A. Bushhouse, M2
Richard N. Danila, M2
John W. Oswald, M2

Senior Research Fellow
Peter J. Hannan, M2

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

Curriculum—The program provides students with the core methodological skills needed to address chronic or acute diseases, long-term or newly emerging health problems, and behavioral and biological aspects of health and disease. The doctoral program is for students interested in research and teaching careers in the health sciences. Courses are also available to students from other public health and health-related programs.

Students may select areas of concentration appropriate to their academic interests and career objectives, including the epidemiologic and public health aspects of cardiovascular disease; cancer; infectious diseases; alcohol, tobacco, and other substance abuse; maternal, child, and reproductive health; women’s health; nutrition; genetic epidemiology; behavioral interventions; and epidemiologic research methods. A detailed description of the course of study may be obtained online or by contacting the major coordinator at gradstudies@epi.umn.ed

Prerequisites for Admission—For the doctoral program, applicants must have completed or be about to complete a master’s degree in a related field. Applicants should have prior coursework in life or behavioral sciences. Applicants who have not completed a master’s degree in epidemiology or a related field are asked to apply to the master’s of public health in epidemiology through the School of Public Health. Because positions in the doctoral program are limited, selection is competitive with respect to academic background and experience.

Special Application Requirements—The following materials are required by the department. The program’s strong emphasis on methodology, quantitative aptitude is very important. This can be demonstrated by a 70th percentile on the quantitative section of the GRE and satisfactory grades in college-level quantitative courses. At least three recommendations (form and separate letter) from faculty 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) demonstrating evidence of their capability in or potential for original research in a specific epidemiologic area and, if possible, indicating interest in particular methodologies or study designs. Serious doctoral applicants are encouraged to contact the major coordinator at gradstudies@epi.umn.ed before applying. Students begin their studies in the fall semester. Applications must be completed by January 15 of the same year for the doctoral program for scholarship consideration; the final deadline is February 15.

For an online application, see the School of Public Health Web site at www.sph.umn.ed

Note: Students who are or ever were a student in the University of Minnesota Graduate School and are applying to any graduate or professional program in the University of Minnesota, must complete a change of status application. See the Graduate School Web site for the appropriate form and fee at www.grad.umn.edu/current_students/forms/cos.pdf.

Courses—Refer to the epidemiology Ph.D. program sheet available on the School of Public Health Web site for courses pertaining to the program at www.sph.umn.edu/education/epiphd/home.html.

Use of 4xxx Courses—Inclusion of any 4xxx courses on degree program forms of majors or minors is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements

Students are not admitted directly into the master’s 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’s of public health (M.P.H.) degree through the School of Public Health (SPH). For more information on the M.P.H. degree please go to the SPH Web site at www.sph.umn.edu.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The master’s minor requires 20 credits; 16 credits in epidemiology and biostatistics core courses; 10 credits in advanced courses (epidemiological theory, teaching practicum, writing research grants, seminars on epidemiologic issues); 4-6 credits in Ph.D.-specific electives; 24 thesis credits; 6-8 credits (three courses) of epidemiology-related interventions/methods taken from a menu of courses (e.g., cancer epidemiology, public health policy as a prevention strategy, smoking intervention); and 7-9 credits in advanced biologically or behaviorally related courses.

Ergonomics

See Human Factors/Ergonomics.

Experimental Surgery

Contact Information and Faculty—See Surgery.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm. Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—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). The experimental surgery program provides an opportunity to gain practical research experience.

**Prerequisites for Admission**—Prospective students must be in the general surgery training program and have two to three clinical years of training completed.

**Courses**—For courses pertaining to the program, please refer to Surgery (SURG) in the course section of this catalog.

**Use of 4xxx Courses**—4xxx courses are not permitted toward degree requirements.

**M.S.Exp.Surg. Plan A Degree Requirements**
The M.S.Exp.Surg. is offered under Plan A only. At least 32 course credits (26 in the major and 6 in the minor or related fields) plus 10 thesis credits are required for a total of 42 credits.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

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### Family Policy

#### Minor Only

**Contact Information**—Graduate Minor in Family Policy, Department of Family Social Science, University of Minnesota, 290 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-625-3116; fax 612-625-4227; fsosgradinfo@che.umn.edu; http://fsos.che.umn.edu/graduate/ minor_fp.html). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Professor**
Jean W. Bauer, Family Social Science, M
Jeffrey L. Edleson, Social Work, M
Nancy Eustis, Public Affairs, M
Katherine Fennelly, HHH Institute for Public Affairs, M
David Hollister, Social Work, M
B. Jan McCulloch, Family Social Science, M
Jeylan T. Mortimer, Sociology, M
Samuel Myers, Public Affairs, M

Kathryn Rettig, Family Social Science, M
Marlene Stum, Family Social Science, M
Susan J. Wells, Social Work, M
Becky Yust, Design, Housing, and Apparel, M

**Associate Professor**
Marilyn Bruin, Design, Housing, and Apparel, M
Jeffrey R. Crump, Design, Housing, and Apparel, M
Elizabeth (Liz) E. Davis, Applied Economics, M
Maria Hanratty, Public Affairs, M
Kathleen E. Hall, Sociology
Linda E. Jones, Social Work, M
Erin L. Kelly, Sociology
Deborah Levison, Public Affairs, M
Elizabeth Lightfoot, Social Work, M
Joan Patterson, Epidemiology, M
Ann Ziebarth, Design, Housing, and Apparel, M

**Program Director**
Marcie Jefferys, Social Work, M

**Curriculum**—This minor is available to both master’s and doctoral students. The family policy minor provides a multidisciplinary academic foundation in the analysis of policies for their impact on families. Students completing the family policy minor are knowledgeable about major public and private policies affecting families, and understand how these policies came to be adopted, including social, economic, and political past and current influences. Participating students develop a framework in which to analyze policies for their impact on families, and an understanding of the differential impact on diverse families. Students may choose relevant courses from a variety of disciplines, including applied economics, family social science, housing, law, political science, public health, public policy, social work, and sociology. By integrating their knowledge across disciplines, students develop a comprehensive understanding of how families are affected by public and private policies.

**Prerequisites for Admission**—Admission is contingent upon prior admission to a master or doctoral degree-granting program within the Graduate School. Any graduate student currently in good standing in the Graduate School may elect to complete the minor.

**Special Application Requirements**—Students formally apply to the minor by completing the Application for Family Policy Minor and submitting to the director of graduate studies, family policy minor, prior to beginning courses. The PDF form is available at http://fsos.che.umn.edu/graduate.html.

**Courses**—Please contact the minor program office or http://fsos.che.umn.edu/graduate.html for information on relevant courses.

**Use of 4xxx Courses**—4xxx courses are not allowed in the minor.

**Minor Only Requirements**
The master’s minor is nine credits. FPOL 8000—Family Policy Perspectives is required plus 6 credits from one of the departments or professional schools’ elective courses on the course list. The doctoral minor is twelve credits. FPOL 8000—Family Policy Perspectives is required plus 9 additional credits from elective courses that make a coherent plan. The dissertation must include a family policy application.

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### Family Social Science

**Contact Information**—Department of Family Social Science, University of Minnesota, 290 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-625-3116 or 612-625-1900; fax 612-625-4227; fsosgrad@umn.edu; http://fsos.che.umn.edu/graduate.html).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Professor**
Jean W. Bauer, SM
Shirley L. Bauger, ASM
Pauline E. Boss (emeritus), ASM
Rose M. Brewer, African American and African Studies, AM2
Sharon M. Danes, SM
Daniel F. Detzner, ASM
William J. Doherty, SM
Ann W. Garwick, Nursing, AM2
Harold D. Grotevant, SM
M. Janice Hogan (emeritus), ASM
James W. Maddock (emeritus), ASM
B. Jan McCulloch, SM
Kathryn D. Rettig, SM
Paul C. Rosenblatt, SM
Marlene S. Stum, SM
William L. Turner, SM

**Associate Professor**
Joan M. Patterson, Psychiatry, ASM
Beatrice E. Robinson, Family Medicine and Community Health, AM2
Martha A. Rueter, SM
Catherine A. Solheim, M2
Elizabeth Wieling, SM
B long Xiong, AM2
Virginia S. Zuiker, SM

**Assistant Professor**
Jodi B. Dworkin, M2
Tai J. Mendenhall, Family Medicine and Community Health, AM2

**Lecturer**
Wayne A. Caron, M2
William J. Goodman, M2

**Senior Fellow**
Martha F. Erickson, AM2

**Research Associate**
Gretchen E. Wrobel, AM2

**Other**
Patricia Olson, Minnesota Extension Services Director, M2

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

**Curriculum**—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.

**Prerequisites for Admission**—A strong applicant to the master’s program will have two family courses; at least one course in economics, political science, government, or public policy; one course in sociology or anthropology; one psychology course; one course in statistics or research methods; experience working with families through paid employment or volunteer work; and interest in developing competence in research. A strong applicant to the doctoral program will have all requirements for the master’s program plus three additional social or behavioral science courses and two additional statistics or research methods courses. It is important that students, especially those applying for the Ph.D. program, present evidence of interest in research and that they have experience working with families through paid employment or volunteer work. Occasionally, the graduate faculty admits a student who lacks one or more required courses with the understanding that the missing course(s) will be made up prior to entering the program or in the first year of graduate work.

The marriage and family therapy program is accredited by the American Association for Marriage and Family Therapy. Admission to the program is available only to doctoral students with a clinical master’s degree. Students cannot earn a clinical master’s degree in the Department of Family Social Science. Students may apply for admission to the Ph.D. program 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.

**Special Application Requirements**—Consult the Family Social Science Graduate Program Handbook or the director of graduate studies. The Graduate Program Handbook and all materials needed for the application process may be found at [http://fsos.che.umn.edu/graduate/admissions_orientation.html](http://fsos.che.umn.edu/graduate/admissions_orientation.html).

Applicants for the doctoral program and Plan A master’s program are reviewed only once per year. The application deadline is December 15 for admission fall semester of the following year. Applications for the Plan B master’s program are considered once they are complete, and students may begin graduate study the semester after the application is approved.

**Courses**—Refer to Family Social Science (FSOS) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Students from other majors may take courses with instructor approval and include them on their degree programs subject to their own program’s approval. 4xxx courses counted on graduate programs must be taught by a member of the graduate faculty and must include assignments that are at the graduate level.

**M.A. Degree Requirements**

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. It 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.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A student’s master’s must complete at least 6 credits of 5xxx or 8xxx in family social science. All courses must be taken A-F and completed with a GPA of at least 3.00.

**Ph.D. Degree Requirements**

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.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—A doctoral minor requires at least 12 credits of 8xxx courses in family social science. All courses for the minor must be taken A-F and completed with a GPA of at least 3.00.

**Family, Youth and Community**

See Education, Curriculum, and Instruction.

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**Feminist Studies**

**Contact Information**—Feminist Studies Graduate Program, Department of Gender, Women, and Sexuality Studies, University of Minnesota, 425 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455; (612) 626-0332; fax 612-624-3573; [fsws@umn.edu](mailto:fsws@umn.edu); [www.gwss.umn.edu](http://www.gwss.umn.edu).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.htm](http://www.grad.umn.edu/faculty_rosters/faculty.htm).

**Regents Professor**

Sara M. Evans, History, AM2
Elaine Tyler May, American Studies, AM2

**Professor**

Rose M. Brewer, African American and African Studies, ASM
Karlyn K. Campbell, Communication Studies, AM2
Anna Clark, History, AM2
Mary Dietz, Political Science, AM2
Lisa J. Disch, Political Science, AM2
Raymond Duval, Political Science, AM2
Mary L. Fellows, Law School, AM2
Donna Gabaccia., History, MA
Shirley N. Garner, English, AM2
Jane F. Gilgun, Social Work, AM2
Ruth-Ellen B. Joees, German, Scandinavian, and Dutch, ASM
Indira Y. Junghare, Linguistics, ESL, and Slavic Languages and Literatures, AM2
Amy K. Kaminsky, Gender, Women, and Sexuality Studies, SM
Mary Jo Kane, Kinesiology, AM2
Ruth Karras, History, AM2
Sally J. Kenney, Public Affairs, AM2
Sally G. Kohnstetl, Geology and Geophysics, AM2
Helga Leitner, Geography, AM2
Mary J. Maynes, History, AM2
Richard W. McCormick, German, Scandinavian, and Dutch, AM2
Ellen Messer-Davidov, English, ASM
Rica Nagar, Gender, Women, and Sexuality Studies, SM
Riv-Ellen Prell, American Studies, AM2
Paula Rabinowitz, English, ASM
Gloria Goodwin Raheja, Anthropology, AM2
Naomi B. Scheman, Philosophy, SM
Edward Schiappa, Communication Studies, AM2
Mary Lay Schuster, Rhetoric, AM2
Amy L. Sheldon, Communication Studies, AM2
Billie J. Wahlstrom, Rhetoric, AM2
Ann B. Waltner, History, AM2

**Associate Professor**

Lisa Albrecht, Social Work, ASM
Walter Bockting, Medical School, AM2
Maria M. Brewer, French and Italian, AM2
Sarah Chambers, History, AM2
Susan Craddock, Women’s Studies, SM
Maria Damon, English, AM2
Jigna Desai, Gender, Women, and Sexuality Studies, M2
Roderick Ferguson, American Studies, AM2
Susanna Ferlito, French and Italian, AM2
Kathleen Hull, Sociology, AM2
Amy Lee, Postsecondary Teaching and Learning, AM2
Josephine Lee, English, AM2
Jonathon Metzel, Psychology, SM
Lisa A. Norling, History, AM2
Students interested in the graduate minor program must submit a completed application by April 15 to be considered for admission in fall semester. Applications received after April 15 are considered as space allows. It is expected that no more than 12 students will be admitted into the minor each year. Admission to the minor program does not require an undergraduate major or minor in women’s studies. However, applicants are expected to show general knowledge of feminist scholarship as evidenced, for example, in some combination of previous coursework, research, writing, or organizational experience.

Courses—Refer to Gender, Women, and Sexuality Studies (GWSS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx feminist studies courses on degree program forms of feminist studies majors or minors for the Ph.D. degree is discouraged; such courses are only considered in exceptional circumstances, subject to adviser and director of graduate studies approval.

M.A. Plan B Degree Requirements
Students are not admitted to the master’s program, it is available only to students admitted to the Ph.D. program who wish to secure this credential for ABD employment purposes or who must exit the program. The courses required for the M.A. are the same as those required for the Ph.D.; see below. In addition, three Plan B papers and a final oral exam on these papers are required.

Language Requirements—None, but a second language is strongly encouraged.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The graduate minor focuses on skills and competencies in four areas: interdisciplinary knowledge of women and gender; feminist theories and methods; feminist research in a specific field; feminist practice through teaching or internships. To complete a Ph.D. minor, students must complete GWSS 8108 and 8109 and three graduate-level electives (9 credits), including at least one 5xxx or 8xxx course in Gender, Women and Sexuality Studies and at most one feminist studies-approving course from a student’s home department. Students must apply for admission into the graduate minor program.

Financial Mathematics

Contact Information—Masters of Financial Mathematics Degree Program, School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-1306; fax 612-624-6702; gradprog@math.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Scot Robert Adams, M2
John Robert Baxter, M2
Bernardo Cockburn, M2
Lawrence F. Gray, M2

Assistant Professor
Carlos Tolmasky, M2

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

Curriculum—This 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 and a practitioner’s course offering hands-on practice to learn financial software tools. There is also a programming course with a focus on learning to use software to present
technical material to a not necessarily technical audience. Courses are offered in the evenings to accommodate working professionals. The program is designed with a possibility for full-time students to complete all requirements in one-year.

**Prerequisites for Admission**—A primary criterion for admission is a strong knowledge of undergraduate mathematics (particularly multivariable calculus, some ODEs and linear algebra) and/or significant work experience in finance. Those who are admitted, but who either do not have a strong mathematics background or who may need a “refresher” may be requested to take the course sequence: FM 5001/FM 5002—Preparation for Financial Mathematics.

**Special Application Requirements**—Applicants are requested to submit GRE Mathematics Subject test scores only. Generally speaking, admission is restricted to those with GRE Mathematics Subject Scores above the 50th percentile. Students should submit test scores, transcripts, and three letters of recommendation by February 28 for early admission notification, and no later than June 5. Students normally are admitted fall semester only.

**Courses**—Refer to Financial Mathematics (FM) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.F.M. Degree Requirements**

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—Programming and Presentation in Finance. In addition to the 30 required credits, students who either do not have a strong mathematics background or need a “refresher” may be asked to take FM 5001/5002—Preparation for Financial Mathematics.

**Final Exam**—None.

**Language Requirements**—None.

**Fisheries**

See Conservation Biology.

**Ph.D. Degree Requirements**

The number of credits required varies depending on preparation and the research undertaken. Most students take a total of about 60 credits. 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 a teaching assistant during their graduate career.

**Minor Requirements for Students Majoring in Other Fields**—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.

**Forestry**

See Natural Resources Science and Management.
French

Contact Information—A departmental general information bulletin and a projection of graduate-level courses to be offered is available from the Department of French and Italian, University of Minnesota, 260 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax 612-624-6021; frit@umn.edu; www.frit.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
F. R. P. Akehurst, SM
Daniel Brewer, SM
Susan Noakes, SM, Italian, M

Associate Professor
Mária M. Brewer, SM
Bruno Chaouat, M
Juliette Cherbuliez, M
Susanna Ferlito, SM, Italian, M
Betsy Kerr, SM
Judith Preckshot, SM
Peter H. Robinson, SM
Eileen B. Sivert, SM

Assistant Professor
Hakim Abderrazak, M2
Mary F. Brown, M2
Christophe M. Wall-Romana, M2

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

Curriculum—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 expertise, interest, and research in areas that have shaped—and continue to shape—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.

Prerequisites for Admission—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. For the Ph.D. program, an M.A. in French (or equivalent) is required.

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, a sample of their academic writing, an audiotape of their spoken French, and a written statement of career interests and goals.

International student applicants should also submit scores for the TOEFL or equivalent English proficiency testing program. Students may apply at any time; however, submission of all application materials by January 15 is encouraged to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year. New teaching assistants and fellowship recipients are only admitted for fall semester; others may be admitted in mid-year.

Affiliated Research Centers—Students are encouraged to explore interdisciplinary approaches through outside coursework or participation in one of several academic centers with which the programs are affiliated. These centers include, in the College of Liberal Arts, the Center for Advanced Research in Language Acquisition, the Center for German and European Studies, the Center for Medieval Studies, the Institute for Advanced Study, as well as the University’s Immigration History Research Center. Students specializing in francophone literatures and cultures may pursue these interests through the African American and African studies program or the Interdisciplinary Center for the Study of Global Change.

Courses—Refer to French (FREN), and French and Italian (FRIT), in the course section of this catalog.

Use of 4xxx Courses—4xxx courses in French, or other programs may be used for graduate credit only in exceptional cases. Students should consult the director of graduate studies and adviser before registering.

M.A. Degree Requirements
Students may pursue Plan A (with thesis) or Plan B (with two papers). Plan A requires at least 24 credits, Plan B at least 33 credits. Both plans require at least 18 credits in the major and 6 credits in related fields or, in a minor, the number of credits required by the minor program (usually 6 credits). Plan A also requires at least 10 thesis credits. (Detailed information is available through the program office.)

Final Exam—The final exams are both written and oral.

Language Requirements—For the M.A. degree, students must demonstrate proficiency in one foreign language besides English and French.

Minor Requirements for StudentsMajoring in Other Fields—A master’s minor in French requires at least 9 credits.

Ph.D. Degree Requirements
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 credits). Detailed information is available through program office.

Language Requirements—For the Ph.D., students must demonstrate proficiency in one foreign language besides English and French, at a level higher than for the M.A. and suitable for use in research. Doctoral students specializing in the Middle Ages, Renaissance, or Early Modern period (roughly to 1666) must also demonstrate knowledge of Latin.

Minor Requirements for StudentsMajoring in Other Fields—A Ph.D. minor requires at least 12 credits.

French Studies

Postbaccalaureate Certificate

Contact Information—French Studies Certificate, Department of French and Italian, 260 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4308; fax 612-624-6021; frit@umn.edu; www.frit.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
F. R. P. Akehurst, M
Daniel Brewer, M
Susan Noakes, M

Associate Professor
Mária M. Brewer, M
Bruno Chaouat, M
Juliette Cherbuliez, M
Susanna Ferlito, M
Betsy Kerr, M
Judith Preckshot, M
Peter H. Robinson, M
Eileen B. Sivert, M

Assistant Professor
Hakim Abderrazak, M2
Mary F. Brown, M2
Christophe M. Wall-Romana, M2

Curriculum—This 15-credit graduate program is addressed primarily to 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.

Prerequisites for Admission—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 3.00. Applicants with considerable teaching experience or other relevant professional experience (publications, translations, work experience in France or a francophone country), who have a GPA below 3.00, are encouraged to make inquiries to the director of graduate studies.
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 (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.

Certificate Requirements—The certificate consists of five courses (15 credits) selected according to the following formula: one course (3 credits) in French linguistics, one course (3 credits) in French or francophone literature or culture, and three elective courses (9 credits) in French or 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 be taken at the 5xxx and 8xxx levels and no more than two courses (6 credits) at the 4xxx level. 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.

Genetics

See Molecular, Cellular, Developmental Biology, and Genetics.

Geographic Information Science

Contact Information—Master of Geographic Information Science Program, Department of Geography, University of Minnesota, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax 612-624-1044; mgis@umn.edu; www.mgis.umn.edu/). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Marvin E. Bauer, Forest Resources, M2
James Bell, Soil, Water, and Climate, M2
Paul V. Bolstad, Forest Resources, M2
Philip J. Gersmehl, M2
Robert B. McMaster, M2
Shashi Shekhar, Computer Science, M2

Associate Professor

Francis Harvey, M2
Roderick H. Squires, M2

Assistant Professor

Steven Manson, M2

Other

William J. Craig, M2
Mark Lindberg, M2
Susanna McMaster, M2

Teaching Specialist

Stephen Lime, AM2
Timothy Loesch, AM2
Robert Maki, AM2

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

Curriculum—The master of geographic information science (MGIS), 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 focus 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.

Prerequisites for Admission—Admission to the program requires a bachelor’s degree with a preferred GPA of 3.00. Prospective students also should have completed a college-level mathematics course, statistics course, and computer programming course.

Special Application Requirements—Applicants must submit a MGIS program application form; transcripts; a clearly written 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.

Courses—Refer to Geography (GEOG) and Geographic Information Science (GIS) in the course descriptions for courses pertaining to the program. Also refer to Forest Resources (FR) and Environmental Sciences, Policy and Management (ESPM) in the course descriptions for additional courses.

Use of 4xxx Courses—No more than two 4xxx courses may be included in the program without consent of the adviser and director of graduate studies.

M.G.I.S. Plan B Degree Requirements

The degree is offered Plan B (without thesis) and requires 35 credits of coursework, three Plan B projects, and a final examination. All students must have at least 35 credits, with a minimum of 18 credits in core and technology classes (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 8xxx geography seminar, and GIS 8501. At least 6 credits must be taken outside the geography department (GEOG and GIS designators) but may include core GIS classes (e.g., FR and ESPM designators).

Students must submit three Plan B projects that are typically performed as part of, or extensions to, assignments completed during their coursework. Report content and medium must be approved by the director of graduate studies in consultation with each student’s adviser. Students may, with permission of the director of graduate studies and their adviser, substitute a single project for the three Plan B projects. Finally, students must complete a final oral examination with three faculty members.

Language Requirements—None

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—A master’s minor is developed in consultation with a faculty adviser. Consult the MGIS director of graduate studies about selecting an adviser. The minor requires at least 9 credits (3 courses).

Geography

Contact Information—Department of Geography, University of Minnesota, 414 Social Sciences Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-625-6080; fax 612-624-1044; willi046@umn.edu; www.geog.umn.edu/). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Dwight A. Brown (emeritus), SM
Philip J. Gersmehl, SM
John Fraser Hart, SM
Lawrence M. Knopp, Jr., Geography, Duluth, AM2
Helga Leitner, SM
Ann R. Markesen, Public Affairs, AM2
Judith A. Martin, SM
Robert B. McMaster, SM
Rica Nagar, Gender, Women, and Sexuality Studies, AM2
Abdi I. Samatar, SM
Earl P. Scott (emeritus), SM
Eric S. Sheppard, SM

Associate Professor

Bruce P. Braun, SM
Susan L. Craddock, Gender, Women, and Sexuality Studies, AM2
Jeffrey R. Crump, Design, Housing, and Apparel, AM2
Pat Farrell, Geography, Duluth, AM2
Scott Freundshuh, Geography, Duluth, AM2
Vinay K. Gidwani, M2
Timothy J. Grifis, Soil, Water, and Climate, AM2
Francis J. Harvey, M2
George L. Henderson, SM
Katherine Klink, SM
Roger P. Miller, SM
Bryan N. Shuman, M2
Roderick H. Squires, SM
Karen E. Till, M2
Connie H. Weil, SM

Assistant Professor

William J. Craig, Center for Urban and Regional Affairs, AM2
Brenda Kayzar, M2
Kurt F. Kiptmueller, M2
Steven M. Manson, M2
Arun Saldanha, M2
Sasy S. Ziegler, M2

Other
Mark B. Lindberg, Director, University of Minnesota Cartography Lab, M2

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

Curriculum—The discipline of geography is rooted in concepts of place, location, and scale. Geographers draw on theories and methods from diverse fields of inquiry to form synergistic overlaps among four primary areas of geographic inquiry: human geography, physical geography, nature-society relationships, and spatial analysis and mapping.

Human geography seeks to understand the creation and changing nature of places and regions, and how peoples and places are interconnected through social, economic, political, and cultural processes. Physical geography focuses on the earth's interrelated physical environmental systems (climate, vegetation, landforms, water, and soil), and the interactions between the physical environment and social, economic, and political systems. Nature-society geography examines how the human and biophysical worlds interact and affect one another in and across different societies, and how environments shape and are shaped by human and non-human processes. Geographic inquiry also addresses cartographic representation, such as new methods in geographic visualization, and undertakes fundamental and applied research into all aspects of geographic information science, including the societal dimensions of geographic technologies. The program emphasizes research and teaching in political economy, international development, and globalization; urban geography; physical environmental systems; nature-society relationships; cultural and political landscapes; the geography of population and health; geographic information science and cartography; geographic education; and the history and philosophy of geography. In the first year of the graduate program students take a pair of core courses in geographic thought and research methodologies. Beyond this, 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.

Prerequisites for Admission—Prospective students should have completed the equivalent of introductory courses in physical and human geography and at least seven upper division courses in systematic and regional geography. Students who were not undergraduate geography majors are encouraged to apply but may be required to make up deficiencies.

Special Application Requirements—Three letters of recommendation must be sent to the department. Scores from the General (Aptitude) Test of the GRE that are less than five years old are required of students with baccalaureate degrees from U.S. institutions. Graduate study in the program begins in the fall semester. The application deadline is December 15 for entrance the following September. All applications are evaluated once each year in early January.

Courses—Refer to Geography (GEOG) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—No more than two 4xxx courses may be included in the degree program form without consent of the adviser and director of graduate studies.

M.A. Degree Requirements
The M.A. is offered under Plan A (with thesis) and Plan B (without thesis). Plan A requires at least 21 course credits (plus 10 thesis credits); Plan B requires at least 31 course credits and three Plan B papers. Each student is required to take GEOG 8001 and 8002, 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. The M.A. program usually is completed within two years.

Language Requirements—M.A. students are expected to acquire competency in the foreign language/research methodology necessary for their graduate research. This requirement is set by the advising committee, which is also responsible for certifying that the requirement has been met before the final exam.

Final Exam—The final exam is oral.

Minor Requirements for Students

Minor Requirements for Students

Ph.D. Degree Requirements
Each student is required to take GEOG 8001 and 8002, two additional GEOG 81xx and/or 82xx courses, and a third GEOG 82xx course. GEOG 8970 and 8980 may be used for GEOG 81xx or 82xx coursework with permission of the adviser. Students are also required to take 24 thesis credits and at least three elective courses. Course credits from the M.A. program may be transferred to the Ph.D. program. Further details on degree requirements may be found in the department publication The Graduate Program in Geography at the University of Minnesota.

Language Requirements—Ph.D. students are expected to acquire competency in the foreign language/research methodology necessary for their graduate research. This requirement is set by the advising committee, which is also responsible for certifying that the requirement has been met before the final exam.

Minor Requirements for Students

Geological Engineering

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; gradsec@ce.umn.edu; www.ce.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Roberto Ballarini, SM
Steven L. Crouch, SM
Peter A. Cundall, ASM
Gary A. Davis, M2
Emmanuel M. Detournay, SM
Andrew Drescher, SM
E6 Foufoula-Georgiou, SM
Catherine E. French, SM
Theodore Galambos (emeritus), ASM
Miki Honzho, M2
Joseph F. Labuz, SM
Arturo E. Schultz, M
Carol K. Shield, SM
Karl A. Smith, SM
Henryk K. Stolarski, SM
Otto D. L. Strack, SM
Vaughn R. Voller, SM

Associate Professor
William A. Arnold, M2
Randal J. Barnes, SM
Bojan B. Guzina, SM
Raymond M. Hozalski, SM
Lev Khazanovich, SM
Timothy M. LaPara, SM
David M. Levinson, M
Mihai O. Marasteanu, SM
Paige J. Novak, M
Fernando Porté-Agel, M2

Assistant Professor
Kimberly Hill, SM
Henry X. Liu, SM
Steven F. Wojtkiewicz, SM

Senior Research Associate
Sofia G. Mogilevskaya, AM2
Eugene Skok, M2

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

Curriculum—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
Degree Programs and Faculty

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.

Prerequisites for Admission—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. For the M.Geo.E. program, an ABET-accredited bachelor’s degree in geological engineering is required.

Special Application Requirements—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.

Courses—Refer to Geological Engineering (GEOE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx departmental courses on degree program forms is subject to adviser and director of graduate studies approval. Students from other majors may include such courses subject to their own program’s approval. 4xxx courses can not be required courses for undergrad Civil or Geological Engineering undergraduate majors.

M.Geo.E. Design Project Degree Requirements

The master of geological engineering (M.Geo.E.) 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 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. The M.Geo.E. requires at least 30 credits and is offered under two plans. One requires at least 20 course credits and preparation of a design project (10 credits); the other plan 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 department for either plan.

Language Requirements—None.

Final Exam—A final oral exam is required of all M.Geo.E. students.

Minor Requirements for Students Majoring in Other Fields—For a master’s minor, two or more 5xxx to 8xxx courses from the same area of geological engineering are required, for a total of 6 or more credits.

M.S. Degree Requirements

The master of science (M.S.) degree balances education in engineering fundamentals and design with research and development. The M.S. degree is for students wishing to pursue a career in industry or to continue toward a Ph.D. degree. Students 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 two plans. Plan A emphasizes research and preparation of a thesis; Plan B emphasizes coursework. 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 30 course credits. At least 6 credits of coursework must be from outside the department for either Plan A or Plan B.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—For a master’s minor, two or more 5xxx to 8xxx courses from geological engineering are required, for a total of 6 or more credits.

Geology

Contact Information—Department of Geology and Geophysics, University of Minnesota, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-1333; fax 612-625-3819; geology@umn.edu. www.geom.umn.edu.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
Herbert E. Wright, Jr. (emeritus), ASM
Professor
E. Calvin Alexander, Jr., SM
Subir K. Banerjee, M2
Erik Brown, ASM
Steve Colman, Geological Sciences, Duluth, ASM
R. Lawrence Edwards, SM
John W. Goodge, Geological Sciences, Duluth, ASM
Vicki L. Hansen, Geological Sciences, Duluth, ASM
Marc Hirschmann, SM
Peter J. Hudleston, SM
Emi Ito, SM
Thomas C. Johnson, Geological Sciences, Duluth, ASM
David L. Kohlstedt, M2
Howard D. Mooers, Geological Sciences, Duluth, ASM
Ronald L. Morton, Geological Sciences, Duluth, ASM
Christopher Paola, SM
Hans-Olaf Pfannkuch, SM
William E. Seyfried, SM
James H. Stout, SM
Christian P. Teyssier, SM
Harvey Thorleifson, SM
Donna L. Whitney, SM

Associate Professor
David Fox, SM
Christina Gallup, Geological Sciences, Duluth, ASM
Karen L. Kleinspehn, SM
Bryan Shuman, Geography, AM2
John Swenson, Geological Sciences, Duluth, ASM
Nigel J. Watrus, Geological Sciences, Duluth, ASM

Assistant Professor
James Almdinger, Fisheries, Wildlife and Conservation Biology, AM2
Anna K. Fayon, AM2
Katsumi Matsumoto, SM
James D. Miller, Geological Sciences, Duluth, AM2
Lee Penn, Chemistry, ASM
Lesley Perg, SM
Martin Saar, SM

Adjunct Assistant Professor
Mark Edlund, AM2
Carrie Jennings, AM2

Senior Research Associate
Kang Ding, AM
Daniel R. Engstrom, AM2
Paul H. Glaser, AM2
Michael J. Jackson, AM2
Mark Zimmerman, AM2
Degree Programs and Faculty

Other
Val W. Chandler, Minnesota Geological Survey, AM2
Kristina Curry, Bell Museum of Natural History, AM2
Raymond Rogers, AM2
Anthony C. Runkel, Minnesota Geological Survey, AM2

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

Curriculum—The geology major includes the areas of structural geology, tectonics, metamorphic geology, Quaternary studies, climate and environmental change, limnology, paleontology, groundwater geology, hydrogeology, geofluids, surface processes, geomorphology, stratigraphy, sedimentology, mineralogy, experimental and theoretical petrology, experimental geochemistry, isotopic and aqueous geochemistry. Students may accommodate other areas of interest such as earth resources, engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the department.

Prerequisites for Admission—Most candidates for advanced degrees have completed a bachelor’s degree in geology, geophysics or in the broad field of earth and material sciences. However, applications from students in fields such as chemistry, physics, or biology are encouraged. At least one year of study in calculus, chemistry, and physics are required. In general, an outstanding academic record is expected.

Special Application Requirements—The student’s statement of purpose, three letters of recommendation, and official GRE scores are required for admission and financial aid consideration. Applications for admission are considered at any time, although applications for financial aid should be submitted to the department by January 15 to ensure consideration. Studies may begin in any semester or summer session, although fall semester is preferable. Please refer to the Graduate Programs section of the department web site for a listing of all required applications materials.

Courses—Refer to Geology and Geophysics (GEO) in the course section of this catalog for courses pertaining to the program. All courses must all be taken at 4xxx and 5xxx, with several formal courses to be included at 8xxx.

Use of 4xxx Courses—For both the M.S. and Ph.D., typically no more than 30 percent of the total course credits are 4xxx.

M.S. Plan A, Plan B, and Plan C Degree Requirements
The M.S. is offered Plan A (with thesis), Plan B (with project), and Plan C (coursework only with emphasis in hydrogeology and environmental geoscience). Plan A requires a minimum of 30 course credits consisting of at least 14 course credits in the major, 6 course credits in the related field, and 10 thesis credits. Plan B requires a minimum of 30 course credits consisting of at least 14 course credits in the major and 8 credits in the related field. Plan C is the coursework-only option, which requires a minimum of 30 course credits consisting of at least 14 credits in the major and 9 credits in the related field or a minor. Courses in the minor and related field are normally taken from outside the department, although they may be taken from within in special cases.

Language Requirements—None.

Final Exam—Plan A students must pass the final oral examination in defense of their thesis. Plan B students must pass the final oral and/or written examination.

Minor Requirements for Students MAjoring in Other Fields—The master’s minor is established individually with approval by the graduate studies committee. Typically no more than 50 percent of the total course credits are 4xxx.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 36 course credits consisting of at least 12 course credits in the minor or supporting field. In some cases, fewer than 24 credits in the major field are acceptable provided the total is at least 36. Courses in the minor and supporting program are normally taken from outside the department, although they may be taken from within in special cases.

Language Requirements—None.

Final Exam—Ph.D. students must pass the final oral examinations in defense of their thesis.

Minor Requirements for Students MAjoring in Other Fields—The Ph.D. minor is established individually with approval by the graduate studies committee. Typically, no more than 50 percent of the total course credits are 4xxx.

Geophysics

Contact Information—Department of Geology and Geophysics, University of Minnesota, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-1333; fax 612-625-3819; geology@umn.edu; www.geology.umn.edu)

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
Subir K. Banerjee, SM
Marc Hirschmann, M2
David L. Kohlstedt, SM
Bruce M. Moskowitz, SM
Christopher Paola, M2
Justin Revenaugh, SM
James H. Stout, SM
Christian P. Teyssier, M2
Renata M. Wentzcovitch, Chemical Engineering and Materials Science, ASM
David A. Yuen, SM

Associate Professor
Karen L. Kleinspehn, M2

Assistant Professor
Katsu Mi Gun, SM
Martin Saar, SM

Senior Research Associate
Michael J. Jackson, AM2
Mark Zimmerman, AM2

Other
Val Chandler, Minnesota Geological Survey, AM2

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

Curriculum—The geophysics major includes the areas of applied and theoretical geophysics, paleomagnetism and rock magnetism, mineral and rock physics, seismology and geostatistics. Students may accommodate other areas of interest such as earth resources, engineering geology, environmental geology, materials science, soil science, and paleoecology by choosing a minor or supporting field from outside the department.

Prerequisites for Admission—Most candidates for advanced degrees have completed a bachelor’s degree in geology, geophysics, or earth and material sciences. However, applications from students in fields such as chemistry, physics, or biology are encouraged. At least one year of calculus, chemistry, and physics are required. In general, an outstanding academic record is expected.

Special Application Requirements—The student’s statement of purpose, three letters of recommendation, and official GRE scores are required for admission and financial aid consideration. Applications for admission are considered at any time, although applications for financial aid should be submitted to the department by January 15 to ensure consideration. Studies may begin in any semester or summer session, although fall semester is preferable. Please refer to the Graduate Programs section of the department web site for a listing of all required applications materials.

Courses—Refer to Geology and Geophysics (Geo) in the course section of this catalog for courses pertaining to the program. All courses must be taken at 4xxx and 5xxx, with several formal courses to be included at 8xxx.

Use of 4xxx Courses—For both the M.S. and Ph.D., typically no more than 30 percent of the total course credits are 4xxx.

M.S. Degree Requirements
The M.S. is offered Plan A (with thesis) and Plan B (with project). Plan A requires a minimum of 30 course credits consisting of at least 14 course credits in the major, 6 course credits in the related field, and 10 thesis credits. Plan B requires a minimum of 30 course credits consisting of at least
14 credits in the major and 8 credits in the related field. Plan C is the coursework-only option which requires a minimum of 36 course credits consisting of at least 12 course credits in the major or supporting field. In some cases, fewer than 24 credits in the major field are acceptable provided the total is at least 36. Courses in the minor and supporting program are normally taken from outside the department, although they may be taken from within in special cases.

Language Requirements—None.

Final Exam—Plan A students must pass the final oral examination in defense of their thesis. Plan B students must pass the final oral and/or written examination.

Minor Requirements for Students Majoring in Other Fields—The master’s minor is established individually with approval by the graduate studies committee. Typically no more than 50 percent of the total course credits are 4xxx.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 36 course credits consisting of at least 12 course credits in the minor or supporting field. In some cases, fewer than 24 credits in the major field are acceptable provided the total is at least 36. Courses in the minor and supporting program are normally taken from outside the department, although they may be taken from within in special cases.

Language Requirements—None.

Final Exam—Ph.D. students must pass the final oral examination in defense of their thesis.

Minor Requirements for Students Majoring in Other Fields—The Ph.D. minor is established individually with approval by the graduate studies committee. Typically, no more than 50 percent of the total course credits are 4xxx.

Germanic Studies

Contact Information—Department of German, Scandinavian and Dutch, University of Minnesota, 205 Folwell Hall, 9 Pleasant St. SE, Minneapolis, MN 55455 (612-625-2080; fax 612-624-8297; gsd@umn.edu; www.gsd.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Evelyn S. Firchow, German, Germanic Medieval, SM
Poul Houe, Scandinavian, SM
Ruth-Ellen B. Joeres, German, SM
Ruth M. Karras, History, Scandinavian, AM
Anatoly Liberman, German, Germanic Medieval, Scandinavian, SM
Richard W. McCormick, German, SM
James A. Parente, Jr., German, Scandinavian, Germanic Medieval, SM
Jochen Schulte-Sasse, German, SM
Goran N. Stockenstrom, Scandinavian, SM
Arlene A. Teraoka, German, SM
Jack D. Zipes, German, SM

Associate Professor
Andreas Gailus, German, SM
Kaaren E. Grimstad, Scandinavian, Germanic Medieval, SM
Rembert Hueser, German, SM
Patricia C. McBride, German, SM
Charlotte A. Melin, German, SM
Leslie Morris, German, SM
Ray M. Wakefield, German, Germanic Medieval, SM
Monika Zagar, Scandinavian, SM

Assistant Professor
Eric Baker, German, M2

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

Curriculum—There are five tracks within the Germanic studies graduate program: German (M.A. and Ph.D.), Scandinavian Studies (M.A.), Teaching (M.A.), Germanic Medieval Studies (M.A. and Ph.D.), and German and Scandinavian Studies (Ph.D.).

Prerequisites for Admission—A B.A. or M.A. or equivalent in German, Scandinavian, or related field (depending on the track to which one applies) is required. Students with bachelor’s degrees who apply for the German track or the Germanic Medieval Studies track usually are admitted into the Ph.D. program with the understanding that the M.A. will be attained first. Students with bachelor’s degrees who are interested in the German and Scandinavian studies Ph.D. must first complete an M.A. in the German track or the Scandinavian track and should have either near-native 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.

Applicants to the Scandinavian studies M.A. must have a strong competency in a Scandinavian language, and they should have taken at least four Scandinavian literature courses or the equivalent. Applicants to the Germanic Medieval Studies M.A. should have a strong command of German; knowledge of another Germanic language and/or a reading knowledge of Latin is preferred. Applicants for any track whose preparatory work evidences gaps may be asked to complete supplemental work before admission.

Special Application Requirements—The following must be sent directly to the department: the department’s Application for Graduate Study form; a statement of professional goals describing the applicant’s intellectual development and plans for the future; a copy of one or more papers representative of the applicant’s level of scholarly development; three letters of recommendation; and a complete set of transcripts (in addition to transcripts sent to the Graduate School). For master’s program applicants, and for all students who wish to be considered for the Graduate School Fellowship, the General (Aptitude) Test of the GRE is required; the GRE is optional for applicants whose native language is not English. Students are admitted in the fall semester only. All application materials must be received by January 10.

Use of 4xxx Courses—A limited number of 4xxx courses may be included in degree programs of Germanic Studies majors or minors, subject to the approval of the adviser and the director of graduate studies. 4xxx courses counted on graduate programs must be taught by a member of the graduate faculty and must include graduate-level work.

Minor Requirements for Students Majoring in Other Fields—M.A. minors are required to take the basic seminar in either German (GER 8002) or Scandinavian (SCAN 8002) and two other courses, for at least 9 credits. Ph.D. minors who have not completed one of the basic seminars at the M.A. level must fulfill this requirement at the Ph.D. level. In addition, Ph.D. minors must complete at least three other courses for a total of at least 12 credits (usually four courses).

German Track

M.A. Degree Requirements
The M.A. 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 M.A. requires at least 33 credits, including two introductory courses in language and theory, four courses in different periods of German literature, a philology course, an elective in German literature/culture, a pedagogy course, two courses outside the German track, demonstration of oral and written proficiency in German and one Plan B paper.

Courses—Refer to German (GER); German, Scandinavian, and Dutch (GSD); and Dutch (DTCH) in this catalog for courses pertaining to this track.

Language Requirements—Students who intend to continue in the Ph.D. program are strongly encouraged to acquire a reading proficiency in one other foreign language during their M.A. program (refer to requirements for the Ph.D.).

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
The Ph.D. 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 Ph.D. requires at least 39 credits, including six courses in German literature/culture, a course in Germanic philology, a pedagogy course (if it has not been taken for the M.A.), the dissertation seminars, and four courses outside the German track. At least 24 thesis credits are required.
Courses—Refer to German (GER); German, Scandinavian, and Dutch (GSD); and Dutch (Dutch) in the course section of this catalog for courses pertaining to this track.

Language Requirements—The program requires reading competence in at least two languages or a high degree of proficiency in one language other than German or English.

Scandinavian Studies Track

M.A. Degree Requirements

The M.A. 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 M.A. in the Scandinavian track may also include Finnish.

The M.A. requires at least 33 credits, including 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, two courses outside the Scandinavian track, and one Plan B paper.

Courses—Refer to German (GER); German, Scandinavian, and Dutch (GSD); and Scandinavian (SCAN) in the course section of this catalog for courses pertaining to this track.

Language Requirements—The track requires advanced competency in at least one Scandinavian language or Finnish, and reading knowledge of two other Scandinavian languages.

Final Exam—The final exam is written and oral.

Teaching Track

M.A. Degree Requirements

The M.A. in teaching 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 M.A. requires at least 33 credits, including 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 language and culture courses; two or more courses in language teaching, curriculum and instruction or teaching English as a second language or linguistics; one elective; demonstration of oral and written proficiency in German, and one Plan B paper.

Courses—Refer to German (GER); Linguistics (LING); Curriculum and Instruction (CI); Language, Teaching, and Technology (LGTT); and Teaching English as a Second Language (TESL) in the course section of this catalog for courses pertaining to this track.

Final Exam—The final exam is oral.

Germanic Medieval Studies Track

M.A. Degree Requirements

The M.A. offers students the opportunity to do advanced work in Germanic medieval studies and prepares them with theoretical and practical tools to enter the Ph.D. track. The M.A. requires at least 33 credits, including two introductory courses in literature and theory; four courses chosen from two of the 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; two courses in Germanic medieval studies; a pedagogy course; at least two courses in related fields or a designated minor; demonstrated oral and written proficiency in German, and one Plan B paper.

Courses—Refer to English (ENGL, ENGC); Dutch (Dutch); German (GER); German, Scandinavian, and Dutch (GSD); and Scandinavian (SCAN) in the course section of this catalog for courses pertaining to this track.

Students who intend to continue in the Ph.D. program are encouraged to acquire a reading proficiency in Dutch or a modern Scandinavian language or Latin.

Final Exam—The final exam is written and oral.

Ph.D. Degree Requirements

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 36 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 pedagogy course (if it has not been taken for the M.A.), the dissertation seminars, and four courses in a designated minor or supporting field; 24 thesis credits are also required.

Courses—Refer to English (ENGL, ENGC); Dutch (Dutch); German (GER); German, Scandinavian, and Dutch (GSD); and Scandinavian (SCAN) in the course section of this catalog for courses pertaining to this track.

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 Track

Ph.D. Degree Requirements

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 39 credits. Students choose to emphasize either German or Scandinavian. The German emphasis requires at least four GER 8xxx literature or theory courses (above GER 8002) 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 (above GER 8002). Students in both emphases are required to take a pedagogy course (if it has not been taken for the M.A.), the dissertation seminars, and 4 courses in a designated minor or supporting program. 24 thesis credits are required.

Courses—Refer to German (GER); German, Scandinavian, and Dutch (GSD); and Scandinavian (SCAN) in the course section of this catalog for courses pertaining to this track.

Language Requirements—Reading competence in one language other than German, English, or a Scandinavian language.

Gerontology

Minor Only

Contact Information—Graduate Minor Program in Gerontology, Center on Aging, University of Minnesota, MMC 197, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-3904; fax 612-624-8448; coa@umn.edu), www.hsr.umn.edu/cola.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Donna Z. Bliss, Nursing, M
David O. Born, Preventative Services, M
James C. Floyd, Pharmacy Practice, M
Jim Curtisinger, Ecology, Evolution, and Behavior, M
Daniel F. Dettzner, Family Social Science, M
Richard P. DiFabio, Physical Medicine and Rehabilitation, M
William Durfee, Mechanical Engineering, M
Maurice W. Dysken, Psychiatry, M
Nancy N. Eustis, Public Affairs, M
Judith M. Garrard, Public Health, M
Cynthia R. Gross, Pharmacy Practice, M
David R. Guay, Pharmacy Practice, M
Lois J. Heller, Medicine, Duluth, M
Degree Programs and Faculty

Robert L. Kane, Public Health, M
Rosalie A. Kane, Public Health, M
Helen Q. Kivnick, Social Work, M
Thomas E. Lackner, Pharmacy, M
Alice Larson, Veterinary Pathobiology, M
Tom A. Larson, Pharmacy Practice, M
Frank M. Lassman (emeritus), Otolaryngology, AM
Chap Le, Biostatistics, M
Matthew K. McGue, Psychology, M
Steven H. Miles, Medicine, M
Phyllis Moen, Sociology, M
Jeylan T. Mortimer, Sociology, M
Jean K. Quam, Social Work, M
Jon Schommer, Pharmaceutical Care and Health Systems, M
Stephen Schondelmeyer, Pharmacy Practice, M
Virginia Seybold, Cell Biology and Neuroanatomy, M
Marlene S. Stum, Family Social Science, M
Marc Swiontkowski, Orthopedic Surgery, M
David Thomas, Biochemistry, M
Michael Wade, Kinesiology, M
Jean Wyman, Nursing, M

Associate Professor
Lynn Blewett, Public Health, M
Debra Ferrington, Ophthalmology, M
James Gambucci, Preventive Sciences, M
Pricilla A. Gibson, Social Work, M
Leslie A. Grant, Carlson School of Management, M
Merrie J. Kaas, Nursing, M
Kathleen Krichbaum, Nursing, M
Elizabeth Lightfoot, Social Work, M
Terry Lum, Social Work, M
Christine A. Mueller, E, Nursing, M
James T. Pacala, Family Medicine and Community Health, M
Rosemarie J. Park, Work, Community, and Family Education, M
James R. Reinardy, Social Work, M
Robert C. Serfass, Kinesiology, M
Stephen K. Shuman, Preventive Sciences, M
Carla E. S. Taboure, Kinesiology, M
LaDora V. Thompson, Physical Medicine and Rehabilitation, M

Assistant Professor
Michael K. Davern, Public Health, M
Joseph E. Gaugler, Nursing, M
Jeremy L. Holzman, Medicine, M
Hoe Lee, Social Work, M
Dawn Annette Lowe, Biochemistry, M
David B. Luke, English, M
Teresa C. McCarthy, Family Medicine and Community Health, M

Clinical Assistant Professor
Patrick W. Irvine, Medicine, M

Lecturer
Wayne Caron, Family Social Science, M

Research Associate
Lois Cutler, Public Health, M
Celina W. Gershenson, Psychology, M
Leann M. Snow, Physical Medicine/Rehabilitation, M

Other
Ursula Bea Krinke, Epidemiology, M
David M Radoshevich, Surgery, M
Huber R. Warner, Biological Science, M

Curriculum—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.

Prerequisites for Admission—Students must have gained admission to a master’s or doctoral degree-granting program within the Graduate School, and have prepared a minor program of coursework approved by the director of graduate studies in gerontology.

Courses—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.

Use of 4xxx Courses—4xxx courses may not be included on degree program forms.

Minor Only Requirements
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, ordinarily including NURS 8320—Multidisciplinary Seminar on Social Perspectives of Aging (3 cr). Other courses may be substituted with the approval of the director of graduate studies.

Greek
See Classical and Near Eastern Studies.

Health Informatics

Contact Information—Director of Graduate Studies in Health Informatics, Division of Health Informatics, University of Minnesota, MMC 511, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-8440; fax 612-625-7166; www.hinfgrad.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
Donald P. Connelly, SM
Shawn Curfev, Information and Decision Sciences, SM
Connie W. Delaney, Nursing, SM
Lynda B. Ellis, SM
David P. Fan, Genetics and Cell Biology, SM
Stanley M. Finkelstein, SM
John R. Finnegan, Jr., Epidemiology, SM
James R. Fricton, Diagnostic/Surgical Sciences, SM
Laël C. Gatewood, SM
Paul E. Johnson, Information and Decision Sciences, SM
George G. Klee, M2
Robert P. Patterson, Physical Medicine and Rehabilitation, SM

Adjunct Professor
Christopher G. Chute, SM

Associate Professor
Stephen T. Parente, Health Care Management, M2
Sandra J. Potthoff, Health Care Management, SM
Edward Ratner, Medicine, M2

Assistant Professor
Bonnie Westra, Nursing, M2

Adjunct Assistant Professor
Marcelline Harris, M2
Martin LaVenture, M2
George Vasmatis, M2

Other
Ernest F. Retzel, Bioinformatics, M2
Linda A. Watson, Health Sciences Library, AM2
Brian J. Westrich, M2

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

Curriculum—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, telemedicine, bioinformatics, user interface design, system impact evaluation, database construction and analysis, clinical decision-making, evaluation of health programs, image and signal processing, and physiological monitoring and control.

Prerequisites for Admission—Applicants are expected to have at least a bachelor of science or equivalent degree from a recognized institution of higher education. Although students are accepted into the program with different backgrounds and varying degrees of experience, some prerequisites are required, usually in the form of college coursework. Acceptance
into the program is not precluded by minor deficiencies in background; rather it is conditional on these being made up before or during the first year of study. See the prerequisites each program below for areas of study that must be completed before admission to the program. Courses used to fulfill prerequisites are not given graduate credit. Courses in the curriculum assume that these prerequisite courses have been taken.

Note: These prerequisites are subject to change. Please check the Web site at [www.hinfgrad.umn.edu](http://www.hinfgrad.umn.edu) for current information about the program.

Special Application Requirements—The GRE or similar professional examination (e.g., MCAT, GMAT, PCAT) is required. Three letters of recommendation and a statement of purpose must be submitted with the application. Students are advised to apply for admission for fall semester, since spring semester admission may entail the student taking longer to complete the program.

Courses—Refer to Health Informatics (HINF) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses in computer science may be used to satisfy the elective requirements for the master of health informatics (M.H.I.), M.S., and Ph.D. degrees if the student has not previously taken a computer science course in the same subarea (e.g., database design) at a higher level. Acceptance of 4xxx courses from other departments or programs requires the approval of the adviser and the director of graduate studies.

M.H.I. Degree Requirements

The master of health informatics (M.H.I.) emphasizes the role of informatics-trained professionals as liaisons who bring both a background of medicine and knowledge of information technology to the task of solving health care problems. The curriculum consists of 32 credits of coursework that include: 8 credits of health informatics, 4 credits of technology-focused health administration, 3 credits of statistics and research design, 6 credits of coursework in the student’s chosen area of specialization, 6 credits of electives, 2 credits of seminar, and a 3-credit capstone course in which the student completes 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. Prerequisites include one course or demonstrated experience with a modern programming language (e.g., Java, Visual Basic, C++), an undergraduate GPA of 3.00 or higher, and a degree in a health profession. This last prerequisite can be waived for those without a health professions degree but will require six additional credits of coursework in the health sciences.

M.S. Degree Requirements

The research-oriented Plan A master’s degree is available to advanced applicants, such as those with a professional degree in a health sciences discipline. It requires 32 course credits and 10 thesis credits. The Plan B option requires 42 course credits, including 6–7 credits from a technical area and 6–7 credits from the health sciences. Both plans require seven core courses, a sequence in statistics or biostatistics, and registration in the health informatics seminar (HINF 5436) for the first year and for at least two semesters after that (1 credit each semester). For most students, the program requires two academic years and one summer. Prerequisites include six semester credits in the medical, life, or biological sciences; the equivalent of one calculus course at the college level; and one course or demonstrated experience with a modern programming language (e.g., Java, Visual Basic, C++).

Ph.D. Degree Requirements

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 24 thesis credits. Prerequisites include six semester credits in the medical life or biological sciences; the equivalent of one calculus course and one linear algebra course at the college level; and one course or demonstrated experience with a modern programming language (e.g., Java, Visual Basic, C++).

Language Requirement—None.

Minor Requirements for Students Majoring in Other Fields—Master’s students must successfully complete the introductory sequence in health informatics (HINF 5430 and HINF 5431). Ph.D. students must take the introductory sequence and one 8xxx course in health informatics.

Health Journalism

No new students are being accepted to this program for the 2007–08 academic year. Contact the Graduate School Admissions Director or the program itself for information on the status of the program.

Contact Information—Health Journalism M.A. Program, School of Journalism and Mass Communication, University of Minnesota, 111 Murphy Hall, 206 Church Street S.E., Minneapolis MN 55455 (612-626-1851; fax 612-625-9825; [journal@umn.edu](mailto:journal@umn.edu); [www.healthjournalism.umn.edu](http://www.healthjournalism.umn.edu)).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.htm](http://www.grad.umn.edu/faculty_rosters/faculty.htm).

Professor

John R. Finnegan, Jr., Epidemiology, M2
Russell V. Luepker, Epidemiology, M2
Mary T. Story, Epidemiology, M2
Daniel J. Sullivan, M2

Associate Professor

Kenneth O. Doyle, Jr., M2
Ian A. Greaves, Environmental and Occupational Health, M2
Christopher J. Ison, M2
Gary J. Schwitter, M2

Assistant Professor

Donald Brazeal, M2
Brian G. Southwell, Journalism, M2
Marco Yez, M2

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

Curriculum—A joint program of the School of Journalism and Mass Communication and the School of Public Health, the professional master’s in health journalism 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 in addition to the other degree.

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 departmental application to the School of Journalism and Mass Communication. The departmental 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 of 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 departmental 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.

Courses—Refer to Journalism and Mass Communications (JOUR) and Public Health (PUBH) in the course section of this catalog for courses pertaining to this program.

Use of 4xxx Courses—Use of 4xxx courses is discouraged.

M.A. Degree Requirements
A minimum of 33 credits and a capstone project are required. Students select one of two program tracks: They may complete the degree requirements either within 12 calendar months or in four academic semesters. All students must take a minimum of 16 credits in journalism. All coursework must be taken A-F.

Language Requirements—Foreign language study is recommended for students who plan to work internationally.

Final Exam—The final examination is oral.

Health Services Research, Policy, and Administration

Contact Information—Division of Health Policy and Management (HPM), School of Public Health, University of Minnesota, MMC 729 Mayo Building, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500; fax 612-624-4498; http://www.sph.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
James W. Begun, Public Health, SM
Jon B. Christianson, Public Health, SM
Bryan E. Dowd, Public Health, SM
Roger D. Feldman, Public Health, SM
Susan Bartlett Foote, Public Health, SM
Judith M. Garrard, Public Health, SM
Robert L. Kane, Public Health, SM
Rosalie A. Kass, Public Health, SM
John E. Kralowski (emeritus), Public Health, SM
Karen M. Kuntz, Public Health, M
A. Marshall McBean, Public Health, SM
Ira S. Moscovice, Public Health, SM
John A. Nyman, Public Health, SM
Stuart M. Speidel, Health Informatics, SM
Vernon E. Weckwerth, Public Health, SM
Douglas R. Wholey, Public Health, SM

Associate Professor
Lynn A. Bluest, Public Health, SM
Kathleen T. Call, Public Health, SM
Leslie A. Grant, Public Health, SM
Donna D. McAlpine, Public Health, M
Gordon M. Moser, Public Health, M
Stephen T. Parente, Health Care Management, M
Sandra J. Potthoff, Public Health, SM
William J. Riley, Public Health, M
Todd H. Rockwood, Public Health, SM
Robert James Town, Public Health, SM
Beth A. Viraag, Public Health, SM

Adjunct Associate Professor
Robert A. Connor, Health Care Management, SM
Michael D. Finch, Public Health, SM

Assistant Professor
Jean Marie Abraham, Public Health, M
Michael E. Davern, Public Health, AM

Adjunct Assistant Professor
Jeremy L. Holtzman, Medicine, M
Yvonne Catharina Maria Jonk, Public Health, M
David M. Radosovich, Surgery, M

Other
Kirk C. Allison, M
Tori Dahl, AM
Pamela Jo Johnson, AM

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

Curriculum—Health services research focuses on the organization and delivery of cost-effective health services. It deals with policy issues related to costs, access, and quality of health services and equitable distribution of health resources. Master's students develop analytical capabilities that may be applied to health care management, health services research, or health policy work. The program emphasizes a population health orientation, research and policy perspective, and analytic methods. Health services research at the Ph.D. level is for those interested in affecting public policy related to health care systems. Students come from a variety of educational backgrounds, including economics, political science, sociology, and public affairs. Strong quantitative skills are essential. The program 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 supported by the student's involvement with faculty on research projects. The program provides further interchange with faculty through research seminars and doctoral colloquia.

Prerequisites for Admission—The M.S. program does not have specific course prerequisites, but some college-level math and economics is recommended. The Ph.D. program requires calculus, statistics, and intermediate microeconomics. 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—A 3.00 GPA for previous coursework is preferred. The GRE general exam is required. GRE exam scores required for M.S. program applicants: 1000 (500 verbal, 500 quantitative) and 3.5 analytical writing. Ph.D. applicants: 1200 (600 verbal, 600 quantitative) and 5.0 analytical writing. Unless exempt, international students must complete the TOEFL exam with preferred scores of 600 (paper), 250 (computer), or 100 (Internet). The TOEFL is not required for students from English speaking countries, or those who have completed 16 semester credits or 24 quarter credits within the past 24 months at a recognized institution of higher learning in the United States. The M.S. and Ph.D. programs in HSRP&A reside in the School of Public Health and all accepted students are required to obtain certain immunizations as a condition of enrollment.

All applicants must submit the following: official grade transcripts from all previous academic institutions; a statement indicating reasons for seeking the M.S. or 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 CV. Students are admitted fall semester only. The programs are full time. For an online application, see the School of Public Health Web site at www.sph.umn.edu/students/application/home.htm.

Courses—Refer to Public Health (PUBH), particularly numbers 65xx, 67xx, 68xx, and 88xx, in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements requires the approval of the director of graduate study.

M.S. Degree Requirements
The M.S. offered under Plan A is in outcomes research. Plan A requires a thesis (publishable research paper), and a final oral exam. Plan B requires a written project and final oral exam. Both Plan A and Plan B are full-time, two-year programs.

Plan A requires 49–52 credits, including 35–36 core credits, 6 elective credits in one or more related fields outside the major, and 10 thesis credits. Plan B requires 46 credits, including 35 core credits and 11 elective credits in one or more related fields outside the major.

Ph.D. Degree Requirements
The Ph.D. requires at least 70 credits, including 34 core credits in the major, a minimum of 12 credits in the minor or supporting program, and 24 thesis credits. The minor or supporting program may be in areas such as economics, statistics, sociology, bioethics, gerontology, business administration, or epidemiology.
Language Requirements—None.
Minor Requirements for Students
Majoring in Other Fields—The minor is developed uniquely for each student with the advice and counsel of the director of graduate studies.

Hispanic and Luso-Brazilian Literature and Linguistics

Contact Information—Department of Spanish and Portuguese Studies, University of Minnesota, 51 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (phone: 612-625-5858; fax 612-625-3549; spanpot@umn.edu; www.spanport.umn.edu).
For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Ana Paula Ferreira, SM
René Jara, SM
Amy K. Kaminsky, Gender, Women, and Sexuality Studies, ASM
Carol A. Klee, SM
Nicholas Spadaccini, SM

Associate Professor
Fernando Arenas, SM
Timothy Face, M2
Ofélia Ferrán, SM
Ana Forcinito, SM
Francisco A. Ocampo, SM
Joanna O’Connell, SM
Luís Ramos-García, SM

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

Curriculum—The department offers one M.A. program—Hispanic and Lusophone Literatures, Cultures, and Linguistics—with three formal tracks: Hispanic Literatures and Cultures, Lusophone Literatures and Cultures, and Hispanic Linguistics. The department also offers the doctor of philosophy degree in Hispanic and Lusophone Literatures and Linguistics. For the Ph.D., students study one of four areas of emphasis: Spanish, Spanish American, and Lusophone literatures and cultures, and Hispanic Linguistics. The four specialized area components are fully integrated in these degree programs. The close integration of these areas makes this department unique in the United States.

The department has a strong tradition of fostering socio-historical perspectives on literatures and cultures. Our faculty is committed to comparative and interdisciplinary study and they engage a variety of contemporary theoretical approaches, with strengths in postcolonial theory, feminisms, critical race theory, queer theory, hermeneutics of human rights, and theories of globalization. Members of the Hispanic linguistics faculty are specialists in the fields of sociolinguistics, second language acquisition, syntax, pragmatics, phonetics, and phonology. The program in Lusophone literatures and cultures is one of the few in the nation that focuses on the Portuguese-speaking world as a whole and in its parts. Graduate students may also take courses in related departments such as Gender, Women, and Sexuality Studies; Cultural Studies and Comparative Literature; Linguistics; History; Afro-American and African Studies; French and Italian; Chicano Studies; Anthropology; and Geography, among others.

Prerequisites for Admission—Preferred undergraduate GPA of at least 3.00 and a preferred graduate GPA of at least 3.50. 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—The following materials should be sent to the attention of the director of graduate studies: a departmental application, statement of purpose, three letters of recommendation from previous professors who can evaluate the applicant’s scholarship, a writing sample of a research project, a complete set of transcripts, GRE General Test scores, and an oral sample to demonstrate fluency in Spanish, Portuguese, or English based on the applicant’s native language. The deadline for application for admission and financial aid is December 15 for fall entry. Applicants are considered for admission for fall semester only. Applicants who wish to be considered for graduate assistantships or university-wide fellowships are encouraged to apply early.

Courses—Refer to Portuguese (PORT), Spanish (SPAN), and Spanish-Portuguese (SPPT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 54 course credits (17 courses) beyond the B.A., including SPPT 5999, 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.

Language Requirements—Students are required to be fluent in Spanish and/or Portuguese and acquire literacy in at least one other foreign language (see the department’s Graduate Handbook).

Minor Requirements for Students
Majoring in Other Fields—The doctoral minor requires at least 18 credits of 5xxx or 8xxx courses (six courses), to be determined in consultation with the director of graduate studies.

Hispanic and Lusophone Literatures, Cultures, and Linguistics

Contact Information—See Hispanic and Lusophone Literatures, Cultures, and Linguistics.
For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Ana Paula Ferreira, M2
René Jara, M2
Amy K. Kaminsky, Gender, Women, and Sexuality Studies, AM2
Carol A. Klee, M2
Nicholas Spadaccini, M2

Associate Professor
Fernando Arenas, M2
Timothy Face, M2
Ofélia Ferrán, M2
Ana Forcinito, M2
Francisco A. Ocampo, M2
Joanna O’Connell, M2
Luís Ramos-García, M2

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

Curriculum—The department offers an M.A. program, Hispanic and Lusophone Literatures, Cultures, and Linguistics and a Ph.D. program in Hispanic and Lusophone Literatures and Linguistics. The M.A. program offers three formal tracks that students select upon entrance to the program, which is recorded on the transcript. The tracks each offer distinct training as follows.

Hispanic Literatures and Cultures: Students receive a solid experience in Peninsular and Spanish-American Literatures and Cultures. Works and literary movements are studied in their historical, social, and cultural contexts, combining the approaches of literary criticism with those of sociology, the history of ideas, anthropology, and feminism, among others.

Lusophone Literatures and Cultures: This track prepares students in Portuguese Studies, understood as an interdisciplinary critical formation through which the literatures and cultures of Portugal, Brazil, and Lusophone Africa are approached. Students are trained in the main periods, movements, and issues pertaining to Portuguese-language literatures and cultures.
both nationally and internationally, within relevant comparative frameworks.

**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.

**Prerequisites for Admission**—Preferred undergraduate GPA of at least a 3.00 and a preferred graduate GPA of at least a 3.50. Prospective students generally have completed an undergraduate degree or substantial work in the field.

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**—The following materials should be sent to the attention of the director of graduate studies: a departmental application, statement of purpose, three letters of recommendation from previous professors who can evaluate the applicant’s scholarship, a writing sample of a research project, a complete set of transcripts, GRE General Test scores, and an oral sample to demonstrate fluency in Spanish, Portuguese, or English based on the applicant’s native language. The deadline for application for admission and financial aid is December 15 for fall entry. Applicants are considered for admission for fall semester only. Applicants who wish to be considered for graduate assistantships or university-wide fellowships are encouraged to apply early.

**Courses**—Refer to Portuguese (PORT), Spanish (SPAN), and Spanish-Portuguese (SPPT) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

**M.A. Degree Requirements**

The M.A. is offered under both Plan A and Plan B. Plan A requires a minimum of 37 credits, including SPPT 5999, 18 credits in the major field taken from among designated 5xxx level core courses, 6 credits in a minor or related field, and 10 thesis credits. Plan B requires a minimum of 33 course credits—including SPPT 5999, 24 credits in the major field taken from among designated 5xxx core courses, 6 credits in a minor or related field, and two Plan B papers. Most students pursue Plan B.

**Language Requirements**—Students are required to be fluent in Spanish and/or Portuguese and acquire literacy in at least one other foreign language (see the department’s Graduate Handbook).

**Final Exam**—There is a written and an oral final exam that students take in their last semester of coursework, usually the fourth semester.

**Minor Requirements for Students Majoring in Other Fields**—A master’s minor requires at least 6 credits to be determined in consultation with the director of graduate studies.

**Hispanic Linguistics**

See Hispanic and Lusophone Literatures, Cultures, and Linguistics.

**Hispanic Literatures**

See Hispanic and Lusophone Literatures, Cultures, and Linguistics.

**History**

**Contact Information**—Department of History, University of Minnesota, 646 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455 (612-624-5840; fax 612-624-7096; histdgs@umn.edu; www.hist.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Regents Professor**

Sara M. Evans, SM
Allen F. Isaacman, SM
Elaine Tyler May, American Studies, SM

**Professor**

Catherine Asher, Art History, AM2
Frederich Asher, Art History, AM2
Bernard S. Bachrach, SM
Anna K. Clark, SM
Gary Cohen, SM
Gail Dubrow, Landscape Architecture, SM
John K. Evans, SM
John M. Eyer, History of Medicine, ASM
Cesar E. Farah, SM
Edward L. Farmer, SM
Stephen C. Feinstein, Holocaust and Genocide Studies, AM
Donna Gabaccia, SM
David F. Good, SM
Ruth M. Karras, SM
Sally G. Kohlstedt, History of Science and Technology, ASM
Lary May, American Studies, SM
Mary Jo Maynes, SM
Robert E. McCaa, SM
Russell R. Menard, SM
David W. Noble, American Studies, ASM
Carla R. Phillips, SM
William D. Phillips, Jr., SM
Jeffrey Pilcher, SM
Kathryn L. Reyerson, SM
Steven Ruggles, SM
Joel B. Samaha, Sociology, SM
Theofanis G. Stavrou, SM
James D. Tracy, SM
Ann B. Waltner, SM
Eric D. Weitz, SM

**Associate Professor**

Jennifer Alexander, History of Science and Technology, AM2
Keletso E. Atkins, African American and African Studies, AM2
Sarah C. Chambers, SM
Brenda Child, American Studies, AM2
Kirsten Fischer, SM
Tamara Giles-Vernick, M2
George D. Green, SM
Christopher M. Isett, M2
Susan D. Jones, Ecology, Evolution, and Behavior, AM2
Erika Lee, SM
Patricia Lorcin, SM
Michael Lower, SM
Patrick J. McNamara, SM
Lisa A. Norling, SM
Jean M. O’Brien-Kehoe, SM
J. B. Shank, SM
Ajay Skaria, SM
Eva Von Davidsson, Classical and Near Eastern Studies, AM2
Liping Wang, SM
Barbara Y. Welke, SM
Thomas C. Wolfe, SM

**Adjunct Associate Professor**

Tanner Akcam, AM2

**Assistant Professor**

Giancarlos Casule, M2
David Chang, M2
Victoria B. Coifman, African American and African Studies, AM2
Tracey Deutsch, M2
Andrea Gallia, M2
Carol Hakim, M2
Malinda Lindquist, M2
Hiromi Mizuno, M2
Kevin Murphy, M2
Michele Wagner, M2

**Lecturer**

Marguerite Ragnow, AM

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

**Curriculum**—Areas of concentration 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 Advanced Feminist 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.
Prerequisites for Admission—The only prerequisite for admission is a bachelor’s degree. The program admits only to the Ph.D. and most students will have majored in history as an undergraduate. Preparation in at least two broad areas of history and training in at least one foreign language are strongly encouraged.

Special Application Requirements—The department requires the following: completion of the history department application (online submission strongly encouraged), three letters of recommendation, a writing sample, statement of purpose, transcripts, GRE scores, and, for international students, TOEFL scores. The application deadline is December 1. The department application and instructions may be found on the department’s Web site at www.hist.umn.edu.

Courses—Refer to History (HIST) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx history courses are not included on degree program forms for the history graduate major or minor.

M.A. Degree Requirements
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. The Plan A requires six history courses (including HIST 8015), two non-history courses, 10 M.A. thesis credits, and submission of a defensible thesis. The Plan B requires eight history courses (including HIST 8015), two non-history courses, and three Plan B papers (see department Web site for details).

Language Requirements—A reading knowledge of at least one foreign language is required before admission to the master’s exam.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—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.

Ph.D. Degree Requirements
The Ph.D. requires twelve history courses (including HIST 8015) (roughly 48 credits), four non-history courses (roughly 12 credits), and 24 Ph.D. thesis credits to total 72 credits.

Language Requirements—Reading knowledge of at least two foreign languages is required before admission to the preliminary exam. Some areas of concentration may require additional foreign languages. In some cases, quantitative methods may be considered a foreign language.

Minor Requirements for Students Majoring in Other Fields—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 history must serve on the student’s preliminary oral examining and thesis committees. The preliminary oral exam also serves as the exam for the minor.

History of Medicine and Biological Sciences
See History of Science, Technology, and Medicine.

History of Science and Technology
See History of Science, Technology, and Medicine.

History of Science, Technology, and Medicine

Contact Information—Program in the History of Science, Technology, and Medicine University of Minnesota, Tate Lab of Physics, 116 Church Street S.E., Minneapolis, MN 55455 (612-624-7069; fax 612-624-4578; HIST@physics.umn.edu; www.hstm.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
John M. Eyer, History of Medicine, SM
Sally Gregory Kohlstedt, Geology and Geophysics, SM
Arthur L. Norberg (emeritus), Computer Science, ASM
Robert W. Seidel, Chemical Engineering, SM
Alan E. Shapiro, Physics, SM
Roger H. Stuewer (emeritus), Physics, ASM

Associate Professor
Jennifer Karns Alexander, Mechanical Engineering, SM
Tamara L. Giles-Vernick, History, AM2
Michel Janssen, Physics, SM
Susan D. Jones, Ecology, Evolution, and Behavior, SM
C. Kenneth Waters, Philosophy, AM2

Assistant Professor
Mark E. Borrello, Ecology, Evolution, and Behavior, SM
Jennifer Gunn, History of Medicine, SM

Adjunct Assistant Professor
Jon Harkness, History, AM2
David Rhees, Surgery, AM2
Jole Richard Shafelford, Medicine, SM

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

Curriculum—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.

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 Web site for the program financial aid form.

Courses—Refer to History of Science and Technology (HSCI) and the History of Medicine (HMED) course lists in this catalog for graduate classes pertaining to the two tracks in our combined program.

Use of 4xxx Courses—Use of 4xxx courses on degree programs is subject to approval by the director of graduate studies.

M.A. Degree Requirements
The M.A. is offered under Plan A and Plan B. Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits. Following the guidelines in the Graduate Student Handbook for the program (www.hstm.umn.edu), M.A. students will select one of two tracks, in the history of science and technology or in the history of medicine, with some provisions for both breadth and depth. In addition, each student must take the two-semester sequence of historiography and research preparation (HSCI/HMED 8112 and HSCI/HMED 8113). Each student must also take two courses (6 credits) in a minor or related field. Under the Plan A option, students must also take 10 thesis credits. All of the courses selected for the requirements must be passed with a grade of B or better. HSCI 4xxx courses may be included as appropriate for the area and period requirements and with permission of the Director of Graduate Studies.

Language Requirements—M.A. students must demonstrate reading proficiency in one foreign language, normally French or German.

Final Exam—The final exam is oral.
Minor Requirements for Students Majoring in Other Fields—The master’s minor requires 6 credits and is structured for the student’s interests.

Ph.D. Degree Requirements
The Ph.D. is for those planning professional careers that require a high degree of scholarly competency, including teaching and research. Following the guidelines in the Graduate Student Handbook for the program [link to handbook], Ph.D. students will select one of two tracks, in the history of science and technology or in the history of medicine, with some provisions for both breadth and depth. In addition, each student must take the two-semester sequence of histobiography and research preparation (HSCI/HMED 8112 and HSCI/HMED 8113) and a minor or supporting program consisting of four courses (12 credits). Students must also take 24 thesis credits. All of the courses selected for the requirements must be passed with a grade of B or better.

Language Requirements—Before taking the preliminary exams, students must demonstrate reading proficiency in two foreign languages, normally French and German.

Minor Requirements for Students Majoring in Other Fields—The doctoral minor requires 12 credits and is structured for each student’s interests in discussion with the director of graduate studies.

Housing Studies

Postbaccalaureate Certificate

Contact Information—Housing Studies Certificate, College of Continuing Education, Student Support Services, 101 Wesbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4000; info@cce.umn.edu; www.cce.umn.edu/certificates/hbhp).

For latest graduate faculty listings, see [link to directory].

Professors
William Angell, Design Housing and Apparel, M
Becky Yust, Design Housing and Apparel, M

Associate Professors
Marilyn Bruin, Design Housing and Apparel, M
Jeff Crump, Design Housing and Apparel, M
Ann Ziebarth, Design Housing and Apparel, M

Curriculum—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.

Prerequisites for Admission—Students must have a bachelor’s degree from an accredited U.S. university or its foreign equivalent. A preferred performance level for your undergraduate GPA of 3.00 (Students who do not have a 3.00 GPA should describe relevant non-academic experience as well as explain any other relevant factors for the Graduate School’s and program faculty’s consideration.) Students must apply for admission to the certificate with the Graduate School after completing no more than one course.

Courses—Required course: DHA 5471—Special Topics: Seminar for Certificate Students in Housing Studies (2 cr.). Elective courses: DHA 4461, 4465, 5463, 5467, 5469, 5481, 5484, 8463, and 8467. Classes are offered on a rotating basis; students need to check the Class Schedule at [link to class schedule] or contact the department for schedules.

Certificate Requirements
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.

The 4xxx courses listed under course options have been approved for inclusion in a Housing Studies Certificate Program. Students should review their plan of study with the academic adviser. Early in the program, students should file a certificate program plan with CCE indicating the courses they plan to take, subject to faculty approval. All courses must be completed with a grade of B- or better and an overall GPA of 2.80 or higher.

Human Factors/ Ergonomics

Minor Only
Contact Information—Professor Caroline Hayes, Graduate Minor Program in Human Factors/Ergonomics, Department of Mechanical Engineering, Institute of Technology, University of Minnesota, Mechanical Engineering Building, 111 Church Street, S. E., Minneapolis, MN, 55455 (612-624-8391; [link to department]).

For latest graduate faculty listings, see [link to directory].

Professor
John C. Carmody, AM
Arthur G. Erdman, Mechanical Engineering, AM
Laël C. Gatewood, Laboratory Medicine and Pathology, AM
Susan G. Gerberich, Environmental/Occupational Health, AM
Maria Gini, Computer Science, M
Denise A. Guerin, Design, Housing, and Apparel, AM
Caroline C. Hayes, Department of Mechanical Engineering, M
Matts Heimdal, Computer Science, M
Paul Johnson, Carlson School of Management, M
Joseph A. Konstan, Computer Science, M
Karen L. LaBatt, AM
Gordon E. Legge, Psychology, M
Shashi Shekar, Computer Science, AM
John Shutiske, Biosystems and Agricultural Engineering, M
Thomas Stoffregen, Kinesiology, M
Donald Vesley, M
Michael Wade, Kinesiology, M

Adjunct Professor
Victor Koschev, Kinesiology, M

Associate Professor
Lee Ann Breuch, Rhetoric, M
Elizabeth By, Design, Housing, and Apparel, M
Jonathan Chapman, Biosystems and Agricultural Engineering, M
Victoria Interrante, Computer Science, M
Loren Terveen, Computer Science, M

Adjunct Associate Professor
Nicolas Ward, Mechanical Engineering, M

Lecturer
Christopher Miller, AM

Senior Research Fellow
Thomas Smith, Kinesiology, M

Research Associate
Kathleen Harder, College of Design, M
Michael Manser, Mechanical Engineering, M

Curriculum—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 address 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.

Prerequisites for Admission—Admission to the minor is contingent upon prior admission to a graduate degree-granting program within the Graduate School. Admission is only by permission of the director of graduate studies in the human factors/ergonomics minor.

Courses—Refer to Human Factors/ Ergonomics (HUMF) in the course section of this catalog for courses pertaining to this program.

Use of 4xxx Courses—Use of 4xxx courses is permitted based on adviser and director of graduate studies approval.

Minor Only Requirements
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, masters 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 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.

Human Genetics

Minor Only

Contact Information—Graduate Minor Program in Human Genetics, Institute of Human Genetics, University of Minnesota, 4-122 Moos Tower, MMC 206, 515 Delaware Street SE, Minneapolis, MN 55455 (612-626-3267; [fax 612-626-7031]; [www.hg.mc.umn.edu]).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html].

Professor

Susan Berry, Pediatrics, M
John West Day, Neurology, M
Stephen C. Elker, Genetics, Cell Biology, Developmental Biology, M
Perry B. Hackett, Genetics, Cell Biology, Developmental Biology, M
Richard A. King, Medicine, M
Matt McCue, Psychology, M
R. Scott McVor, Genetics, Cell Biology, Developmental Biology, M
Harry T. Orr, Lab Medicine/Pathology, M
Laura P. W. Ranum, Genetics, Cell Biology, Developmental Biology, M
Brian George Van Ness, Genetics, Cell Biology, Developmental Biology, M
Chester B. Whitley, Pediatrics, M

Associate Professor

Kathleen F. Conklin, Genetics, Cell Biology, Developmental Biology, M
Betsy Anne Hirsch, Laboratory Medicine/Pathology, M
David Andrew Largaespada, Cancer Center, M
Bonnie S. Le Roy, Genetics, Cell Biology, Developmental Biology, M
James Scott Pankow, Epidemiology, M
Karen-Sue Taussig, Medicine, M

Assistant Professor

Michael D. Koob, Laboratory Medicine/Pathology, M
Michael B. Miller, Epidemiology, M
Nikunj V. Somia, Genetics, Cell Biology, Developmental Biology, M

Curriculum—The courses for the human genetics minor require a basic understanding of human and molecular genetics and some statistics.

Prerequisites for Admission—No specific course prerequisites are required for admission to the minor in human genetics. The following courses serve as prerequisites for the core courses that can be included in the minor: BIOL 4003—Genetics (3 cr), GCD 4143—Human Genetics (3 cr), GCD 4034—Molecular Genetics (3 cr) or GCD 8121/BIOC 8002—Advanced Molecular Genetics (3 cr), STAT 3001—Introduction to Statistical Analysis (3 cr), PUBH 5414—Biostatistical Methods I (3 cr) and basic introductory courses to prokaryotic and eukaryotic molecular genetics. If a student has an insufficient background in a particular area the Steering Committee may recommend specific courses prior to starting the human genetics minor program. These courses do not count toward the minor requirements.

Courses—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 MCDDBG student). Contact the program for specific courses for the minor program.

Minor Only Requirements

A master’s minor in human genetics requires 9 credits, and a doctoral minor requires 12 credits.

Human Resources and Industrial Relations

Contact Information—Industrial Relations Center, University of Minnesota, 3-300 Carlson School of Management, 321 19th Avenue S., Minneapolis, MN 55455 (612-624-8810; fax 612-624-8360; hrirgrad@umn.edu; www.irc.csom.umn.edu/page5876.asp).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html].

Professor

Avner Ben-Ner, SM
Mario F. Bognanno (emeritus), ASM
John W. Budd, SM
John P. Campbell, Psychology, SM
Zvi Eckstein, Economics, SM
John A. Fossum, SM
Jo-Ida C. Hansen, Psychology, SM
Morris M. Kleiner, Public Affairs, SM
Jeylan T. Mortimer, Sociology, SM
John Remington, SM
Paul R. Sackett, Psychology, SM
James G. Scoville, SM
Connie R. Wanberg, SM
Yijiang Wang, SM
Mahmood A. Zaidi, SM

Associate Professor

Ross E. Azavedo, SM
Joyce E. Bonn, Psychology, AM2
Michelle K. Duffy, SM
Theresa M. Glomb, SM
Maria J. Hanratty, Public Affairs, SM
Deniz S. Omes, Psychology, SM
Jason Shaw, SM

Assistant Professor

Lisa M. Leslie, M2
Colleen F. Manchester, M2

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

Curriculum—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 doctoral degree is a research degree for individuals interested in academic careers.

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. Research methods and quantitative analysis of employment problems and issues are also included. Specialization in two areas is required for Ph.D. candidates, while M.A. candidates are encouraged to choose electives to support a generalist orientation with key business knowledge.

Prerequisites for Admission—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, GRE scores, and a clearly written statement of career interests, goals, and objectives. Master’s degree applicants may substitute the GMAT for the GRE. Applicants whose native language is not English must also submit score results from the TOEFL or IELTS.

Students may enter both the day and evening M.A. programs in the fall or spring semester. The application deadlines are June 15 and October 15. The M.A. financial aid deadline for fall semester is February 1. Students may enter the Ph.D. program only in the fall; the application deadline is January 1. Applicants for all programs are encouraged to apply early, particularly for fall semester.

Courses—Refer to Human Resources and Industrial Relations (HRIR) in the course section of this catalog for courses pertaining to the program.
Use of 4xxx Courses—4xxx courses are not permitted toward M.A. or Ph.D. degree requirements.

M.A. Degree Requirements
The M.A. is offered under Plan A (thesis) and coursework only in day (full-time) and evening (part-time) programs. Most students complete the M.A. under the coursework option, which requires at least 48 credits. Major coursework includes 8001, 8011, 8031, 8141/8241, 8051, and 8071 and elective credits in HRIR. At least 8 credits must be earned in related fields. Plan A requires at least 38 course credits and 10 thesis credits. Major coursework includes 8011; three courses from among 8031, 8141/8241, 8051, and 8071; and 12–16 additional HRIR credits. Also required are 6–10 credits in an approved field or fields of study related to human resources and industrial relations. Plan A is generally limited to students who have considerable related graduate coursework.

Commonly selected related fields include accounting, finance, operations management, managerial communications, economics, human resource development, law, psychology, public affairs, sociology, and research methods.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
Students must complete at least 12 credits of research methods (most complete 18 or more credits); at least 6 credits of human resources and industrial relations doctoral seminars in each of two areas of specialization and other credits in these areas as needed; at least 3 credits in each of the other three subfields; and at least 12 credits in a minor or supporting program in one or more of the following social and behavioral sciences—applied economics, business administration, economics, history, political science, psychology, and sociology. Research methods courses taken outside the program may be applied toward the minor or supporting program requirement. Specific coursework is planned in consultation with the student’s adviser, the Ph.D. coordinator, and the director of graduate studies. Students must pass preliminary exams in each of their subfields and research methods.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor or supporting program may be selected by students majoring in business administration, education, hospital and health care administration, or the social and behavioral sciences. The minor must consist of at least 21 credits, including five courses in at least four subfields, plus a doctoral seminar.

Human Rights

Minor Only
Contact Information—Graduate Minor in Human Rights, Institute for Global Studies, University of Minnesota, 232 Social Science Building, 267 19th Avenue South, Minneapolis, MN 55455 (612-626-1879; fax 612-626-2243; hrminor@umn.edu; www.hrp.cla.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
Kathryn Sikkink, Political Science, M
David Weissbrodt, Law, M

Professor
Ragui Assaad, Humphrey Institute of Public Affairs, M
Katherine Fennelly, Humphrey Institute of Public Affairs, M
Stephen Feinstein, Holocaust and Genocide Studies, M
Sally Kenney, Humphrey Institute of Public Affairs, M
Helga Leitner, Geography, M
Dario Menanteau, Social Work, M
Eric Weitz, History, M
Mahmood A. Zaidi, Human Resources and Industrial Relations, M

Associate Professor
Elizabeth Heger Boyle, Sociology, Law, M

Assistant Professor
Barbara A. Frey, Institute for Global Studies, M
Michele D. Wagner, History, M

Other
Karen Brown, Institute for Global Studies, M
John R. Vreyens, Agricultural, Food and Environmental Sciences, M

Curriculum—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 three 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 80-hour internship. M.A. and M.S. students must complete one additional elective course (3 credits) while doctoral and law students select at least two additional electives (totaling 6 credits) 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.

Prerequisites for Admission—Admission to a master’s or doctoral degree-granting program within the Graduate School. Admission is limited and only by permission of the director of graduate studies in human rights. A GPA of 3.00 is required.

Special Application Requirements—Students should submit a letter of application describing their background and motivation for applying to the minor program to the director of graduate studies. The director may request further information.

Courses—Elective courses are taken from a designated course list at www.hrp.cla.umn.edu/gradCourses.html.

Use of 4xxx Courses—4xxx courses may not be included on degree program forms for the minor.

Minor Only Requirements
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.

Immunology
See Microbiology, Immunology, and Cancer Biology.

Industrial and Systems Engineering

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; gradinfo@ie.umn.edu; www.ie.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
Sant Ram Arora, SM
Saifallah Benjaafar, SM
Diwakar Gupta, SM
Caroline C. Hayes, SM
Arthur V. Hill, Operations and Management Sciences, ASM
Tarald O. Kvalseth (emeritus), ASM
Patrick J. Starr, SM
Thomas Stoffregen, Kinesiology, AM

Associate Professor
William L. Cooper, SM
Karen L. Donohue, Operations and Management Sciences, ASM

Research Associate Professor
Nic Ward, Mechanical Engineering, AM

Assistant Professor
Brian Denton, Mayo Clinic College of Medicine, AM
Bharath Rangarajan, SM

Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.
Curriculum—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, health care delivery systems, revenue management, and supply chain management.

Prerequisites for Admission—Undergraduate degree in engineering or in a closely related scientific field such as mathematics, physics, statistics, computer science, or economics is required. Exceptionally well-qualified students with a baccalaureate degree may be admitted directly to the Ph.D. program.

Special Application Requirements—GRE General Test scores are required for admission to the Ph.D. and the M.S.I.Sy.E.—IE track programs. GRE scores are also used in making departmental financial support decisions. For the Ph.D. program and the M.S.I.Sy.E.—SE track program, three letters of recommendation are required. Students are admitted in fall and spring semesters only; department deadlines are December 15 and October 15, respectively.

Courses—Refer to Industrial Engineering (IE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—No 4xxx courses may be applied toward an ISyE graduate degree.

M.S.I.Sy.E. Degree Requirements

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 requires 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 must be included in the 30 credits. The IE track has two options.

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 by 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—IE5545, 5551, or 8541. Students may replace a required course by 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 either take the Plan B course IE 8951/8953, or complete one to three Plan B papers, determined in consultation with the adviser.

The systems engineering (SE) track is a coursework only option. It requires at least 17 course credits in the major field, and 6 course credits in a minor or related field. Required courses are IE 5111, 5112, 5113, 5541, and 5553.

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.

Language Requirements—None.

Final Exam—For IE track students, the final exam is oral. No final exam for SE track students.

Minor Requirements for Students Majoring in Other Fields—At least 6 credits in industrial and systems engineering are required for a master’s minor.

Ph.D. Degree Requirements

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 by 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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—At least 12 credits in industrial and systems engineering are required for a doctoral minor.

Industrial Relations

See Human Resources and Industrial Relations.

Infrastructure Systems Engineering

Contact Information—Center for the Development of Technological Leadership, University of Minnesota, 1300 South Second Street, Suite 510, Minneapolis, MN 55454 (612-624-5474; fax 612-624-7510; degree@cdtl.umn.edu, www.cdtl.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor

Massoud Amin, Electrical and Computer Engineering, M2
Gary A. Davis, M2
Andrew Drescher, M2
Catherine E. French, M2
John S. Gulliver, M2
Joseph F. Labuz, M2
Panos G. Michalopoulos, M2
Arturo E. Schultz, M2
Michael J. Semmens, M2
Carol K. Shield, M2
Karl A. Smith, M2
Heinz G. Stefan, M2
Vaughan R. Voller, M2

Associate Professor

Randal J. Barnes, M2
Raymond M. Hozalski, M2
Mihai Marasteanu, M2

Lecturer

Bradford Henry, AM2
Peter Hilger, AM2
Steven Olson, AM2
Howard Preston, AM2
Eugene Skok, AM2
Raymond Spack, AM2
Craig A. Waldron, AM2
Peter R. Willenbring, AM2

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

Curriculum—The master of science in the infrastructure systems engineering (M.S.I.S.E.) program focuses on developing management and engineering tools that address the issues in local, county, and state infrastructure. It is an interdisciplinary program offered through the Institute of Technology’s Center for the Development of Technological Leadership 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.

Prerequisites for Admission—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.

Special Application Requirements—None.

Courses—Refer to Infrastructure Systems Engineering (ISE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Applying 4xxx courses toward degree requirements is extremely limited. Such requests will be reviewed on a case by case basis and will require director of graduate studies approval.

M.S.I.S.E. Plan B Degree Requirements

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.

Language Requirements—None.

Final Exam—An oral presentation and defense of the capstone project is required.
Integrative Biology and Physiology

See Cellular and Integrative Physiology.

International Education

Minor Only


Professor
Patricia G. Avery, Curriculum and Instruction, M William M. Bart, Educational Psychology, M David Chapman, Educational Policy and Administration, M Fred Finley, Curriculum and Instruction, M Gerald W. Fry, Educational Policy and Administration, M Gary N. McLean, Work and Human Resource Education, M R. Michael Paige, Educational Policy and Administration, M

Associate Professor
Philip R. Goodrich, Biosystems and Agricultural Engineering, M Rosemarie J. Park, Work and Human Resource Education, M

Adjunct Assistant Professor
Kay A. Thomas, Educational Psychology, M

Lecturer
Joan DeJaeghere, Educational Policy and Administration Deanne L. Magnusson, Educational Policy and Administration, M

Curriculum—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 eight University departments. The minor is limited and only by permission of the director of graduate studies in the program office for information on relevant coursework.

Courses—Please contact the minor program office for information on relevant coursework.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree programs is subject to adviser and director of graduate studies approval.

Minor Only Requirements
At least 9 graduate credits at the master’s level, 12 at the doctoral level. 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 EDPA 5103—Comparative Education and 5124—Critical Issues in International Education (one for master’s, both for doctoral); research (EDPA 5121; for doctoral students only); and area-specific coursework (at least one course for master’s and doctoral: ATEE 5351, CI 5747, EDHD 5001, EDPA 5048, 5080, 5101, 5102, 5104, 5121, 5132, 8104, EPSY 5101, 5112, 5113, 5431, 5432, 5461, 8403, FSOS 8005, HRD 5408, 5496, WHRE 5821, KIN 5900, 8607, WHRE 8142. Electives from the university may be added with the adviser’s consent and director of graduate studies approval.

Interpersonal Relationships Research

Minor Only

Contact Information—Doctoral Minor Program in Interpersonal Relationships Research, Department of Psychology, University of Minnesota, 325L VoTech Education Building, 1954 Buford Avenue, St. Paul, MN 55108 (612-626-0025; simpsi08@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Eileen S. Berscheid, Psychology, M

Professor

Associate Professor
Suzanne Jones, Communication Studies, M Ascan F. Koerner, Communication Studies, M Richard M. Lee, Psychology, M

Assistant Professor
Ann Meier, Sociology, M

Curriculum—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.

Prerequisites for Admission—Admission to the interpersonal relationships research graduate minor is contingent upon prior admission to the Graduate School and to a doctoral program in a degree-granting department. Admission to the minor program is limited and only by permission of the director of graduate studies in interpersonal relationships research.

Courses—Refer to Interpersonal Relationships Research (IREL) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses are permitted based on director of graduate studies approval.

Minor Only Requirements
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).

Japanese
See Asian Literatures, Cultures, and Media.

Journalism
See Mass Communication.

Kinesiology

Contact Information—Marta Fahrenz, Coordinator of Graduate Studies, School of Kinesiology, University of Minnesota, 223B Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax 612-626-7700; kin@umn.edu; http://education.umn.edu/kti).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Arthur S. Leon, SM
Herbert L. Pick, Jr., Child Development, AM2
Thomas Stoffregen, SM
Michael Wade, SM
Albert Yonas, Child Development, AM2

Associate Professor
Donald Dengel, SM
Paula M. Ludewig, Physical Medicine and Rehabilitation, AM2
Virgil G. Mathiowetz, AM2
Trish Painter, Medicine, AM2
Keith C. Russell, M2
Robert C. Serfass, AM2
Diane M. Wiese-Bjornstal, SM

Adjunct Associate Professor
Catherine M. Kotz, Food Science and Nutrition, AM2

Assistant Professor
Yingjie Chen, Medicine, AM2
Lisa A. Kihl, M2
Dawn A. Lowe, Biochemistry, AM2
Moira A. Petit, M2
Stephen D. Ross, M2
Steven D. Stovitz, Medicine, AM2

Adjunct Assistant Professor
Daniel Kaiser, Medicine, AM2

Lecturer
Rayla Allison, M2
Jo Ann Buyse, M2
Stacy Ingraham, M2
Nicole LaVoi, AM2
Richard Rodgerson, AM2
Aynsley M. Smith, AM2
Thomas J. Smith, M2

Senior Fellow
Victor S. Koscheyev, SM

Research Associate
George Blitz, AM2
Bruce David Johnson, AM2
Carol A. Leitschuh, M2

Other
Anthony Brown, Recreational Sports, AM2
Christopher Kaufman, AM2
Aaron Scott Kelly, AM2
James C. Turman, Recreational Sports, AM2

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

Curriculum—Emphasis areas in the master’s and doctoral programs are adapted physical education (master’s only), biomechanics/neural control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport psychology, or sport sociology.

Prerequisites for Admission—Although prospective master’s 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. Prospective doctoral students have generally completed a master’s degree in a field related to kinesiology. Admitted students may be required by their advisor to complete background preparation in undergraduate and graduate kinesiology and related coursework.

Special Application Requirements—Applicants must submit a University of Minnesota Graduate School application form; a completed School of Kinesiology application form; a written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal and quantitative) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly paper; and photocopies of official transcripts. Students may apply at any time; however, submission of all application materials by December 15 is encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students can be admitted any term.

Research Facilities—Research facilities for graduate students in kinesiology include the Human Factors Research Laboratory; Human Sensorimotor Control Laboratory; Gait and Posture Laboratory; Laboratory of Physiological Hygiene and Exercise Science; Laboratory for Musculoskeletal Health; Laboratory for Integrative Human Physiology; Laboratory for Health and Human Performance and Extreme Environments; Sports Marketing Research Group; Tucker Center for Research on Girls and Women in Sport. Courses—Refer to Kinesiology (KIN) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.A. Degree Requirements

M.A. students select an emphasis in adapted physical education, biomechanics/neural control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport psychology, or sport sociology.

The M.A. 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) equivalent. A GPA of at least 3.00 is required to maintain good standing and to graduate.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires at least 6 credits of graduate-level kinesiology courses.

Ph.D. Degree Requirements

Ph.D. students pursue an individualized program with an emphasis in biomechanics/neural control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport 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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires at least 12 credits of graduate-level kinesiology courses, including 5171 (3 cr) and 5980 (1 cr).

Landscape Architecture

Contact Information—Department of Landscape Architecture, University of Minnesota, 144 Ralph Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-625-6800; fax 612-625-0710; island@umn.edu; http://landarch.cdes.umn.edu; default.htm). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Gail Dubrow, M2
Ann Forsyth, M2
Lance M. Neckar, M2
Peter J. Olin, Horticultural Science, M2
David G. Pitt, M2

Associate Professor
Clintan Hewitt, M2
John A. Koepeke, M2
Rebecca J. Krinke, M2
Kristine F. Miller, M2
Laura R. Musacchio, M2
Robert D. Sykes, M2

Adjunct Assistant Professor
Joseph R. Favour, AM
Robert Gunderson, AM
Richard T. Murphy, AM
Patrick Nunally, AM2
Daniel B. Shaw, AM
Degree Programs and Faculty

Senior Research Fellow
Stephan J. Roos, AM2

Research Fellow
Carlos J. Fernandez, AM2

Lecturer
Dean F. Abbott, M2
L. Peter Macdonagh, AM

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

Curriculum—Students are directed toward developing professional design skills rooted in a deep understanding of the intrinsic physical and aesthetic characteristics of natural systems in the landscape. The faculty believes this is the best way for landscape architects to help people transform, conserve, rebuild, and steward the natural and cultural places within which their lives and communities unfold. Students learn to develop and apply place-based design to address local, urban, and regional landscape issues. The curriculum is structured to teach students to be professional landscape architects who use ecological systems-thinking as the basis for artistic design, and to help them develop design literacy based on ecology, art, technology, history, behavior, and place theory.

The department offers the professional master of landscape architecture (M.L.A.), required to become a registered landscape architect, and the master of science (M.S.), a research-oriented (non-professional) degree offering opportunity for a specialized focus within the field of landscape architecture in the context of the professional curriculum. The department also offers a dual degree with urban and regional planning (M.L.A./M.U.R.P.) in cooperation with the Humphrey Institute of Public Affairs.

Requirements for Admission—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 related discipline. All applicants are asked to explain the relationship of their previous academic work and work experience to their proposed program of graduate study.

Special Application Requirements—M.L.A. program applicants must apply by January 15 for entry the following fall. M.L.A. program only for the fall semester. A cumulative GPA of 3.00 or higher is required. GRE scores are not required for entry, 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. Prospective students for the M.S. degree may apply at anytime, however application by January 15 is strongly encouraged to ensure priority consideration for fellowships and assistantships awarded for the next academic year. In addition to completing the application requirements for the Graduate School, applicants should obtain and complete the departmental graduate application materials (available from the department office). The department requires that applicants submit GRE scores. Applicants should submit a statement of intent outlining research objectives and examples of previous research or design work that is substantively or methodologically related to the applicant’s proposed research, or examples of academic or professional work that include 10 to 30 pages of writing, published or unpublished. Successful applicants will have secured the participation of a faculty adviser before completing their applications. Prospective students are encouraged to contact the director of graduate studies to discuss areas of focus and potential faculty advisers. Students may be admitted to the MS program for any academic term.

Courses—Refer to Landscape Architecture (LA) in the course section of this catalog for courses pertaining to the programs.

Use of 4xxx Courses—Inclusion of 4xxx courses in degree programs is subject to approval by the student’s adviser and the director of graduate studies.

M.L.A. Plan B, Coursework Only Degree Requirements

The M.L.A. program, which is accredited by the national Landscape Architecture Accreditation Board (LAAB), is 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 the LAAB standards, 88 graduate credits are required for students without previous design experience. Because coursework is organized in a sequential framework of six designated studio courses, commitment to the program for three successive years is important.

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.

Language Requirements—None.

Final Exam—The final examination is a design portfolio.

M.L.A./M.U.R.P. Plan B Dual Degree Requirements

This option allows students to earn both a master of landscape architecture (M.L.A.) and a master of urban and regional planning (M.U.R.P.) by careful coordination of coursework. Typically, students will be able to achieve both professional degrees in three and a half to four years by cross-counting specified courses. The specific M.U.R.P. specializations for which this option is most appropriate are land use/urban design, housing and community development, and environmental planning.

Students may elect the Plan B option as part of the dual degree, but doing so will require slightly more time to complete both degrees. Consult with the director of graduate studies for details.

To meet the LAAB standards, 88 graduate credits are required to earn an M.L.A., including 36 credits of landscape architecture studio courses, 3 credits of research issues and methods, 9 elective credits (which may be chosen from a list of selected M.U.R.P. program courses), and 40 credits of history, theory, and technology courses. A maximum of 18 credits taken to fulfill M.U.R.P. degree requirements may also be counted toward fulfillment of the M.L.A. degree requirements. Please refer to the urban and regional planning program for M.U.R.P. degree requirements.

M.S. Plan A Degree Requirements

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.
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.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—Minor requirements are determined in consultation with the director of graduate studies.

**Latin**
See Classical and Near Eastern Studies.

**Law**

**Minor Only**

**Contact Information**—Meredith M. McQuaid, Associate Dean, Law School, University of Minnesota, 285 Law Building, 229 19th Avenue S., Minneapolis, MN 55455 (612-625-3025; fax 612-626-1874; [webpage](http://www.law.umn.edu) or [faculty](http://www.grad.umn.edu/faculty_rosters/faculty.htm) for latest graduate faculty listings, see [webpage](http://www.grad.umn.edu/faculty_rosters/faculty.htm)).

**Regents Professor**
David Weissbrodt, M

**Professor**
Edward S. Adams, M
Stephen F. Befort, M
Brian H. Bix, M
Dan Burk, M
Ann Burkhart, M
Dale Carpenter, M
Guy-Urli Charles, M
Jim Chen, M
Carol Chomsky, M
Laure Cooper, M
Thomas Cotter, M
Barry C. Feld, M
Mary L. Fellows, M
Richard S. Fraser, M
Daniel J. Gifford, M
Oren Gross, M
Jill Hasday, AM

**Associate Professor**
Allan Erbesen, AM
Kristen E. Hickman, AM
Heidi Kitrosser, AM
Alexandra Klass, AM
William McGeevan AM
Myron W. Orfield, AM
Shayna M. Sigman, AM
David Stras, AM
Kevin K. Washburn, AM

**Clinical Professor**
Beverly Balos, AM
Brad Clary, AM
Prentiss Cox, AM
Maury S. Landsman, AM
Jean Sanderson, AM
Kathryn J. Sedo, AM
Stephen M. Simon, AM
Carl M. Warren, AM

**Curriculum**—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.

**Prerequisites for Admission**—Admission to the law graduate minor is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School. Enrollment in Law School courses is on a space-available basis, with preference given to law-degree-seeking candidates.

**Courses**—Please contact the minor program office for information on relevant coursework.

**Minor Only Requirements**
A master’s minor requires at least 6 graduate credits; a doctoral minor requires at least 12 graduate credits.

**Learning Technologies**
See Education, Curriculum, and Instruction.

**Liberal Studies**

**Contact Information**—College of Continuing Education, University of Minnesota, 202 Westbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-3025; fax 612-626-0077; [webpage](http://www.cce.umn.edu) or [faculty](http://www.grad.umn.edu/faculty_rosters/faculty.htm) for latest graduate faculty listings, see [webpage](http://www.grad.umn.edu/faculty_rosters/faculty.htm)).

**Professor**
Fred Amram, General College, M2
Kent R. Bales, English, M2
Rose Brewer, Studies in Africa and the African Diaspora, M2
Daniel Detzner, Postsecondary Teaching and Learning, M2
Stephen Feinstein, History, M2
Maria Gini, Computer Science, M2
Peter Lock (emeritus), French and Italian, M2
Judith A. Martin, Geography, M2
Victoria Mikelonis, Rhetoric, M2
Randy Moore, Postsecondary Teaching and Learning, M2
David Schuelke (emeritus), Rhetoric, M2
Karen Seashore, Education and Human Development, M2
John Wallace, Philosophy, M2
Jack Zipes, Germanic Studies, M2

**Clinical Professor**
William Dikel, Psychiatry, M2

**Associate Professor**
Barbara Crosby, Public Affairs and Public Policy, M2
Arthur M. Harkins, Educational Policy and Administration, M2
Bernadette Longo, Rhetoric, M2
Carol A. Miller, American Studies, M2
Roger Miller, Geography, M2
Lisa Norling, History, M2
Robert Silberman, Art History, M2
Jacquelyn N. Zita, Feminist Studies, M2

**Other**
Gerald Allan, M2
Michael M. Andregg, M2
Donna Bennett, M2
Wayne Caron, M2
Jennifer Caruso, M2
Stephen L. Daniel, M2
Sarah Dennison, M2
Margot Galt, M2
Anita Gonzalez, M2
DonnaMae J. Gustafson, M2
Janet Hagberg, M2
John Hassellberg, M2
Janet Hively, M2
Nicholas Pease, M2
David A. Shupe, M2
Roslye Ulan, M2
Sherry Wagner-Henry, M2

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

**Curriculum**—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 Graduate School, 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.

**Prerequisites for Admission**—A bachelor’s degree is required. The faculty committee reviewing each application looks for indications that the student can succeed in graduate study; there is a good “fit” between the M.L.S. program and the student’s stated educational objectives, and 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—A statement of purpose, letters of support, all undergraduate transcripts, transcripts from any postbaccalaureate degree or coursework, and examples of written work should accompany the application. GRE scores may also be submitted, but are not required. International students are required to achieve a passing score on the TOEFL.

Courses—Refer to Liberal Studies (LS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Contact the M.L.S. office prior to taking a 4xxx course.

M.L.S. Degree Requirements
The M.L.S. is a specific variation of the master’s Plan B option. The program requires at least 30 credits. Introduction to Interdisciplinary Inquiry (3 cr) and the Final Project (3 cr) seminars are required. Students must take at least 9 credits of liberal studies seminars. The remaining 15 credits are composed of electives from disciplines throughout the Graduate School, or directed study, directed research, advanced interdisciplinary inquiry, on-line coursework, or additional liberal studies seminars. Courses are selected with the help of the student’s graduate faculty adviser.

Language Requirements—None.

Final Exam—The final project must be prepared as part of 8002 and must be approved by at least two faculty members and the director of graduate studies.

Linguistics

Contact Information—Director of Graduate Studies, Linguistics, University of Minnesota, 215 Nolte Center, 315 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3331; fax 612-624-4579; LING@umn.edu; www.linguistics.umn.edu/grad/index.html).

For latest graduate faculty listings, see www.umn.edu/faculty_rosters/faculty.html.

Professor
Genevieve J. Esarey, English, AM2
Jeanette K. Gundel, SM
Michael B. Kac, Philosophy, SM
Carol A. Klec, Spanish and Portuguese Studies, AM2
Michael P. Maratos, Child Development, AM2
John D. Nichols, American Indian Studies, AM2
Maria D. Sera, Child Development, AM2
Amy L. Sheldon, Communication Studies, SM
Nancy J. Stenson, SM
Polly E. Szatrowski, AM2

Associate Professor
Bruce T. Downing, SM
Timothy Face, AM
Charles R. Fletcher, Psychology, AM2
Betsy K. Kerr, French and Italian, AM2
Benjamin Munson, AM2
Hooi Ling Soh, M2

Assistant Professor
Marianne Milligan, AM2

Instructor
Jean-Phillipe Marcotte, AM2

Lecturer
Daniel Karvonen, AM2

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

Curriculum—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.

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 in fall semester but may be permitted in other semesters in exceptional cases.

Courses—Refer to Linguistics (LING) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses in degree programs is subject to advisor and director of graduate studies approval. Students from other majors may include such courses subject to their own program’s approval.

M.A. Degree Requirements
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.

Language Requirements—The M.A. program requires knowledge of one language not native to the student. Mechanisms for demonstrating knowledge are described in the program’s Graduate Student Handbook.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—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 M.A. minor requires at least 9 credits.

Ph.D. Degree Requirements

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 (30 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. 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.

Language Requirements—The Ph.D. degree requires knowledge of two languages not native to the student. Mechanisms for demonstrating such knowledge are described in the program’s Graduate Student Handbook.

Minor Requirements for Students

Majoring in Other Fields—The doctoral minor requires at least 15 credits (five courses). Students who have had 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.
Literacy and Rhetorical Studies

Minor Only

Contact Information—Center for Writing, University of Minnesota, 10 Nicholson Hall, 216 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-626-7583; fax 612-626-7580; writing@umn.edu; www.writing.umn.edu/lrs/index.html).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Richard W. Beach, Curriculum and Instruction, M
Carol Berkenkotter, Writing Studies, M
Daniel Brewer, French and Italian, M
Karlynn K. Campbell, Communication Studies, M
Andrew D. Cohen, Linguistics, English as a Second Language, M
Hazel Dicken-Garcia, Journalism and Mass Communication, M
Edward M. Griffin, English, M
Alan G. Gross, Writing Studies, M
Linda H. Gurak, Writing Studies, M
Michael Hancher, English, M
Ruth-Ellen J. Joeres, German, Scandinavian, and Dutch, M

Cynthia Lewis, Curriculum and Instruction, M
Earl E. McDowell, Writing Studies, M
Donald Ross Jr., Writing Studies, M
Edward Schiappa, Communication Studies, M
Mary Schuster, Writing Studies, M
Amy L. Sheldon, Communication Studies, M
Geoffrey Sirj, English, M
Thom Swiss, Curriculum and Instruction, M
Elaine E. Tarone, Linguistics, ESL, Slavic Languages and Literatures, M
Barbara M. Taylor, Curriculum and Instruction, M
Paulus W. van den Broek, Educational Psychology, M
Billie J. Wahlstrom, Writing Studies, M
Arthur E. Walzer, Writing Studies, M

Associate Professor
Lisa Albrecht, School of Social Work, M
Lee-Ann Kastman Breuch, Writing Studies, M
Robert L. Brown, Jr., Cultural Studies and Comparative Literature, M
Patrick Bruch, Writing Studies, M
Richard J. Graff, Writing Studies, M
Rebecca L. Krug, English, M
Amy M. Lee, Writing Studies, M
John Logie, Writing Studies, M
Carol A. Miller, American Studies, M
Rosemarie J. Park, Work and Human Resource Education, M
Thomas J. Reynolds, Writing Studies, M
Diane J. Tedick, Curriculum and Instruction, M
Constance L. Walker, Curriculum and Instruction, M
Kirt H. Wilson, Communication Studies, M
Thomas Wolfe, History, M

Lecturer
Julie Kahin, Curriculum and Instruction, M

Other
Pamela Flash, Center for Writing, AM
Kirsten Jamsen, Center for Writing, AM

Curriculum—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 (preferably one of the faculty above), the director of graduate studies in their major, and the director of graduate studies in LRS.

Prerequisites for Admission—Admission is contingent upon enrollment in good standing in a relevant doctoral or master’s program within the Graduate School of the University.

Special Application Requirements—Entrance to the minor is granted by permission of the director of graduate studies in LRS and the faculty selection committee. Application materials include a completed program application form (available online at www.writing.umn.edu/lrs/admissions.html), statement of purpose, curriculum vitae, relevant postsecondary transcripts, and two letters of recommendation. Applications are reviewed on a rolling basis.

Courses—Contact the minor program office for information on relevant coursework pertaining to the program, or view recent course recommendations at www.writing.umn.edu/lrs/courses.htm.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted with approval from the director of graduate studies.

Minor Only Requirements
A master’s minor requires three graduate courses or seminars (9 credits minimum), including one course from each of the following categories: 1) literacy theory or practice, including pedagogy; 2) research methods and practices in literacy or rhetorical studies; 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 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.

Language Requirements—None.

Literacy Education
See Education, Curriculum, and Instruction.

Luso-Brazilian Literature
See Hispanic and Lusophone Literatures, Cultures, and Linguistics.

Lusophone Literatures and Cultures
See Hispanic and Lusophone Literatures, Cultures, and Linguistics.

Management of Technology

Contact Information—Management of Technology Graduate Program, Center for the Development of Technological Leadership, University of Minnesota, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55454 (612-624-5747; fax 612-624-7510; MOT@cdtl.umn.edu; www.cdtl.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Carl Adams, Information and Decision Sciences, M
Massoud Amin, Electrical and Computer Engineering, M
Philip Bromiley, Strategic Management, AM
Norman L. Chervany, Information and Decision Sciences, M
William K. Durfee, Mechanical Engineering, M
Bruce Erickson, Strategic Management, M
Arthur V. Hill, Operations and Management Science, M
George John, Marketing and Logistics Management, M
Edward J. Joyce, Accounting and Business Law, M
Kenneth H. Keller, Public Affairs, M
Francis A. Kulacki, Mechanical Engineering, M
Ian H. Maitland, Strategic Management and Organization, M
Alfred Marcus, Strategic Management and Organization, M
Mary Nichols, Strategic Management and Organization, AM
Dennis L. Polla, Electrical Engineering, M
Kenneth J. Roering, Marketing and Logistics Management, M
Kanti Kingshuk Sinha, Operations and Management Science, M
Carl Adams, Information and Decision Sciences, M

Associate Professor
Douglas Ernie, Electrical and Computer Engineering, M

Assistant Professor
Frederick J. Riggins, Information and Decision Sciences, M

Other
Lockwood Carlson, Management of Technology, M
Dileep R. Rao, Strategic Management and Organization, M

Degree Programs and Faculty
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—The master of science in the management of technology (M.S.MOT.) program is administered by the Institute of Technology’s Center for the Development of Technological Leadership. 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.

Prerequisites for Admission—A bachelor’s degree in an engineering, science, or other technology-related field from an accredited program. Applicants should also have completed coursework (or show proficiency) in economics, mathematical modeling, statistics, and computer literacy.

Special Application Requirements—At least five 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 résumé, and a statement of purpose. GRE or Graduate Management Admission Test (GMAT) scores are not generally required. The professional track record of the applicant weighs heavily in the admissions process. A personal interview with an admissions committee is required. Admission is in fall semester only.

Use of 4xxx Courses—4xxx courses may not be included on degree program forms.

M.S.MOT. Plan B Degree Requirements

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.

Language Requirements—None.

Final Exam—An oral presentation of the capstone project is required.

Manufacturing and Systems Engineering

See Industrial and Systems Engineering.

Mass Communication

Contact Information—Graduate Student Services, School of Journalism and Mass Communication (SJMC), University of Minnesota, 110 Murphy Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-4054; fax 612-626-8251; sjmgrad@tc.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Tian-Kuo Chang, SM
Hazel Dicken-Garcia, SM
John Eighmey, SM
Ronald J. Faber, SM
David P. Fan, Genetics and Cell Biology, ASM
John R. Finnigan, Jr., ASM
Kathleen A. Hansen, SM
Jane E. Kirtley, SM
Mark Snyder, Psychology, ASM
Daniel J. Sullivan, SM
Daniel B. Wackman, SM

Associate Professor
Kenneth O. Doyle, SM
Mark H. Pedelty, M2
Dona B. Schwartz, SM
Gary Schwitzer, M2
Albert R. Tims, Jr., SM
Thomas Wolfe, History, AM2

Assistant Professor
Linus Abraham, M2
Donald Brazeal, M2
Kathryn R. Forde, M2
Jisu Huh, M2
Brian Southwell, SM
Michael R. Stamn, M2
Marco Yjzer, SM

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

Curriculum—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, philosophy, and English also are encouraged to apply.

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, and history; international communication; and media management. All programs are suffused with the study of new media communication.

Prerequisites for Admission—The minimum requirement for admission is a B.A. degree or equivalent.

Special Application Requirements—Applicants must submit a departmental 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; and scores from the General Test of the GRE. 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 31.

Special Facilities—Special facilities include the Minnesota Journalism Center, the Silha Center for the Study of Media Ethics and Law, the Institute for New Media Studies, the Digital Information Resource Center (which houses the Eric Severeid Library), and the SJMC Research Division.

Courses—Refer to Mass Communication (JOUR) in the course section of this catalog for courses pertaining to this program.

M.A. Plan A Degree Requirements

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.

Language Requirements—No foreign language is required.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—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 4xxx.
Ph.D. Degree Requirements
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.

Language Requirements—No foreign language is required.

Minor Requirements for Students Majoring in Other Fields—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.

Materials Science and Engineering
See Chemical Engineering and Materials Science and Engineering.

Mathematics

Contact Information—School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-1306; fax 612-624-6702; gradproe@math.umn.edu; www.math.umn.edu/grad/).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Scot Robert Adams, SM
Stephen B. Agard, SM
Greg William Anderson, SM
Douglas Norman Arnold, SM
John Robert Baxter, SM
Sergero Germanovich Bobkov, SM
Maury Daniel Bramson, SM
Carme Calderer, SM
Bernardos Co undesirable, SM
Mark F. Feshbach, SM
Bert E. Fristedt, SM
Paul B. Garrett, SM
Jay R. Goldman (emeritus), SM
Lawrence F. Gray, SM
Robert D. Gulliver, SM
Dennis A. Hejhal, SM
Naresh C. Jain, SM
Dihua Jiang, SM
Max A. Jodeit, Jr., SM
Donald William Kahn, SM
Markus Keel, SM
Harvey Bayard Keynes, SM
Nicolai Vladimir Krylov, SM
Walter Littman, SM
Mitchell B. Luskin, SM
Gennady Lyubenszki, SM
Albert Marden, SM
Richard P. McGehee, SM
William Messing, SM
Norman G. Meyers, SM
William Messing, SM

Willard Miller, SM
Richard B. Moelson, SM
Claudia Neuhauser, Ecology, Evolution, and Behavior, SM
Wei-Ming Ni, SM
Andrew Odlyzko, SM
Peter John Olver, SM
Hans George Othmer, SM
Peter Polacik, SM
Karel L. Priby, SM
Victor Schorr Reiner, SM
Fernando Leiva Reitich, SM
Joel L. Roberts, SM
Mikhail V. Safonov, SM
Fadil Santosa, SM
Arnd Scheel, SM
George R. Sell, SM
Steven I. Sperber, SM
Dennis W. Stanton, SM
Vladimir Sverak, SM
Alexander A. Voronov, SM
Qiiping Wang, SM
Peter Joseph Webb, SM
Dennis E. White, SM
Ofer Zeitouni, SM

Associate Professor
Jonut Cies-Cantos-Fonantire, SM
Jack Frederi Conn, SM
David L. Frank, SM
Hilolu H. Gershenson, SM
Tian-Jun Li, SM
Ezra Miller, SM
Chester L. Miracle, SM
Wayne H. Richter, SM

Assistant Professor
Adrian Diaconu, SM
Gild Lerman, SM
Marta Lewicka, SM
Duane Q. Nykamp, SM
Jianhong Shen, SM
Daniel Spirn, SM
Carlos Tolmasky, ASM

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

Curriculum—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. The M.S. Program A includes an emphasis in applied and industrial mathematics. The M.S. Program B includes an emphasis in mathematics education and an emphasis in actuarial science.

See also Control Science and Dynamical Systems, and Fluid Mechanics in this catalog for Ph.D. programs that rely heavily on mathematics.

Prerequisites for Admission—A solid background in undergraduate-level mathematics is expected. For students whose goal is the Ph.D. degree, background should include full-year courses in analysis, abstract algebra, and a semester of topology (roughly equivalent to MATH 5615H–5616H, 5285H–5286H, and 5345).

Entering students are ordinarily admitted to the master's degree program. Transfer to the Ph.D. program is made when the Ph.D. preliminary written examination is passed, and does not require earning a master's degree.

Special Application Requirements—All applicants are expected to submit three letters of recommendation, a score from the GRE Subject (Advanced) Test in mathematics, and a supplementary application form available from the mathematics department. Applicants who desire financial assistance should submit their applications, including the departmental form, GRE scores, and letters of recommendation, to the director of graduate studies no later than January 15 to be considered for a fellowship, and no later than February 15 to be considered for a teaching assistantship. Students normally are admitted full semester only.

Courses—Refer to Mathematics (MATH) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—In exceptional cases, 4xxx courses may be permitted as part of degree programs subject to director of graduate studies approval.

M.S. Degree Requirements
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, with emphasis in mathematics education, and with emphasis in actuarial science. For more information, see the Graduate Studies in Mathematics brochure.

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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The master's minor requires a two-semester 8xxx or 5xxx sequence.

Ph.D. Degree Requirements
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.

The Ph.D. preliminary written examination, given twice each year, covers real analysis, complex analysis, algebra, and manifolds and topology. Students must pass the exam by the end of their second year. After passing the exam and completing the coursework, students may take the preliminary oral exam, which they must pass by the end of their fourth year. If a supporting program is chosen, it may consist partly or entirely of mathematics courses.

The choice of courses and exams for the emphasis in applied and industrial mathematics is different from those in the general program. In particular, applications are stressed early on.

For more information, see the program’s Web site at www.math.umn.edu/grad.

Language Requirements—Two foreign languages are required from among the following: French, German, Russian, and Italian.

Minor Requirements for Students

Majoring in Other Fields—Two year-long sequences of 5xxx or 8xxx courses. Consult the director of graduate studies in mathematics.

Mathematics Education

See Education, Curriculum, and Instruction.

Mechanical Engineering

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; gradinfo@me.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

 Regents Professor

Richard J. Goldstein, SM
Benjamin Y. H. Liu (emeritus), ASM

Professor

Roger E. Arndt, Civil Engineering, ASM
Saifallah Benjaafar, SM
Mrinal Bhattacharya, Biosystems and Agricultural Engineering, ASM
John C. Bischof, SM
Thomas R. Chase, SM
Jane H. Davidson, SM
Max Donath, SM
William K. Durfee, SM
Arthur G. Erdman, SM
Edward A. Fletcher (emeritus), ASM
Steven L. Girshick, SM
Caroline C. Hayes, SM
Joachim V. R. Heberlein, SM
Warren E. Ibele (emeritus), ASM
David B. Kittelson, SM
Barney E. Klamecki, SM
Uwe R. Kortshagen, SM

Thomas H. Kuehn, SM
Francis A. Kulacki, SM
Jack L. Lewis, Orthopaedic Surgery, ASM
Susan C. Mantell, SM
Virgil A. Marple, SM
Peter H. McMurry, SM
Katsuhiko Ogata (emeritus), ASM
Emil Pfender (emeritus), ASM
David Y. H. Pui, SM
Rajesh Rajamani, SM
Subbiah Ramalingam, SM
Sridharan Ramaswamy, Bioproducts and Biosystems Engineering, ASM
James W. Ramsey, SM
Jeffrey T. Roberts, Chemistry, ASM
Terrance W. Simon, SM
Fotis Sotiropoulos, ASM
Ephraim M. Sparrow, SM
Patrick J. Starr, SM
Kim A. Stelson, SM
Paul J. Strykowskis, SM
Kumar K. Tamma, SM
Robert T. Tranquillo, Biomedical Engineering, ASM
Vaughn R. Voller, Civil Engineering, ASM

Adjunct Professor

Paul Iaizzo, ASM

Associate Professor

Jennifer Alexander, AM
Victor H. Barocas, Biomedical Engineering, ASM
Joan Bechtold, Orthopaedic Surgery, ASM
Tianhong Cui, SM
Sean C. Garkiss, SM
Allison Hubel, SM
Heinrich O. Jacobs, Electrical and Computer Engineering, ASM

Assistant Professor

Alptekin Aksan, SM
Traian Dumitrica, SM
Julian Marshall, ASM

Associate Program Director

Craig R. Shankwitz, AM
Nicholas J. Ward, AM

Research Associate

Michael Maner, ASM

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

Curriculum—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.

Prerequisites for Admission—An undergraduate degree in engineering or in a closely related scientific field such as physics, chemistry, or mathematics, is required. Unusually well-qualified students may be admitted directly to the Ph.D. program with a baccalaureate degree.

Special Application Requirements—GRE

General Test scores are required for admission and also are used in evaluating requests for financial aid. For the Ph.D. program, three letters of recommendation from faculty members at the previous educational institution are required.

Students are admitted in the fall and spring semesters only, the departmental deadlines for which are December 15 and October 15, respectively, of the previous year.

Courses—Refer to Mechanical Engineering (ME) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Selected 4xxx courses from other departments may be applied toward the degree in consultation with the student’s adviser and the director of graduate studies. No 4xxx ME courses may be applied toward the degree.

M.S.M.E. Degree Requirements

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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—At least 6 credits in mechanical engineering are required for a master’s minor.

Ph.D. Degree Requirements

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; 24 thesis credits are also required.

Language Requirements—None.

Minor Requirements for Students

Majoring in Other Fields—At least 12 credits in mechanical engineering are required for a doctoral minor.
Mechanics
See Aerospace Engineering and Mechanics.

Medical Physics
See Biophysical Sciences and Medical Physics.

Medicinal Chemistry
Contact Information—Department of Medicinal Chemistry, University of Minnesota, 8-101 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-9919; fax 612-624-0139; medchem@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Yusuf J. Abul-Hajj, SM
David M. Ferguson, SM
Gunda I. Georg, SM
Patrick E. Hanna, SM
Stephen S. Hecht, Laboratory Medicine and Pathology, SM
Thomas R. Hoye, Chemistry, SM
Rodney L. Johnson, SM
Lisa A. Peterson, Environmental and Occupational Health, SM
Philip S. Portoghese, SM
Rory P. Remmel, SM
W. Thomas Shier, SM
Marilyn K. Speedie, SM
Robert Vince, SM
Carston R. Wagner, SM

Associate Professor
Mark D. Distefano, Chemistry, ASM
Robert A. Feckic, SM
William B. Gleason, Laboratory Medicine and Pathology, SM
Ramaiah Mukhyla, Experimental and Clinical Pharmacology, ASM
Natalya Y. Tretjakova, SM

Assistant Professor
Elizabeth A. Amin, SM
Shana J. Surla, SM
Chengguo Xing, SM

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

Curriculum—The 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.

Prerequisites for Admission—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 also is a prerequisite, but under certain circumstances such coursework may be taken during the first year. Students usually are admitted fall semester only and admissions are for the Ph.D. program only.

Special Application Requirements—Scores from the General (Apptitude) 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 mid January to ensure priority consideration for fellowship, teaching, and research assistantships awarded for the next academic year.

Courses—Refer to Medicinal Chemistry (MEDC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—With the exception of BIOC 4331, use of 4xxx courses is not permitted toward degree requirements.

M.S. Plan A Degree Requirements
The medicinal chemistry program does not offer admission for a master’s degree. Students must complete a core curriculum of advanced courses in organic chemistry (4 credits) and medicinal chemistry (10 credits), and 6 credits in a minor or related field.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A minimum of 6 credits is required for a master’s minor.

Ph.D. Degree Requirements
All students must complete a core curriculum of advanced courses in organic chemistry (7 credits), biochemistry (8 credits), and medicinal chemistry (12 credits). Students must also participate in the department seminar program, successfully complete a cumulative exam requirement that serves as the preliminary written exam, and prepare and defend an original research proposal which serves as the preliminary oral exam.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A minimum of 12 credits is required for the doctoral minor, including an introductory courses (MEDC 5700 and 5710, advanced medicinal chemistry courses, and other courses in the medicinal chemistry core curriculum.

Medieval Studies
Minor Only

Contact Information—Center for Medieval Studies, University of Minnesota, 302 Nolte Center, 315 Pillsbury Dr. S.E., Minneapolis, MN 55455 (612-626-0805; fax 612-626-7735; cmedst@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
F.R.P. Akehurst, French and Italian, M
Bernard S. Bachrach, History, M
Cesar E. Farah, History, M
Evelyn S. Firchow, German, Scandinavian, and Dutch, M
Donna G. Cardamone Jackson, Music, M
Ruth Mazo Karras, History, M
Michal A. Kobiakla, Theatre Arts, M
Anatoly Liberman, German, Scandinavian, and Dutch, M
Sheila J. McNally, Art History/Classical and Near Eastern Studies, M
Susan J. Noakes, French and Italian, M
James A. Parente, Jr., German, Scandinavian, and Dutch, M
William D. Phillips, Jr., History, M
Kathryn L. Reyerson, History, M
John A. Watkins, English, M
Peter Wells, Anthropology, M

Associate Professor
Janet Ericksen, English, Morris, M
Lianna Farber, English, M
Linda Farber, English, M
Kaaren E. Grimstad, German, Scandinavian, and Dutch, M
Nita Krevans, Classical and Near Eastern Studies, M
Rebecca L. Krug, English, M
Michael T. Lower, History, M
Oliver Nicholson, Classical and Near Eastern Studies, M
Paul F. Rouzer, Asian Languages and Literatures, M
Andrew Scheil, English, M
John W. Steyaert, Art History, M
Krisa Tuw, English, Duluth, M
Ray M. Wakefield, German, Scandinavian, and Dutch, M

Assistant Professor
Mary F. Brown, French and Italian, M
James Schryver, Art History, Morris, M
Jole R. Shackelford, History of Medicine, M
Rosemary Stanfield-Johnson, History, Morris, M

Curriculum—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 collaborative 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 primary emphasis of the program is on
Latin, which is the most common learned and written language of the period, and secondarily on an interdisciplinary approach to medieval culture. 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.

Prerequisites for Admission—Admission to a medieval studies graduate minor is contingent upon prior admission to a master’s or doctoral degree-granting program in the Graduate School.

Courses—Refer to Medieval Studies (MEST) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted based on approval by the director of graduate study.

Minor Only Requirements

The master’s minor requires 6 graduate credits: two courses in medieval studies outside the student’s major department, including a Latin course (LAT 8120 or any Latin course at 5xxx or above) and either one MEST core course (5610 or 8110) or another approved course with medieval or Latin content. If the latter option is chosen, MEST 8010 (the medieval colloquium course) also is required.

The doctoral minor requires 12 graduate credits, comprising courses in medieval studies outside the student’s major department and including an additional Latin course at 5xxx or above. Students from Classical fields using Latin to satisfy requirements in those fields must substitute an equivalent quantity of a medieval vernacular language for the medieval studies Latin requirement.

Students whose work centrally involves medieval vernacular languages may inquire of the director of graduate studies about the possibility of substituting work in one or more of these for some of the required Latin; at the time this catalog went to press, the possibility of allowing such substitutions, or of articulating tracks within the minor with different goals, was under consideration by the Center’s Executive Committee.

Research Opportunities—The Center for Medieval Studies facilitates interdisciplinary collaboration among students and faculty in all areas of medieval studies. Research groups include the Medieval Research Group, the Old Norse Reading Group, and the Conlegium Gaviarium. Other opportunities for research collaboration exist through the Institute for Advanced Study, the Minnesota Manuscript Research Laboratory, and through affiliations with the Hill Museum and Manuscript Library and the Newberry Library Consortium.

Microbial Ecology

Minor Only

Contact Information—Michael Sadowsky, Microbial Ecology Minor Program, University of Minnesota, 439 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108 (612-624-2706; mcecol@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor

G. David Tilman, Ecology, Evolution, and Behavior, M

Professor

Iris D. Charvat, Plant Biology, M
Randall E. Hicks, Biology, Duluth, M
Linda L. Kinkel, Plant Pathology, M
Timothy J. Kurtti, Entomology, M
David J. McLaughlin, Plant Biology, M
Philip J. Regal, Ecology, Evolution, and Behavior, M
Michael J. Sadowsky, Soil, Water, and Climate, M
Lawrence P. Wackett, Biochemistry, M

Curriculum—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 of microorganisms to 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.

Prerequisites for Admission—To be admitted to the minor, a student must be admitted to a master’s or doctoral degree-granting program within the Graduate School, should have broad training in the biological sciences, and must be accepted by the director of graduate studies of the microbial ecology minor program. All students are expected to have had the equivalent of introductory microbiology (MICB 3301) and general ecology, but may fulfill deficiencies in these areas by taking these courses while in the program.

Use of 4xxx Courses—Inclusion of more than one 4xxx course on degree program forms is subject to approval by the adviser and the director of graduate study.

Minor Only Requirements

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 in microbial ecology.

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, 8542, 8551, EEB 4601, 4609, PLPA 8102, 8103, SOIL 5515, 5611.

Microbial Engineering

Contact Information—M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-625-0212; fax 612-625-1700; btigraduate.htm).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Robert J. Brooker, Genetics and Cell Biology, M2
Peter W. Carr, Chemistry, M2
Paul P. Cleary, Microbiology, M2
Antony Michael Dean, Ecology, Evolution, and Behavior, M2
Gary M. Dunny, Microbiology, M2
Lynda B. Ellis, Laboratory Medicine and Pathology, M2
Michael C. Flickinger, Biochemistry, M2
James A. Fuchs, Biochemistry, M2
Alan B. Hooper, Genetics and Cell Biology, M2
Wei-Shou Hu, Chemical Engineering and Materials Science, M2
Romas Kazlauskas, Biochemistry, M2
R. Scott McIvor, Laboratory Medicine and Pathology, M2
Michael J. Sadowsky, Soil, Water, and Climate, M2
Janet L. Schottel, Biochemistry, M2
W. Thomas Shier, Medicinal Chemistry and Pharmacognosy, M2
Friedrich Srienc, Chemical Engineering and Materials Science, M2
Lawrence P. Wackett, Biochemistry, M2
Carston Wagner, Medicinal Chemistry, M2

Associate Professor

Mark D. Distefano, Chemistry, M2
Arkady Khodursky, Biochemistry, M2
Daniel J. O’Sullivan, Food Science and Nutrition, M2
Claudia Schmidt-Dannert, Biochemistry, M2
Peter Southern, Microbiology, M2

Assistant Professor

Daniel R. Bond, Microbiology, M2
Jeffrey A. Granich, Biotechnology Institute, M2
Advanced microbiology, biochemistry, molecular biology, immunology, or chemical engineering. Students may choose supporting coursework (at least 6 credits) from specified fields, including biochemistry, food science, pharmacognosy, genetics, and cell biology and must demonstrate proficiency in computer programming and one computer language. Plan A students carry out a research project resulting in a thesis. Plan B students complete a summer preceptorship (about 2 1/2 months) 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A minor in microbial engineering is offered at the doctoral level only. Students must complete at least 12 credits, selected in consultation with the director of graduate studies for microbial engineering.

Microbiology, Immunology, and Cancer Biology

Contact Information—Microbiology, Immunology, and Cancer Biology Program, University of Minnesota, MMC 196, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-5947; fax 612-626-0623; micab@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
Ashley T. Haase, Microbiology, SM

Professor
Mitchell S. Abrahamsen, Veterinary Biosciences, SM
Khali' Ahamed, Laboratory Medicine and Pathology SM
Dwight L. Anderson, Diagnostic and Biological Sciences, SM (emeritus)
Judith G. Berman, Genetics, Cell Biology, and Development, SM
Peter B. Bitterman, Medicine, SM
Bruce R. Blazar, Pediatrics, SM
Paul P. Cleary, Microbiology, SM
Denis R. Clohisy, Orthopaedic Surgery, SM
Agustin P. Dalmasso, Surgery, SM
Anath Das, Biochemistry, Molecular Biology, and Biophysics, SM
Gary M. Dunny, Microbiology, SM
Lynda B. Ellis, Laboratory Medicine and Pathology, SM
Dale S. Gregerson, Ophthalmology, SM
Kristin A. Hogquist, Laboratory Medicine and Pathology, SM
Stephen C. Jameson, Laboratory Medicine and Pathology, SM

Ronald R. W. Jemmerson, Microbiology, SM
Marc K. Jenkins, Microbiology, SM
Vivek Kapur, Microbial and Plant Genomics, SM
Thomas W. Leinen, Laboratory Medicine and Pathology, SM
Walter C. Low, Neurosurgery, SM
Paul T. Magee, Genetics, Cell Biology, and Development, SM
Louis M. Mansky, Diagnostic and Biological Sciences, SM
Patrick W. Mantyh, Diagnostic and Biological Sciences, SM
James B. McCarthy, Laboratory Medicine and Pathology, SM
R. Scott McIvor, Laboratory Medicine and Pathology, SM
Larry L. McKay, Food Science and Nutrition, SM
Matthew F. Mescher, Laboratory Medicine and Pathology, SM
Jeffrey S. Miller, Medicine, SM
Daniel L. Mueller, Medicine, SM
Sundaram Ramakrishnan, Pharmacology, SM
Michael J. Sadowsky, Soil, Water, and Climate, SM
Michel M. Sanders, Biochemistry, Molecular Biology, and Biophysics, SM
Leslie A. Schiff, Microbiology, SM
Patrick M. Schlievert, Microbiology, SM
Janet L. Schottel, Biochemistry, Molecular Biology, and Biophysics, SM
Yoji Shimizu, Laboratory Medicine and Pathology, SM
Amy P. Skubitz, Laboratory Medicine and Pathology, SM
Daniel A. Vallera, Therapeutic Radiology, SM
Brian G. Van Ness, Genetics, Cell Biology, and Development, SM
Gregory M. Vercellotti, Medicine, SM
Catherine M. Verfaillie, Medicine, SM
Lawrence P. Wackett, Biochemistry, Molecular Biology, and Biophysics, SM
Carol L. Wells, Laboratory Medicine and Pathology, SM
Douglas Yee, Medicine, SM

Associate Professor
Sandra K. Armstrong, Microbiology, SM
Vivian J. Bardwell, Genetics, Cell Biology, and Development, SM
Paul Bohjanen, Microbiology, SM
Kathleen F. Conklin, Genetics, Cell Biology and Development, SM
Dana Davis, Microbiology, SM
Michael A. Farrar, Laboratory Medicine and Pathology, SM
Dan S. Kaufman, Medicine, SM
Arkady B. Khodursky, Biochemistry, Molecular Biology, and Biophysics, SM
Alexander Khoruts, Medicine, SM
Carol A. Lange, Medicine, SM
David A. Largaespada, Genetics, Cell Biology, and Development, SM
Daniel J. O’Sullivan, Food Science and Nutrition, SM
Christopher A. Sullivan, Laboratory Medicine and Pathology, SM
David A. Potter, Medicine, SM
Peter Southern, Microbiology, SM
Kenneth D. Vernick, Microbiology, SM
Bruce K. Walcheck, Veterinary Biosciences, SM

Assistant Professor
Daniel R. Bond, Biotechnology Institute, SM
Wade A. Bresnahan, Microbiology, SM
Degree Programs and Faculty

Jeffrey A. Grahnick, Biotechnology Institute, SM
Jennifer L. Hall, Medicine, SM
Reuben S. Harris, Biochemistry, Molecular Biology, and Biophysics, SM
Haojie Huang, Laboratory Medicine and Pathology, SM
Kohzo Iizuka, Medicine Hematology, SM
Yinduo Ji, Veterinary Pathology, SM
Ameeta Kelekar, Laboratory Medicine and Pathology, SM
Nobuki Kikyo, Medicine, SM
Kim C. Mansky, Developmental and Surgical Sciences, SM
Paul C. Markert, Cancer Center, SM
Stephen J. McSorley, Medicine, SM
Christian D. Mohr, Microbiology, SM
Erik J. Peterson, Medicine, SM
Stephen A. Rice, Microbiology, SM
Kathryn Schwertfeger, Laboratory Medicine and Pathology, SM
Pamela J. Skinner, Veterinary Biosciences, SM
Catherine St. Hill, Veterinary Clinical Sciences, SM
Sing Sing Way, Pediatrics, SM
Xianzheng Zhou, Pediatrics, SM

Research Associate
Brett K. Levay-Young, Surgery, SM

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

Curriculum—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, superantigens, and vascular biology and inflammation.

Prerequisites for Admission—Applicants must have a bachelor’s degree that includes coursework in 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.

Special Application Requirements—The following must be submitted to the program: three letters of recommendation; scores from the General (Aptitude) Test of the GRE; official transcripts; a copy of the Graduate School application; and a brief description of reasons for seeking an advanced degree, areas of research interest, (and reasons for these interests), and career objectives. A minimum TOEFL score of 600 (paper), 250 (computer), or 100 (Internet) is required of applicants whose native language is not English. The MfCB program is a fall semester start only. Applications should be submitted by December 15; those received after that date are considered only if space is available in the desired program.

Courses—Refer to Microbiology, Immunology, and Cancer Biology (MICA) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses on degree program forms is permitted based on director of graduate study approval.

M.S. Plan A Degree Requirements
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.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 22 course credits in the major, 12 course credits in a minor or supporting program, and 24 thesis credits.

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. All students take courses on the structure, function, and metabolism of microorganisms; molecular immunology; and cancer biology, as well as in their chosen concentration 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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires two of the following: MICA 8002, MICA 8003, MICA 8004; and any other MICA 8000-level, 3- or 4-credit course to total 12–18 credits.

Molecular, Cellular, Developmental Biology and Genetics

Contact Information—Director of Graduate Studies, Molecular, Cellular, Developmental Biology and Genetics, University of Minnesota, 6-160 Jackson Hall, 321 Church St. S.E., Minneapolis, MN 55455 (612-624-7470; fax 612-626-6140; mcdb@umn.edu; www.cbs.umn.edu/mcdb.html). Inquiries about graduate program activities, courses, and research opportunities should be directed to the director of graduate studies at the same address and phone number.

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Ronald L. Phillips, Agronomy and Plant Genetics, SM

Professor
Judith G. Berman, SM
Susan A. Berry, Pediatrics, SM
Robert M. Brambl, Plant Biology, SM
Robert J. Brooker, SM
Stephen C. Ekker, SM
Robert P. Elde, Neuroscience, SM
Stuart F. Goldstein, SM
David Greenstein, SM
Perry B. Hackett, SM
Thomas S. Hays, SM
Robert K. Herman, SM
Kristin A. Hoggquist, Laboratory Medicine and Pathology, SM
Stephen C. Jameson, Laboratory Medicine and Pathology, SM
Ross G. Johnson, SM
Richard A. King, Medicine, SM
Ryoko Kuriyama, SM
Paul A. Lefebvre, Plant Biology, SM
Paul C. Letourneau, Neuroscience, SM
Richard W. Linck, SM
Dennis M. Livingston, Biochemistry, Molecular Biology, and Biophysics, SM
Paul T. Magee, SM
Louis M. Mansky, Dentistry, SM
Cary N. Mariash, Medicine, SM
M. David Marks, Plant Biology, SM
James B. McCarthy, Laboratory Medicine and Pathology, SM
R. Scott McIvor, SM
Linda McLoon, Ophthalmology, SM
Steven C. McLoon, Neuroscience, SM
Matthew F. Mescher, Laboratory Medicine and Pathology, SM
Michael B. O’Connor, SM
Neil E. Olszewski, Plant Biology, SM
Harry T. Orr, Laboratory Medicine and Pathology, SM
Mary E. Porter, SM
Laura P. W. Ranum, SM
Ann E. Rougvie, SM
Janet L. Schottel, Biochemistry, Molecular Biology, and Biophysics, SM
Scott B. Selleck, Pediatrics, SM
Yoji Shimizu, Laboratory Medicine and Pathology, SM
Carolyn D. Sillnow, Plant Biology, SM
Michael J. Simmons, SM
Jeffrey A. Simon, SM
Amy P. Skubitz, Laboratory Medicine and Pathology, SM
Robert L. Sorenson, SM
Clifford J. Steer, Medicine, SM
Margaret A. Titus, SM
Howard C. Towle, Biochemistry, Molecular Biology, and Biophysics, SM
Brian G. Van Ness, SM
Catherine M. Verfaillie, Medicine, SM
Chester B. Whiteley, Pediatrics, SM
Susan M. Wick, Plant Biology, SM
Robin L. Wright, SM

Adjunct Professor
Timothy W. Behrens, Medicine, SM
The program is interdisciplinary and contributes to both the biological, chemical, or physical sciences. The program participates in the Joint Degree Program in Law, Health, and Life Sciences.

Prerequisites for Admission—The program is sufficiently flexible to accommodate students with a wide range of backgrounds. Students with bachelor's degrees in any of the biological, chemical, or physical sciences are encouraged to apply. Recommended academic preparation includes one year each of calculus, organic chemistry, and physics, and background in basic biology, including biochemistry and genetics. Research experience is very strongly recommended. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study. Exceptional international applicants with minimum TOEFL scores of 625 (paper), 263 (computer), or 107 (Internet, with writing subsection 25 and reading subsection 25) or IELTS score of 7.0 are considered.

Special Application Requirements—Applicants are required to submit three letters of recommendation from persons familiar with their academic and research capabilities; scores from the General (Aptitude) Test of the GRE; and a statement of interests, goals, and research experience. The Subject (Advanced) Test in biology, chemistry, or biochemistry, cell and molecular biology of the GRE is not required but highly recommended. Deadline for receipt of completed applications is January 2. Graduate studies begin in the fall semester only.

Courses—Refer to Molecular, Cellular, Developmental Biology and Genetics (MCDG) and Genetics, Cell Biology, and Development (GCD) in the course section for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted only with prior written approval from the director of graduate studies.

M.S. Degree Requirements Students are admitted to the 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; in all both cases, applicants must also be competitive for admission at the Ph.D. level.

The M.S. is offered under Plan A and 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 Plan B papers. 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. The M.S. on average takes two years to complete.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master's minor requires 6 credits.

Ph.D. Degree Requirements
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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.
**Other**
Gordon R. Murdock, Bell Museum of Natural History, M
Colleen J. Sheehy, Weisman Art Museum, AM

**Curriculum**—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.

**Prerequisites for Admission**—Admission to the museum studies graduate minor is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School. It is anticipated that no more than 15 students will be admitted to this minor each year.

**Courses**—Refer to Museum Studies (MST) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Use of 4xxx courses towards degree requirements is permitted based on director of graduate studies approval.

**Minor Only Requirements**
The master’s and doctoral minors require 7 and 12 credits respectively. Each requires the introductory seminar (MST 5011, 3 credits), the museum practices course (MST 5012, 3 credits), and at least one credit of internship (MST 5020). Additional credits for the doctoral minor may be internship or directed study (MST 8993).

**Music**

**Contact Information**—School of Music, University of Minnesota, 100C Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-4087; fax 612-624-8001; music@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

**Professor**
John De Haan, SM
Jean Del Santo, SM
Keitha Lucas Hamann, SM
Kelley A. Harness, SM
Young Hol Kim, SM
Mirjana Lausevic, SM
Scott D. Lipscomb, SM
Timothy Lovelace, SM
Jerry Luckhardt, SM
Peter Mercer-Taylor, SM
Fernando A. Meza, SM
Kathy S. Romney, SM
Paul M. A. Shaw, SM
David Walsh, M2

**Associate Professor**
Akosua Addo, SM
Dean W. Billmeyer, SM
Mark P. Bjork, SM
David A. Damschroder, SM

**Assistant Professor**
Matthew Britz-Britz-Stull, SM
Immanuel Davis, SM
Doug Geers, SM
Sumanth Gopinath, M2
Elizabeth H. Jackson Kirchhoff, M
Matthew Mehaffey, M2

**Instructor**
John W. Miller, Jr., AM
Dean Sorenson, AM

**Lecturer**
James L. Clate, AM
Jorja Fleezanis, AM
Brian Grivna, AM
Annette L. Heiderscheit, M2
Kathy Kienzle, AM
Peter M. Lloyd, AM
Basil Reeve, AM
Eugene Rousseau, SM
John Snow, AM2
Charles Ullery, AM
Jeffrey W. Van, AM
Herbert E. Winslow, AM
Earl Yowell, AM
Wendy Zaro-Mullins, AM

**Other**

**Diagnostic Exams**—Music Theory and Music History Placement Exams are administered to all entering students. All graduate students in music must demonstrate proficiency in the material found in the undergraduate music theory and ear training sequences, including the form and structure of tonal music and twentieth-century music theory and ear training. Similarly, they must demonstrate proficiency in music history from the Middle Ages to the present. Individual programs may require additional diagnostic exams.

**Courses**—Refer to Music (MUS), Music Applied (MUSA), and Music Education (MUED) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Use of 4xxx courses toward degree requirements is subject to adviser and/or director of graduate studies approval. For a 4xxx-level theory/composition course to be approved there must also be a 3xxx- or 8xxx-level theory/composition course in the degree program.

**M.A. Degree Requirements**
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.

**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.

**Final Exam**—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.

### M.M. Degree Requirements

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.

**Language Requirements**—None

**Final Exam**—A final oral exam is required that covers coursework and the final project and/or recital.

### D.M.A. Degree Requirements

The doctor of musical arts offers emphases in collaborative piano/coaching, conducting, bassoon, cello, clarinet, flute, oboe, percussion, saxophone, trombone, trumpet, viola, violin, guitar, organ, piano, voice, and woodwind performance. Credit requirements are as follows: 89 credits for piano; 85 credits for instrumental performance, guitar, and conducting; 87 credits for organ and woodwinds; 89 credits for voice; and 91 credits for collaborative piano/coaching.

The School of Music offers two options for D.M.A. degrees. The first option requires the minimum credits as outlined above, typically divided as follows: 32 credits of applied study; 12 credits in musicology/ethnomusicology and theory/composition, with at least one 3-credit course in each area; a minimum of 8 credits directly related to the emphasis (literature, pedagogy, performance practice, conducting, secondary instrument, chamber music, etc.); 9 credits in a supporting program outside of music; 20 recital credits for five recitals; and 4 thesis credits for the D.M.A. project document.

The second option allows students to choose a secondary area of concentration to become professionally prepared in an area that complements the performance major. The secondary area option requires the approval of the student’s adviser and of the director of graduate studies, and is limited to secondary areas approved by the Graduate Committee of the School of Music. Under this option, students perform three doctoral recitals instead of five (12 credits total, at 4 credits each) and fulfill the requirements for a secondary area as described below.

### Criteria for Secondary Areas

A secondary area comprises a minimum of 15 credits in total—normally five 3-credit courses, at least two of which must be 8xx courses. Students choosing this option apply the 8 credits that result from reducing the number of doctoral recitals from five to three toward the secondary area. The remaining credits are derived principally from the other areas of music study already built into the D.M.A.—the areas of musicology, theory, pedagogy, etc. The distribution of these credits depends upon the specific secondary area chosen.

A secondary area concentrates either on a single discipline—e.g., musicology, music theory, composition, choral conducting, or pedagogy. All 15 credits of a secondary area must be earned at the University of Minnesota School of Music (i.e., no transfer credits or credits from outside of the School of Music can be used). Students who choose a secondary area are encouraged but not obligated to write their thesis/D.M.A. project in that area. A list of secondary areas and their course requirements is available upon request from the Graduate Studies Office of the School of Music.

**Language Requirements**—Some D.M.A. emphases require up to two languages chosen from French, German, Italian, or, with approval, other languages appropriate to final research project.

### Ph.D. Degree Requirements

The doctor of philosophy offers emphases in composition, music education/therapy, music theory, and musicology/ethnomusicology. For the doctor of philosophy in music, emphases and minimum course credit requirements are as follows: 51 credits for musicology, ethnomusicology, and theory; 65 credits for composition; and 66 credits for music education. Programs are individualized and build on the core of coursework required for the corresponding master’s degrees. Coursework includes 12–18 credits outside the major. In addition, 24 thesis credits are required.

**Language Requirements**—The language requirement for each emphasis is as follows: Musicology, ethnomusicology, and composition—Two languages chosen from French, German, and Italian (substitution may be made when a different language is needed for the thesis. For composition, one language may also, with approval, be replaced by a collateral field of knowledge or a special research technique).
Degree Programs and Faculty

Theory—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).

Education/Therapy—None.

Music Education
See Music.

Nanoparticle Science and Engineering

Minor Only

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; www.nanoigert.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Donald G. Truhlar, Chemistry, M

Assistant Professor
R. Lee Penn, Chemistry, M

Curriculum—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 with the student and director of graduate studies.

Prerequisites for Admission—Admission to a master’s or doctoral degree-granting program in the Institute of Technology and preparation of a minor program of coursework approved by the director of graduate studies is required. Students in programs outside the Institute of Technology must be approved by the director of graduate studies.

Use of 4xxx Courses—4xxx courses may be included on degree program forms.

Minor Only Requirements
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 MATH 8212—Solid State Reaction Kinetics.

Natural Resources Science and Management

Contact Information—College of Food, Agricultural and Natural Resource Sciences, University of Minnesota, 190 Coffey Hall, 1420 Eckles Avenue So., St. Paul, MN 55108 (612-624-2748; fax 612-625-8787; jwiley@umn.edu www.cfans.umn.edu/gradprograms).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Peter B. Reich, Forest Resources, SM

Professor

Adjunct Professor
David E. Andersen, Fisheries, Wildlife, and Conservation Biology, SM
Gjalt Huppes, Bioproducts and Biosystems Engineering, SM
Douglas H. Johnson, Fisheries, Wildlife, and Conservation Biology, ASM
Randall K. Koka, Soil, Water, and Climate, ASM
Warren Moser, Forest Resources, AM2
John Schomaker, Forest Resources, AM2
Gary Worry, Bioproducts and Biosystems Engineering, AM
John C. Zasada, Forest Resources, ASM

Associate Professor
Todd W. Arnold, Fisheries, Wildlife, and Conservation Biology, M2
Robert Blair, Fisheries, Wildlife, and Conservation Biology, SM
Andrew J. David, Forest Resources, SM
Glenn D. Del Giudice, Fisheries, Wildlife, and Conservation Biology, SM
Fred N. Finley, Curriculum and Instruction, AM
David L. Garshelis, Fisheries, Wildlife, and Conservation Biology, SM
Sarah E. Hobbie, Ecology, Evolution, and Behavior, AM
Patrick H. Huelman, Bioproducts and Biosystems Engineering, M2
Teaching Specialist

Joe Magner, Fisheries, Wildlife, and Conservation Biology, AM2

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

Curriculum—Students normally emphasize one of the following tracks: 1) forests—biology, ecology, conservation, and management; 2) economics, policy, management, and society; 3) assessment, monitoring, and geospatial analysis; 4) recreation resources, tourism, and environmental education; 5) forest hydrology and watershed management; 6) forest products; 7) paper science and engineering; or 8) wildlife ecology and management.

Prerequisites for Admission—Prerequisites vary by subfield. 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. Applicants for the doctoral program should demonstrate a capacity for advanced study and independent research.

Special Application Requirements—Applications are processed on a continual basis throughout the year, and students are admitted each semester. However, to ensure full consideration for fellowships and assistantships, submission of application materials by January 1 (for fall admission) is required. General GRE scores are required. Master’s student applicants are strongly encouraged to submit three letters of recommendation. Applicants for the doctoral program should provide three recommendations from people who can evaluate their capacity for advanced study and independent research.

Courses—Refer to Bioproducts and Biosystems Engineering (BBE), Environmental Sciences, Policy, and Management (ESPM), Fisheries and Wildlife (FW), Forest Resources (FR), and Natural Resources Science and Management (NR) in the course section of this catalog.

Use of 4xxx Courses—Although there is no set maximum number of 4xxx credits, programs with insufficient 5xxx and 8xxx coursework credits will not be approved. Inclusion of 4xxx Forest Resources (FR), Environmental Sciences, Policy, and Management (ESPM), Bioproducts and Biosystems Engineering (BBE), and Fisheries and Wildlife (FW) courses on the degree program form for the M.S., Ph.D., or minor degree is subject to adviser and director of graduate studies approval. Students from other majors may use these 4xxx courses subject to their own program’s approval. The Natural Resources Science and Management Graduate Studies Committee reviews and must approve all graduate degree programs.

Minor Requirements for Students

Majoring in Other Fields—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.

Language Requirements—None.

Final Exam—The final exam is oral.

M.S. Degree Requirements

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 subfield. Students present a seminar on the thesis, the Plan B project, or a topic selected in consultation with the graduate adviser. Specific requirements vary by subfield; prospective students should contact the director of graduate studies or a prospective faculty adviser for specific information.

Ph.D. Degree Requirements

The doctoral program varies from 30 to 60 credits. In addition, students must register for 24 thesis credits. 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.

Neuroscience

Contact Information—Neuroscience Program, University of Minnesota, D-610 Mayo Building, MMC 265, 420 Delaware St. S.E., Minneapolis, MN 55455 (612-626-5898; fax 612-626-6460; neurosci@umn.edu; www.neuroscience.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor

Apostolos P. Georgopoulos, SM

Professor

Mustafa N. al’Absi, Behavioral Sciences, Duluth, SM
James Ashe, SM
Karen Hsiao Ashe, Neurology, SM
Alvin J. Beitz, Veterinary and Biomedical Sciences, SM
David R. Brown, Veterinary Medicine, SM
Dwight A. Burkhardt, Psychology, SM
Marilyn E. Carroll, Psychiatry, SM
H. Brent Clark, Laboratory Medicine and Pathology, SM
Bianca M. Conti-Fine, Biochemistry, SM
Richard Di Fabio, Physical Therapy, SM
Janet M. Dubinsky, SM
Timothy J. Ebnser, SM
Robert P. Elde, Biological Sciences, SM
Esam E. El-Fakahany, Psychiatry, SM

Degree Programs and Faculty
Professor

John H. Anderson, Otologyngology, SM
W. Dale Branton, M2
Patricia L. Farine, Psychiatry, SM
Janet L. Fitzhakeler, Pharmacology, Duluth, SM
Jurgen F. Fohlen,meister, Physiology, SM
Jonathan Gewirtz, Psychology, SM
Paul Kofuji, SM
Catherine M. Koz, Food Science and Nutrition, SM
Dezhi Liao, SM
Paul G. Merkelstein, SM
Giuseppe Pellizer, SM
A. David Redish, SM

Martin W. Wessendorf, SM
Kevin D. Wickman, Pharmacology, SM

Adjunct Associate Professor
Frank H. Burton, Physiology, M2

Assistant Professor
Bagrat Amirkian, M2
Vincent A. Barnett, Physiology, SM
Mathew V. Chaffee, SM
Lihsia Chen, Genetics, Cell Biology, and Development, M2
Carolyn Fairbanks, Pharmacutics, Pharmacology, Neuroscience, SM
Geoffrey M. Ghose, SM
Michael Koob, Neurology, SM
Naoko Koyano, M2
Lorene Lanier, SM
Arthur C. Leuthold, M2
Scott M. Lewis, Neurology, M2
Angus W. MacDonald III, Psychology, M2
Yasuhi Nakagawa, SM
Teresa Nick, SM
Duane Q. Nylamp, Mathematics, SM
John R. Olhfees, Neurosurgery, SM
Raghavendra B. Rao, Pediatrics, M2
Paul R. Schrater, Psychology, SM
Mark J. Thomas, Neuroscience, Psychology, SM
LiLian Yuan, SM
Lance Zirpel, SM

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

Curriculum—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, psychology, and physiology. In some instances, neuroscientific inquiry may also encompass computer science, information processing, engineering, physics, and mathematics.

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, 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.

Prerequisites for Admission—Applicants to the Ph.D. program must have a bachelor’s degree or its foreign equivalent from a recognized college or university. Undergraduate coursework should include instruction in several of the following disciplines: biology, neuroscience, mathematics, physics, chemistry, and philosophy. Prior research experience.

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 on the (computer), or 107 (Internet) version of the test; or obtain 6.5 on the IELTS examination. There are no minimum GPA or GRE score requirements.

Courses—Refer to Neuroscience (NSC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted based on director of graduate studies approval.

M.S. Plan A Degree Requirements

The course requirements for a master’s are the same as those for a Ph.D. degree. They are described under Curriculum (above).
Nonprofit Management

Postbaccalaureate Certificate

Contact Information—Nonprofit Management Certificate, College of Continuing Education, Student Support Services, 150 Westbook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4000; lwd@ccc.umn.edu; http://ccc.umn.edu/certificates/mgmt/nonprofit). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
David Hollister, Social Work, M

Associate Professor
Melissa Stone, Public Affairs, M

Lecturer
Victoria Van Slyke, Social Work, M
Sherry Wagner-Henry, College of Liberal Arts, M

Curriculum—This interdisciplinary 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 Institute 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.

Admission Requirements—To be admitted to this program, applicants must have a bachelor’s degree from an accredited postsecondary U.S. institution or its foreign equivalent. A cumulative GPA of 3.00 is required. Students must also have two years of paid or unpaid work experience in a nonprofit organization in one or more of the following areas: management of a budget; supervision of staff; program development, implementation, and/or evaluation; fundraising and/or grant writing; regular participation in board meetings and/or on board committees. Admission information is available at www.ccc.umn.edu/certificates/mgmt/nonprofit.

Certificate Requirements—Twenty-one credits of coursework are required, including 7.5 credits of required core courses and a minimum of 13.5 elective course credits selected at the discretion of the student in consultation with his or her academic adviser. Core requirements include participation in a leadership seminar (1 credit) reserved for students in the Nonprofit Management Certificate Program, and successful completion of the following courses: PA 5003—Introduction to Financial Analysis and Management (1.5 cr), PA 5251—Strategic Planning and Management (3 cr), PA 5101—Management and Governance of Nonprofit Organizations (3 cr). A grade of B or better in core courses and a cumulative GPA of 2.80 or higher is required for certificate completion.

Nursing

Contact Information—Office of Student and Career Advancement Services, School of Nursing, University of Minnesota, 5-160 Weaver Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-625-7980; fax 612-625-7727; SoNstudentinfo@umn.edu; http://www.nursing.umn.edu/).

Professor
Lyn Bearinger, SM
Donna Bliss, SM
Connie Delaney, SM
Sandra Edmondson, SM
Ann Garwick, SM
Cynthia Gross, SM
Susan Henly, SM
Mary Jo Kreitzer, M2
Barbara Leonard, SM
Joan Liaschenko, SM
Ruth Lindquist, SM
Jean Wyman, SM

Associate Professor
Melissa Avery, SM
Linda Chlan, M2
Laura Duckett, SM
Jaye Fullkerson, AM
Linda Halcon, SM
Helen Hansen, SM
Merrie Kaas, SM
Madeleine Kerr, SM
Kathie Kirchbaum, SM
Linda Lindeke, SM
Margaret Moss, SM
Christine Mueller, SM
Carol O’Boyle, SM
Cynthia J. Peden-McAlpine, SM
Rene Sieving, SM

Adjunct Associate Professor
Elizabeth Saewyc, AM

Assistant Professor
Carolyn Garcia, M2
Joseph Gaugler, M2
Ann Jones, AM
Martha Kubik, M2
Wendy Looman, M2
Susan O’Connor-Von, M2
Cheryl Robertson, M2
Diane Treat-Jacobsen, SM
Bonnie Westra, M2
Fang Yu, M2

Other
Karon Alaniz, AM
Lisa Carney Anderson, M2
Bonnie Bata Jones, M
Bradley Cohen, AM
Elaine Darst, M2
Kathleen Fagerlund, M2
Patty Finch-Guthrie, AM
Mary Findorff, M2
Linda Herrick, AM
Catherine Juve, M2
Leonard Lichtblau, M
Georgia Nygaard, M
Linda Olson Keller, M
Mary Regan, M
Mary Rowan, M2
Kay Savik, M
Sue Ellen Sendelbach, M
Carol Skag, AM
Sharon Tucker, AM
Cecelia Wachendorf, M2

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

Curriculum—The School of Nursing prepares advanced practice nurses, leaders, and scholars in nursing, and provides coursework to prepare postbaccalaureate students from other disciplines to become licensed nurses. The M.S. program includes the following areas of study: adult health clinical nurse specialist, children with special health care needs, family nurse practitioner, gerontological clinical nurse specialist, gerontological nurse practitioner, nurse midwifery, nursing and health care systems administration, pediatric clinical nurse specialist, pediatric nurse practitioner, pediatric nurse practitioner/children with special health care needs, psychiatric-mental health clinical nurse specialist, public health nursing, public health nursing/adolescent nursing, and women’s health care nurse practitioner. The area of study the student chooses in the Plan B option is identified as a subprogram on the official transcript.

The Ph.D. program prepares creative and productive scholars in nursing.

Prerequisites for Admission—Applicants must meet the stated requirements of the Graduate School. A successful applicant typically has an undergraduate GPA of 3.00 and a TOEFL score of 586 (paper), 240 (computer), or 94 (Internet). In the M.S. program, licensure as a registered nurse is required. Registered nurses who do not have a bachelor’s degree with a major in nursing are considered if there is sufficient evidence of ability in health promotion, community health nursing, leadership/management, and teaching/counseling. For the Ph.D. program, a master’s degree with a strong background in the physical and/or behavioral sciences or a bachelor’s degree with an exceptionally strong background are required. For the postbaccalaureate certificate program, a bachelor’s degree in a field other than nursing is required. Seven of the prerequisites for admission must be completed by December 31, with the ability to complete the remaining prerequisites by the time the program starts the following fall. Prerequisite course information is available online at www.nursing.umn.edu.
Nutrition

Contact Information—Nutrition Graduate Program, Department of Food Science and Nutrition, University of Minnesota, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, St. Paul, MN 55108 (612-624-1290; fax 612-625-5272; nutrgrad@umn.edu; http://fscn.cfans.umn.edu/grad_students/nutr_grad_students.html). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
Linda J. Brady, Food Science and Nutrition, SM
Frank B. Cerra, Surgery, ASM
Margot P. Cleary, Hormel Institute, ASM
A. Saari Csallany, Food Science and Nutrition, SM
Daniel D. Gallagher, Food Science and Nutrition, SM
Myron D. Gross, Department of Laboratory Medicine and Pathology, SW
John H. Himes, Epidemiology, SM
Joseph M. Keenan, Family Medicine and Community Health, ASM
Mindy S. Kurzer, Food Science and Nutrition, SM
Theodore P. Labuza, Food Science and Nutrition, M2
Arthur S. Leon, Kinesiology, SM
Allen S. Levine, Food Science and Nutrition, SM
Mark Lyte, Surgery, ASM
Diane R. Neumark-Sztainer, Epidemiology, SM
Joseph R. Prohaska, Biochemistry and Molecular Biology, Duluth, SM
Marla M. Reicks, Food Science and Nutrition, SM
Joanne L. Slavin, Food Science and Nutrition, SM
Mary T. Story, Epidemiology, SM

Adjunct Professor
Mary C. Gannon, Food Science and Nutrition, SM
Julie M. Jones, Food Science and Nutrition, AM

Associate Professor
Lisa J. Harnack, Epidemiology, SM
Craig A. Hassel, Food Science and Nutrition, SM
Daniel J. O’Sullivan, Food Science and Nutrition, SM
Mark A. Pereira, Epidemiology, M2
Cheryl F. Smith, Food Science and Nutrition, SM
Lyn M. Steffen, Epidemiology, SM
Jian-Min Yuan, Epidemiology, SM

Adjunct Associate Professor
Duane Crary, Food Science and Nutrition, AM2
Darlene G. Kelly, Food Science and Nutrition, ASM
Catherine M. Kotz, Food Science and Nutrition, SM
Patricia L. Splett, Food Science and Nutrition, AM2

Assistant Professor
Xiaoli Chen, Food Science and Nutrition, M2
Carrie P. Earthen, Food Science and Nutrition, SM
Andrew P. Flood, Epidemiology, M2
Leonard F. Marquart, Food Science and Nutrition, SM
Doug G. Mashek, Food Science and Nutrition, M2
Melissa Nelson, Epidemiology, M2
Sabrina Peterson, Food Science and Nutrition, M2
Susan K. Raatz, Medical School, SM
Kim Robien, Epidemiology and Community Health, M2
Shalamar Sibley, Medical School, M2
Jamie S. Stang, Epidemiology, AM

Adjunct Assistant Professor
Mary K. Schmidl, Food Science and Nutrition, AM2
Alice C. Shapiro, Epidemiology, M2

Other
U. Bea Krinke, Epidemiology, AM2

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

Curriculum—Nutrition is the study of how nutrients, both essential and non-essential, 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 Pediatrics, Surgery, Psychiatry, 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); Hormel Institute (Austin, Minnesota); Mayo Clinic (Rochester, Minnesota); and V.A. Medical Center, Hennepin County Medical Center, and Park Nicollet Institute (Minneapolis, Minnesota).

Three subspecialty areas are offered in the doctoral degree program: human nutrition, nutritional biochemistry, and public health nutrition. Thesis work can be conducted in the laboratory, clinic, or field, locally or internationally.

Prerequisites for Admission—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. and Ph.D. programs also require the following nutrition courses, or equivalent, that may be completed after admission to the program: Principles of Nutrition (FSCN 1112), Life cycle Nutrition (FSCN 3612), and Human Nutrition (FSCN 4612).
Special Application Requirements—GRE scores and three letters of recommendation evaluating the applicant’s scholarship must be submitted. At least two letters should be from professorial-rank faculty. The GRE Writing Assessment Test is recommended.

Courses—Refer to Nutrition (NUTR) and Food Science and Nutrition (FSCN) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements
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 (three courses), an orientation and presentation skills class, graduate courses in biochemistry, 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.

Language Requirements—None.
Final Exam—The final exam is oral.
Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 6 course credits in nutrition, including NUTR 5621 (4 cr).

Ph.D. Degree Requirements
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 (three courses), an orientation and presentation skills class, graduate level courses in biochemistry, physiology, and statistics, and two advanced topics courses, and presentation of the thesis. All students also are expected to obtain teaching experience, subject to the policies of the adviser’s department or division.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor may be completed by taking NUTR 5621, 5622, 5623W, and three additional credits in nutrition, including at least one 8xxx course.

Occupational Therapy
Individuals interested in applying to the Program in Occupational Therapy should contact the occupational therapy program directly by e-mail at occupationalprogram@umn.edu or by telephone at 612-626-5887. Applications for admission to the occupational therapy program will not be processed by the Graduate School, and instead will be processed by the Center for Allied Health Programs.

Contact Information—Program in Occupational Therapy, University of Minnesota, 388 MMC, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-5887; fax 612-626-7192; occupationalprogram@umn.edu; www.ot.umn.edu). Program office is in 271 Children’s Rehabilitation Center, 426 Church Street S.E., Minneapolis MN, 55455.

For last graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Charles (Chuck) Harvey Christiansen, M2

Associate Professor
Virgil G. Mathiowitz, M2
Erica B. Stern, M2

Assistant Professor
Cheryl A. Meyers, M2
Patricia Schaber, M2

Assistant Clinical Specialist
Elin Schold Davis, AM
Kathleen M. Matukas, AM
Margaret VanExkikh, AM

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

Curriculum—The program provides a combination of academic and clinical education that prepares students to be occupational therapy clinicians and researchers. Emphasis is on application of the critical thinking model to diverse areas of practice and to diagnostic groups in both clinic and community settings. Clinical education includes fieldwork in such areas as physical, psychosocial, and developmental disabilities. Research and scholarly projects emphasize investigation of treatment effectiveness.

The program is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (PO Box 31220, Bethesda, MD, 20824-1220; 301-652-AOTA). Graduates of the program may sit for the national certification exam administered by the National Board for Certification of Occupational Therapy (NBCOT). After successful completion of this exam, the individual will be an Occupational Therapist, Registered (OTR). A felony conviction may affect a graduate’s ability to sit for the NBCOT certification examination or attain state licensure. Most states require licensure to practice; however, state licenses are usually based on the results of this certification exam.

Prerequisites for Admission—Applications are no longer being accepted for the masters of science in occupational therapy degree. Applications are being accepted for the master of occupational therapy degree offered as a professional degree. Applications are accepted from individuals with a bachelor’s degree in any field other than occupational therapy, or from those who will have completed their bachelor’s degree before entering the program. Students may be accepted pending completion of outstanding prerequisite coursework with the understanding that missing course(s) will be completed before beginning the program. Occasionally, under extenuating circumstances, an individual may be admitted who does not meet all of the admissions requirements.

Special Application Requirements—Interested applicants should contact the program directly for special application requirements or go to the electronic program catalog at www.ot.umn.edu.

Courses—Refer to Occupational Therapy (OT) and Physical Medicine and Rehabilitation (PMED) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses cannot be used toward degree requirements.

M.S. Plan B Degree Requirements
Students take 57 credits of predetermined academic coursework, 6 project credits (Plan B), and a minimum of 12 credits of fieldwork education. Optional fieldwork education is available in several specialty areas. Required fieldwork must be completed within 24 months of finishing academic coursework. Plan B projects must be completed within three months following fieldwork. There is no minor or related field requirement. Note: These requirements are only for the master of science in occupational therapy. Please contact the program directly for updated program requirements for the master of occupational therapy.

Language Requirements—None.
Final Exam—The final exam is oral.

Oral Biology

Contact Information—Oral Biology M.S., Ph.D., and D.D.S./Ph.D. Graduate Programs, University of Minnesota, 17-164 Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612-624-3974; oralbio@umn.edu; www.dentistry.umn.edu/oral_biology).

For last graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Apostolos P. Georgopoulos, Neuroscience, SM
Degree Programs and Faculty

**Professor**
Alvin J. Beitz, Veterinary and Biomedical Sciences, SM
David A. Berel, Diagnostic and Biological Sciences, SM
Edward C. Combe, Diagnostic and Biological Sciences, SM
Ralph DeLong, Diagnostic and Biological Sciences, SM
Robert J. Feigal, Developmental/Surgical Sciences, SM
William H. Frey II, College of Pharmacy, SM
Mark C. Herzberg, Diagnostic and Biological Sciences, SM
Louis M. Mansky, Diagnostic and Biological Sciences, SM
Patrick W. Mantyh, Developmental/Surgical Sciences, SM
Joel D. Rudney, Diagnostic and Biological Sciences, SM
Charles F. Schachtele, Diagnostic and Biological Sciences, SM
Donald A. Simone, Diagnostic and Biological Sciences, SM
Larry F. Wolff, Developmental/Surgical Sciences, SM

**Associate Professor**
Mansur Ahmad, Diagnostic and Biological Sciences, SM
Darryl T. Hamamoto, Diagnostic and Biological Sciences, SM

**Assistant Professor**
Darryl T. Hamamoto, Diagnostic and Biological Sciences, SM
Alvin J. Beitz, Veterinary and Biomedical Sciences, SM

**Curriculum**—These interdisciplinary programs are offered by the Department of Diagnostic and Biological Sciences in the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, Veterinary Medicine, and the School of Dentistry. They give students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. The expertise of the graduate faculty includes: sensory neuroscience; bone biology, craniofacial development and tissue engineering; infection and immunity; biomaterials and biomechanics; and mucosal epithelial biology and carcinogenesis. 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.

**Use of 4xxx Courses**—Use of 4xxx courses toward oral biology degree requirements is not permitted.

**M.S. Degree Requirements**
The M.S. 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 may be taken as Plan A (with thesis) or Plan B (without thesis); both plans require a total of 30 credits. Students in both plans must complete 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 complete a minor or related field program in a related nonclinical discipline (minimum 6 credits). Plan A requires 10 thesis credits and Plan B requires 10 credits of additional coursework and three Plan B papers. The Plan B papers consist primarily of critical reviews of the literature, but at least one must include a laboratory study. Students must conform to the Graduate School’s GPA requirements for master’s degree students.

**Ph. D. Degree Requirements**
The PhD program in oral biology is designed as a 4-year program. The first year consists primarily of a core curriculum specified by the graduate faculty in that area of expertise. The core curriculum provides students with a working knowledge of the major concepts and research paradigms in that scientific area, a working vocabulary, and the basis for continued learning. During the first year, the graduate student also selects a laboratory, a research adviser and a cutting-edge research problem for investigation and thesis preparation. During months 13 through 15 in residence, 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. During month 18, students present a brief research seminar consisting of preliminary data to evaluate the promise of success in the lab. Upon completion of this two-part preliminary examination of the thesis proposal, the student will work largely on thesis research through month 45 in residence. Months 45 through 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 six months before defense of the thesis. The dissertation is defended in month 48. Although there is no Graduate School minimum credit requirement for the degree, students are expected to complete a core curriculum of 23-25 credits; all students must satisfactorily complete 8 credits of oral biology topics courses (8021-8028) and participate in the oral biology student seminar series (8030) each semester until graduation. 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 credits) 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.

D.D.S./Ph.D. students will 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 are awarded concurrently.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.

Otolaryngology

Contact Information—Department of Otolaryngology, University of Minnesota, MMC 396, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-625-3200; fax 612-625-2101; www.ent.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Khaliil Ahmed, ASM
Steven K. Juhn, SM
Peter A. Hilger, M2
Frank M. Lassman, ASM
Samuel C. Levine, M2
Robert H. Maisel, SM
Robert H. Margolis, SM
David A. Nelson, SM
Michael M. Paparella, ASM
Peter A. Sami, SM

Adjunct Professor
Stephen L. Liston, AM

Associate Professor
John H. Anderson, SM
Kathleen A. Daly, M2
Markus Gapany, M2
George S. Goding, Jr., M2
Rick M. Ondland, M2
Frank G. Ondrey, SM
Frank L. Rimell, M2
James D. Sidman, AM2

Assistant Professor
Holly C. Boyer, M2
Tina C. Huang, M2
Jizhen Lin, M2
Deirdre D. Michael, M2
Derek J. Schmidt, M2

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

Curriculum—This program prepares students in both clinical and experimental aspects of otolaryngology. The M.S., M.S.Otol., and Ph.D. degrees require a publishable thesis. Rotations at Fairview-University Medical Center, 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 audio logo, 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. Each student selects an adviser and prepares a preliminary research proposal by February 1 of the first year. A full proposal in NIH style is expected by June 1. Both proposals must be reviewed by the graduate research committee. A minimum of six months in basic research begins in the second year. Graduates of the program have careers in teaching, research, and professional practice.

Prerequisites for Admission—The M.S. requires a bachelor’s degree from an accredited university or equivalent. The M.S.Otol. requires an M.D. degree and is usually pursued in conjunction with a residency in otolaryngology. The Ph.D.Otol. 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. The admissions committee reviews previous academic records, letters of recommendation, etc.

Courses—Refer to Otolaryngology (OTOL) in the course section of this catalog for courses pertaining to the program.

Use of 4XXX Courses—Otolaryngology does not offer 4XXX courses. Use of 4XXX courses from other departments is permitted toward degree requirements with the permission of the director of graduate studies.

M.S. Plan A Degree Requirements

Majoring in Other Fields

Minor Requirements for Students Majoring in Other Fields—A minor is not available, but otolaryngology courses may be taken for related fields or supporting program credits.

Language Requirements—None.

Final Exam—The final exams are both written and oral. A grade of 70 percent or higher is expected on a national written exam.

M.S.Otol. Plan A Degree Requirements

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 presentation/poster at a national scientific meeting.

Language Requirements—None.

Final Exam—The final exams are both written and oral. A grade of 70 percent or higher is expected on a national written exam.

Ph.D.Otol. Degree Requirements

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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A minor is not available, but otolaryngology courses may be taken for related fields or supporting program credits.

Curriculum—This program prepares students in both clinical and experimental aspects of otolaryngology. The M.S., M.S.Otol., and Ph.D. degrees require a publishable thesis. Rotations at Fairview-University Medical Center, 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 audio logo, 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. Each student selects an adviser and prepares a preliminary research proposal by February 1 of the first year. A full proposal in NIH style is expected by June 1. Both proposals must be reviewed by the graduate research committee. A minimum of six months in basic research begins in the second year. Graduates of the program have careers in teaching, research, and professional practice.

Prerequisites for Admission—The M.S. requires a bachelor’s degree from an accredited university or equivalent. The M.S.Otol. requires an M.D. degree and is usually pursued in conjunction with a residency in otolaryngology. The Ph.D.Otol. 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. The admissions committee reviews previous academic records, letters of recommendation, etc.

Courses—Refer to Otolaryngology (OTOL) in the course section of this catalog for courses pertaining to the program.

Use of 4XXX Courses—Otolaryngology does not offer 4XXX courses. Use of 4XXX courses from other departments is permitted toward degree requirements with the permission of the director of graduate studies.

M.S. Plan A Degree Requirements

Majoring in Other Fields

Minor Requirements for Students Majoring in Other Fields—A minor is not available, but otolaryngology courses may be taken for related fields or supporting program credits.
Pharmaceutics

Contact Information—Department of Pharmaceutics, College of Pharmacy, University of Minnesota, Room 9-177 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-5153; fax 612-626-2125). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

For latest graduate faculty listings, see www.pharmacology.umn.edu/faculty_rosters/faculty.html.

Professor
Janet M. Dubinsky, ASM
William F. Elmquist, SM
Ronald J. Sawchuk, SM
Henning Schroeder, SM
Ronald A. Siegel, SM
Raj G. Suryanarayanan, SM
Timothy Tracy, ASM
Timothy S. Wiedmann, SM
Cheryl L. Zimmerman, SM

Adjunct Professor
Keith K. Chan, ASM
William H. Frey II, ASM

Associate Professor
Richard C. Brundage, ASM

Adjunct Associate Professor
Wadl M. Awni, ASM
Zheng Jane Li, ASM
Evgenyi Y. Shalaev, ASM

Assistant Professor
Belinda Cheung, ASM
Carolyn A. Fairbanks, SM
Laura S. Stone, ASM
Chuan Calvin Sun, ASM
Chun Wang, ASM

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

Curriculum—Emphases are available in physical pharmacy, biopharmaceutics and pharmacokinetics. Minor fields of particular value include biochemistry, biometry, chemistry, biomedical engineering, chemical engineering, mechanical engineering, pharmacology, and statistics.

Prerequisites for Admission—The pharmaceutics program considers students who possess a B.S. degree and an exceptional scholastic record from recognized colleges of pharmacy or other scientific fields.

Special Application Requirements—Undergraduate 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 of 80 percentile are preferred for the quantitative and analytical sections (or 4.5 on the analytical writing section), 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 600 (paper), 250 (computer), or 100 (Internet) 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 pre-evaluation feature on the pharmaceutics Web site at www.pharmacy.umn.edu/pharmaceutics to determine if their credentials are competitive.)

Courses—Refer to Pharmaceutics (PHM) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted based on the approval of the graduate faculty and director of graduate studies.

M.S. Degree Requirements
Students are not admitted directly into the M.S. program. Pharmaceutics Ph.D. students may pursue an M.S. through a change of status request. Students take core courses in pharmaceutics and chemistry. In addition to the 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 29 course credits in upper division (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.

Language Requirements—One collateral field of knowledge chosen with the consent of the director of graduate studies is required. The field must have the approval of the major adviser and pharmaceutics graduate faculty.

Minor Requirements for Students Majoring in Other Fields—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.

Pharmacology

Contact Information—Graduate Program in Pharmacology, University of Minnesota, 612-624-2168; fax 612-625-0458; www.pharmacology.med.umn.edu/.

Pharmacology—Refer to Pharmacology (PHM) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements are permitted based on the approval of the graduate faculty and director of graduate studies.

M.S. Degree Requirements
Students are not admitted directly into the M.S. program. Pharmacology Ph.D. students may pursue an M.S. through a change of status request. Students take core courses in pharmacology. 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 29 course credits in upper division (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 pharmacology, 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.

Language Requirements—One collateral field of knowledge chosen with the consent of the director of graduate studies is required. The field must have the approval of the major adviser and pharmacology graduate faculty.

Minor Requirements for Students Majoring in Other Fields—A minor in pharmacology requires a minimum of 12 credits in PHM 5xxx, PHM 8xxx, or PHAR 6xxx courses and approval of the pharmacology director of graduate studies. In addition, one member of the Ph.D. supervisory committee must be a pharmacology graduate faculty member. The minor program must be declared prior to the preliminary oral examination.
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—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.

Prerequisites for Admission—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. Students may apply at any time; however, submission of all application materials by January 15 is strongly encouraged to ensure priority consideration for fellowships and research assistantships awarded for the next academic year. Students can be admitted any term.

Research Facilities—Graduate faculty members in the pharmacology program have state-of-the-art laboratories located in Hasselmo Hall, Moos Tower, Molecular and Cellular Biology, and Jackson Hall. The Basic Research Center on Molecular and Cell Biology of Drug Abuse is comprised of pharmacology program graduate faculty.

Courses—Refer to Pharmacology (PHCL) in the course section of this catalog for courses pertaining to this program.

Use of 4xxx Courses—Use of 4xxx courses on degree program forms is subject to adviser and/or director of graduate studies approval.

M.S. Degree Requirements
Plan A requires a minimum of 20 course credits (14 in pharmacology, and 6 in biochemistry and physiology) 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.

For more detailed information, contact the director of graduate studies in pharmacology.

Language Requirements—None.

Final Exam—The final exam is an oral defense of thesis.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 9 credits in pharmacology approved by the director of graduate studies in pharmacology.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 21 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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits in pharmacology approved by the director of graduate studies in pharmacology. There are no special requirements (e.g., specific courses, written examination).

Philosophy
Contact Information—Department of Philosophy, University of Minnesota, 831 Walter Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455-0310 (612-625-6563; fax 612-626-8380; ljmphil@umn.edu [www.philosophy.umn.edu]).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html]

Professor
Elizabeth S. Belfiore, Classical and Near Eastern Studies, ASM
Norman J. Law, Philosophy, Public Health, ASM
Eugene Garver, Philosophy, St. John’s University, ASM
Jeanette K. Gundel, Linguistics, ESL, and Slavic Languages and Literatures, AM2

Associate Professor
Sarah W. Holtman, SM
Michael Mason, M2
Michael D. Root, SM

Assistant Professor
Debra DeBruin, Public Health, AM2
Peter Hanks, M2
Alan Love, M2
David Martinez, American Indian Studies, AM2
Antigone Nounou, M2

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

Curriculum—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. 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.

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 Web site. The department application for admissions and aid is available from the Committee on Admissions and Aid at the address listed above or may be downloaded from the philosophy Web site, found at [www.philosophy.umn.edu/programs/gradprogram/gradprogram.html].

Department applications should 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, Interdisciplinary Center for the Study of Global Change.

Applications, together with all supporting materials, must be received by January 7. The philosophy department generally admits students only for fall semester.
Physical Therapy

Contact Information—Physical Therapy Program Office, University of Minnesota, MMC 388, 420 Delaware St. SE, Minneapolis, MN 55455 (612-624-2662; fax 612-625-4274; ptquest@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
James R. Carey, SM
Richard P. DiFabio, SM
Carl G. Kukulka, SM
Robert P. Patterson, AM

Associate Professor
Paula M. Ludewig, SM
LaDora V. Thompson, SM

Assistant Professor
Lisa L. Dorsey, SM
Teresa J. Kimberley, SM
Dawn A. Lowe, SM
LeAnn Snow, SM

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

Curriculum—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 graduate study. Academic coursework and research activity are completed during the first seven semesters. The final two semesters are devoted to clinical internships.

Didactic Curriculum—During the first year of the program the curriculum involves the basic sciences, physical agents, biomechanical principles, and clerkship clinical experiences. The second year advances and integrates first-year coursework into evaluation skills, treatment techniques, and critical thinking. These tools are utilized during second-year clerkships in orthopedics, rehabilitation, and wellness.

Clinical Curriculum—Students complete up to 40 weeks of clinical internships in addition to clinical clerkships imbedded in the academic curriculum. The full-time internships occur during the third year of the program. Each student completes clinical affiliations in the following areas: acute hospital, outpatient, rehabilitation, and a specialty area. These are under direct supervision of experienced clinical faculty and give each student the opportunity to combine theoretical skills with practical experience. Beyond direct patient care, students also develop skills and knowledge related to administration, management and supervision, education, and consultation. Graduates of the program are eligible to apply for state registration or licensure according to the laws of individual states.

Prerequisites for Admission—To be considered for admission, the student must complete a baccalaureate degree by June 15 of the year of application (no preferred major); an operational standard GPA of 3.00 for overall coursework and a 3.00 in the physical therapy prerequisite coursework are the preferred minimum; and the student must complete at least 100 hours of volunteer or work experience in a physical therapy setting. Information and applications, including a list of prerequisite coursework, are available at www.physther.umn.edu.

Special Application Requirements—Submission of GRE scores is required. For international students, a TOEFL score of at least 550 (paper), 213 (computer), or 79 (Internet) is required, and the TSE is highly recommended (score of at least 50). The D.P.T. program accepts only applications completed online at www.physther.umn.edu.

Courses—Refer to Physical Therapy (PT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses towards degree requirements is subject to advisor and director of graduate studies approval.

D.P.T. Degree Requirements
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 an oral presentation 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.

Language Requirements—None.

Physics

Contact Information—Physics Program, School of Physics and Astronomy, University of Minnesota, 145 Tate Laboratory of Physics, 116 Church Street S.E., Minneapolis, MN 55455 612-624-6366; fax 612-624-4578; physics@umn.edu. For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Benjamin F. Bayman (emeritus), ASM
John H. Broadhurst, SM
Charles E. Campbell, SM
Cynthia A. Cattell, SM
Hans W. Courant (emeritus), ASM
Priscilla B. Cushman, SM

Courses—Refer to Philosophy (PHIL) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—All philosophy 4xxx courses are available for graduate credit. Philosophy students may use any 4xxx philosophy course on their graduate degree program, but must register concurrently for a related 1 credit 8xxx workshop to receive graduate credit for the 4xxx course. Students from other majors may register for the related workshop with the permission of the instructor of the 4xxx course.

M.A. Degree Requirements
The M.A. is offered under two plans. Plan A requires 14 course credits in philosophy, 6 course credits outside the department, and 10 thesis credits. Plan B requires 24 course credits in philosophy, 6 course credits outside the department, and three Plan B papers. For details see Philosophy Department Degree Program: M.A., available as a PDF on the philosophy Web site.

Language Requirements—None.

Final Examination—The final examination is oral.

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.

Ph.D. Degree Requirements
No minimum credits are required for the Ph.D., though specific philosophy courses are required that total 26-28 credits; 24 thesis credits are also required. Successful second-year department review represents passing the preliminary written examination. Successful third-year department review, which includes passing a three-paper examination, represents 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 Philosophy Department Degree Program: Ph.D., available as a PDF on the philosophy Web site.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.

Physical Education and Recreation

See Kinesiology.
Curriculum—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.

Prerequisites for Admission—To be a physics major, an undergraduate major in physics or a strong undergraduate minor in physics is required.

Special Application Requirements—Teaching assistantships and a few fellowships are available on application to the School of Physics and Astronomy; 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 are required. 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 and teaching and research assistantships awarded for the next academic year.

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 training sessions, which is required if a student’s financial support comes from TA assignments.

Language Requirements—There is no language requirement. However, in some instances the thesis adviser may require a reading knowledge of one or more foreign languages if justified by the nature of the topic.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics. For the master’s minor, students must complete a minimum of 6 credits in physics.

Ph.D. Degree Requirements

The Ph.D. requires a minimum of 40 credits, including classical physics (PHYS 5011-5012), quantum mechanics (PHYS 5001-5002), and two semesters of a seminar in the student’s research area. 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 of the minor field. Any course may be used to satisfy the related field requirement.

Minor Requirements for Students

Majoring in Other Fields—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).

Physiology

See Cellular and Integrative Physiology.

Planning

See Urban and Regional Planning.
Plant Biological Sciences

Contact Information—Plant Biological Sciences Graduate Program, University of Minnesota, 250 Biological Sciences Center, 1445 Gortner Avenue, St. Paul, MN 55108 (612-625-4222; fax 612-625-1738; pbiogrp@umn.edu; www.cbs.umn.edu/plantbio@gradprog). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Ronald L. Phillips, Agronomy and Plant Genetics, SM
Peter B. Reich, Forest Resources, SM

Professor
Deborah L. Allan, Soil, Water, and Climate, SM
David D. Biesboer, Plant Biology, SM
Robert M. Brambl, Plant Biology, SM
Iris D. Charvat, Plant Biology, SM
Jerry D. Cohen, Horticultural Science, SM
Anath Das, Biochemistry, Molecular Biology and Biophysics, SM
Gary M. Gardner, Horticultural Science, SM
Burle G. Gengenbach, Agronomy and Plant Genetics, SM
Florence K. Gleason, Plant Biology, SM
Peter H. Graham, Soil, Water, and Climate, SM
Robert J. Jones, Agronomy and Plant Genetics, SM
Paul A. Lefevre, Plant Biology, SM
Albert H. Markhart III, Horticultural Science, SM
M. David Marks, Plant Biology, SM
David J. McLaughlin, Plant Biology, SM
Neil E. Olszewski, Plant Biology, SM
James A. Perry, Forest Resources, SM
Michael J. Sadowsky, Soil, Water, and Climate, SM
Ruth G. Shaw, Ecology, Evolution, and Behavior, SM
Carolyn D. Silflow, Plant Biology, SM
D. Peter Snustad, Plant Biology, SM
Joseph R. Sowokinos, Horticultural Science, SM
Kate VandenBosch, Plant Biology, SM
Susan M. Wick, Plant Biology, SM
Nevin D. Young, Plant Pathology, SM

Adjunct Professor
Ford Denison, Ecology, Evolution, and Behavior, SM
John W. Gronwald, Agronomy and Plant Genetics, SM
Deborah A. Samac, Plant Pathology, SM
Carroll P. Vance, Agronomy and Plant Genetics, SM

Associate Professor
Neil D. Anderson, Horticulture, SM
J. Stephen Gaunt, Plant Biology, SM
Susan I. Gibson, Plant Biology, SM
Jane Glazebrook, Plant Biology, SM
William Gray, Plant Biology, SM
Fumiaki Katagiri, Plant Biology, SM
Michael D. Marks, Plant Biology, SM
Georgiana May, Plant Biology, SM
Gary J. Muehlbauer, Agronomy and Plant Genetics, SM
Min Ni, SM
Alan G. Smith, Horticultural Science, SM
Cindy B. Tong, Horticultural Science, SM
John M. Ward, Plant Biology, SM
George Weiblen, Plant Biology, SM

Adjunct Associate Professor
Les J. Szabo, Plant Pathology, SM

Assistant Professor
James A. Bradeen, Plant Pathology, SM
Clay Carter, Biology, Duluth, SM
Jeannine Cavender-Bares, Ecology, Evolution, and Behavior, SM
Julie Etterson, Biology, Duluth, SM
Rebecca Montgomery, Forest Resources, SM
Jennifer S. Powers, Soil, Water, and Climate, SM
Anton A. Sanderfoot, Plant Biology, SM
Nathan Springer, Plant Biology, SM
Peter Tiffin, Plant Biology, SM
Cynthia Weinig, Plant Biology, SM

Adjunct Assistant Professor
David Garvin, Agronomy and Plant Genetics, SM
Rodney Venteria, Soil, Water, and Climate, SM

Other
Kevin Silverstein, Plant Biology, M2

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

Curriculum—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.

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 January 1 is strongly encouraged to ensure priority consideration for fellowships and teaching and research assistantships awarded for the next academic year.

Courses—Refer to Plant Biological Sciences (PBS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements
Course programs are planned in consultation with an advisory committee. Students are expected to take a minimum of four courses in the major in addition to the two 1-credit current topics courses taken during their first year.

Students participate in a teacher-training program and then serve as a teaching assistant for one semester. Regular attendance at the weekly plant biological sciences colloquium seminars is expected. Plan A students write a thesis proposal and present the results of their research at a colloquium seminar. Plan B students develop a thesis proposal.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Final Exam—The final exam is oral.

Minor Requirements for Students
Majoring in Other Fields—A master’s minor requires a minimum of 6 credits approved by the director of graduate studies.

Ph.D. Degree Requirements
Doctoral requirements are the same as those for a master’s degree. In addition, a dissertation proposal and the presentation of two seminars are required.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Minor Requirements for Students
Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits approved by the director of graduate studies.

Plant Pathology

Contact Information—Department of Plant Pathology, University of Minnesota, 495 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108 (612-625-8200; plpathgp@umn.edu; www.plpa.cfans.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Robert A. Blanchette, SM
Robert Morgan Brambl, SM
Senyu Chen, SM
Carol A. Ishimaru, SM
Linda L. Kinkel, SM
Robert A. Blanchette, SM
Senyu Chen, SM
Robert Morgan Brambl, SM
Senyu Chen, SM
Carol A. Ishimaru, SM
Linda L. Kinkel, SM
Sagar V. Krupa, SM
Benham E. L. Lockhart, SM
David H. MacDonald, SM

Courses—Refer to Plant Pathological Sciences (PBS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements
Course programs are planned in consultation with an advisory committee. Students are expected to take a minimum of four courses in the major in addition to the two 1-credit current topics courses taken during their first year.

Students participate in a teacher-training program and then serve as a teaching assistant for one semester. Regular attendance at the weekly plant biological sciences colloquium seminars is expected. Plan A students write a thesis proposal and present the results of their research at a colloquium seminar. Plan B students develop a thesis proposal.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Final Exam—The final exam is oral.

Minor Requirements for Students
Majoring in Other Fields—A master’s minor requires a minimum of 6 credits approved by the director of graduate studies.

Ph.D. Degree Requirements
Doctoral requirements are the same as those for a master’s degree. In addition, a dissertation proposal and the presentation of two seminars are required.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Minor Requirements for Students
Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits approved by the director of graduate studies.
Prerequisites for Admission—Master’s degree applicants must have a sound college background in the basic biological and physical sciences and mathematics, including 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. All students accepted into the department with 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 a Ph.D. program. Criteria for the change include scholastic standing, potential for success in completing a Ph.D., and writing competency. Such a change in status must be approved by the student’s advisory committee and the director of graduate studies after consultation with the Graduate Studies Committee. 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.

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 and must be submitted to the department at the time of application. Students may apply at any time; however, submission of all application materials by January 10 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

Courses—Refer to Plant Pathology (PLPA) in the course section of this catalog for courses pertaining to the program, or to the department Web site at www.plpa.agr.umn.edu.

Use of 4xxx Courses—For M.S. Plan A and Ph.D. students, 4xxx courses are not permitted toward degree requirements.

M.S. Degree Requirements
Plan A (thesis) and Plan B (without thesis) both require a minimum of 14 course credits in plant pathology and 6 course credits in a minor or related field. In addition, Plan A requires 10 thesis credits and Plan B requires 5 project or elective credits. Regular attendance at weekly plant pathology seminars is expected. Internships are encouraged as part of the graduate experience; 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 at www.plpa.agr.umn.edu.

Language Requirements—A foreign language is generally not required. However, knowledge of a foreign language may be necessary for students doing research in non-English-speaking countries.

Minor Requirements for Students
Majoring in Other Fields—A minimum of 12 credits in PLPA 5xxx or 8xxx is required for a doctoral minor.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 17 course credits in plant pathology, which may include 5xxx and 8xxx courses taken before admission to the program (with approval of the director of graduate studies), and to complete 12 credits in a minor or supporting program, and 24 thesis credits. 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; 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 at www.plpa.agr.umn.edu.

Language Requirements—A foreign language is generally not required. However, knowledge of a foreign language may be necessary for students doing research in non-English-speaking countries.
Prerequisites for Admission—Students must have a bachelor’s degree from an accredited U.S. university or its foreign equivalent. Applicants should have mathematics courses at least up through algebra and a course in microeconomics (ECON 1101 is offered via distance education at the University). A GPA of 3.00 is required and, for international students, a TOEFL score consistent with the Graduate School’s requirements.

Courses—Core courses (5 credits): PA 5431 (3 cr); HRIR 5053 (2 cr). Elective courses: HRIR 5021 (4 cr); HRIR 5023 (2 cr); HRIR 8071 (4 cr); HRIR 8021 (3 cr); HRIR 8024 (2 cr); PA 8386 (3 cr); PA 5401 (3 cr); HIST 5844 (3 cr); LAW 6203 (3 cr); LAW 6231 (3 cr).

Use of 4xxx Courses—4xxx courses may not be used to meet certificate requirements.

Certificate Requirements
The certificate consists of at least 15 credits: 5 credits in the core (required courses), and 10 credits of supporting electives. Courses are drawn primarily from the Humphrey Institute of Public Affairs and the Industrial Relations Center in the Carlson School of Management, with additional courses from the College of Liberal Arts and the Law School, and applied economics. 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. Note that some elective courses require prerequisites which do not count toward the certificate.

Completion Requirements—Early in the program, each student should file a certificate program plan with the College of Continuing Education indicating the courses that will be taken, subject to change with faculty approval. Completion of the certificate program requires completion of the indicated courses with core courses requiring a grade of B or better and with an overall GPA in certificate coursework of 3.00 or higher.

Political Psychology
Minor Only
Contact Information—Doctoral Minor in Political Psychology, Center for the Study of Political Psychology, University of Minnesota, 1325 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455; (612-624-0864; fax 612-625-2078; psyccenter@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor John L. Sullivan, Political Science, M
Professor Patricia G. Avery, Curriculum and Instruction, M Eugene Borgida, Psychology, M Karlyn K. Campbell, Communication Studies, M Gay Charles, Law, M
Ronald J. Faber, Journalism and Mass Communication, M Dean Hewes, Communication Studies, M Lawrence Jacobs, HHH Institute of Public Affairs, M David W. Johnson, Educational Psychology, M Paul E. Johnson, Information and Decision Sciences, M Sally J. Kenney, HHH Institute of Public Affairs, M

Associate Professor Geoffrey Maruyama, Educational Psychology, M Alexander J. Rotman, Psychology, M W. Phillips Shively, Political Science, M Mark Snyder, Psychology, M Daniel B. Wackman, Journalism and Mass Communication, M

Assistant Professor Paul Goren, Political Science, M Brian Southwell, Journalism and Mass Communication, M

Curriculum—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 in 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 ten programs within the Graduate School and Law School.

Prerequisites for Admission—Admission is contingent upon prior admission to the Graduate School and a doctoral program in a degree-granting department. Applicants are required to demonstrate knowledge of research methods useful in the study of political psychology by successfully completing (grade of B or better) two or more methodological courses. Examples include POL 8123, 8129; PSY 8814, 8815; STAT 5021, 5302. Other courses from these and other departments are acceptable. Students should consult with the director of graduate studies prior to enrolling in a course to confirm that it satisfies this requirement. Finally, the director of graduate studies in political psychology must approve admission.

Courses—Please contact the minor program office for information on relevant coursework.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to director of graduate studies approval.

Minor Only Requirements
The doctoral minor requires a minimum of 14 graduate credits, including 8 credits in required courses and 6 credits in at least two electives from outside the student’s department. Students are able to tailor the minor to complement their major programs. The required courses are POL 8307, 8308 or PSY 8211, 8212—Proseminar in Political Psychology (2 cr); POL 8311—Political Psychology and Socialization (3 cr); and PSY 8201—Social Cognition (3 cr). Contact the director of graduate studies for more details.

Political Science
Contact Information—Department of Political Science, University of Minnesota, 1414 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455 (612-624-4144; fax 612-626-7599; polisci@umn.edu; www.polisci.umn.edu/grad). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor Kathryn A. Sikkink, SM John L. Sullivan, SM
Associate Professor Scott Abernathy, M2 Christopher Frederico, M2 Timothy R. Johnson, M2 Daniel Kellihier, SM Joanne Miller, M2 Wendy M. Rahn, SM Martin W. Sampson III, SM David J. Samuels, SM
Assistant Professor Ben Ansell, M2 Elizabeth Beaumont, M2 Teri Caraway, M2 Kathleen Collins, M2 Songying Fang, M2 Jane Gingrich, M2 Paul Goren, M2
Enrollment
Courses may be selected from other departments with approval of the department that teaches the course. Political science courses at these levels are generally not open to Ph.D. students, who are expected to take 8xxx seminars.

M.A. Degree Requirements Plan B Only
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 while pursuing their doctorate. 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.

Language Requirements—None.
Final Exam—The final exams are written and oral.

Ph.D. Degree Requirements
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 is also available that leads to an M.A. in public affairs from the Hubert H. Humphrey Institute of Public Affairs and a Ph.D. in political science.

Students concentrate in two of the five subfields and take a minimum of 9 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). Students who concentrate in comparative politics must have appropriate language competence in their area(s) of specialization.

Population Studies

Minor Only
Contact Information—Department of Sociology, University of Minnesota, 909 Social Sciences, 267 19th Avenue South, Minneapolis, MN 55455 (612-624-4300; fax 612-624-7020; popstudies@umn.edu; www.pop.umn.edu/training/population/minor). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Use of 4xxx Courses—4xxx and 5xxx courses from other departments usually are acceptable for supporting or minor programs with approval of the department that teaches the course. Political science courses at these levels are generally not open to Ph.D. students, who are expected to take 8xxx seminars.

M.A. Degree Requirements Plan B Only
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 while pursuing their doctorate. 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.

Language Requirements—None.
Final Exam—The final exams are written and oral.

Ph.D. Degree Requirements
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 is also available that leads to an M.A. in public affairs from the Hubert H. Humphrey Institute of Public Affairs and a Ph.D. in political science.

Students concentrate in two of the five subfields and take a minimum of 9 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). Students who concentrate in comparative politics must have appropriate language competence in their area(s) of specialization.
Degree Programs and Faculty

Language Requirement—None.

Minor Only Requirements
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. In addition to the core course, master’s students take at least three credits and doctoral students take at least nine credits from the list of approved courses at [www.pop.umn.edu/training/population-minor/curriculum](http://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 six credits at the master’s level and twelve 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).

Portuguese
See Hispanic and Luso-Brazilian Literatures and Linguistics.

Program Evaluation

Minor Only

Contact Information—Director of Graduate Studies, Program Evaluation Program, University of Minnesota, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax 612-624-3377; klinge004@umn.edu). For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

Professor
Michael Baizerman, Social Work, M
Nancy N. Eustis, Public Affairs, M
Judith Garrard, Public Health, M
David R. Johnson, Institute on Community Services, AM
Jean A. King, Educational Policy and Administration, M
Richard A. Krueger, Educational Policy and Administration, M
Frances P. Lawrenz, Educational Psychology, M
Arthur J. Reynolds, Institute on Community Services, AM
Jo-Ida C. Hansen, SM
Emma Hasche, SM
Megan R. Gunnar, Child Development, ASM

Assistant Professor
Stuart Yeh, Educational Policy and Administration, M

Research Associate
Debra Ingram, Center of Educational Improvement, M
Valerie Ruhe, Center for Teaching and Learning Services, M

Curriculum—A minor in program evaluation may be pursued at both the doctoral and the master’s levels. The core of the curriculum consists of courses in the foundations of evaluation, evaluation theory, and internship experiences.

Prerequisites for Admission—Prior admission into an established M.A. or Ph.D. is required. Admission to the minor, therefore, will be contingent upon enrollment in good standing within a recognized degree-granting program of the Graduate School.

Special Application Requirements—Students apply for admission through the director of graduate studies and faculty. 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, and education). Students from existing evaluation programs in EdPA and EPsy are not eligible for the minor.

Courses—Refer to Educational Policy and Administration (EDPA), Educational Psychology (EPsy), Family Social Science (FSOS), Public Health (PUBH), and Work and Human Resource Education (WHRE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses is not permitted.

Minor Only Requirements
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 among the student, the major adviser, and the director of graduate studies.

Psychological Foundations of Education
See Educational Psychology.

Psychology

Contact Information—Department of Psychology, University of Minnesota, 249 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax 612-624-2079; psycapply@umn.edu; [www.psych.umn.edu](http://www.psych.umn.edu)). For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html](http://www.grad.umn.edu/faculty_rosters/faculty.html).

Regents Professor
Ellen S. Berscheid, SM
Megan R. Gunnar, Child Development, ASM

Professor
Eugene Borgida, SM
Thomas J. Bouchard, Jr., SM
Dwight A. Burkhardt, SM
John P. Campbell, SM
Marilyn E. Carroll, Psychiatry, ASM
Sandra L. Christensen, Educational Psychology, ASM
Scott J. Crow, Psychiatry, AM
Bruce N. Cuthbert, SM

Mark L. Davison, Educational Psychology, ASM
René V. Dawis (emeritus), ASM
Byron Engelhard, Child Development, ASM
Patricia A. Frazier, SM
Jo-Ida C. Hansen, SM
Dorothy K. Hatuskami, Psychiatry, ASM
Sheng He, SM
William G. Iacono, SM
Paul E. Johnson, Information and Decision Sciences, ASM
Daniel J. Kersten, SM
Thomas J. Kiresuk, Psychiatry, AM
Eric Klinger (emeritus), Social Sciences, Morris, ASM
Robert F. Krueger, SM
Matt G. Kushner, Psychiatry, ASM
Gordon E. Legge, SM
Gloria R. Leon (emeritus), ASM
Allen S. Levine, Psychiatry, ASM
Chad J. Marsolek, SM
Ann S. Masten, Child Development, ASM
Matthew K. McGuire, SM
Deniz S. Ones, SM
J. Bruce Overmier, SM
Christopher J. Patrick, SM
Herbert L. Pick, Jr., Child Development, ASM
William N. Robiner, Medicine, AM
Alexander J. Rothman, SM
Paul R. Sackett, SM
Jeffry A. Simpson, SM
Mark Snyder, SM
L. Alan Stroufe, Child Development, ASM
Thomas Stoffregen, Kinesiology, ASM
Travis Thompson, Pediatrics, AM
Paul van den Broek, Educational Psychology, ASM
Neal F. Viemeister, SM
Niels G. Waller, SM
Connie R. Wanberg, Human Resources and Industrial Relations, ASM
Richard A. Weinberg, Child Development, ASM
David J. Weiss, SM
James E. Ysseldyke, Educational Psychology, ASM

Associate Professor
Joyce E. Bono, SM
James P. Cleary, Neurology, AM
Charles R. Fletcher, SM
Christopher M. Federico, SM
Jonathan C. Gewirtz, SM
Theresa M. Glomb, Human Resources and Industrial Relations, AM
Martha H. Gonzales, SM
William M. Grove, SM
Darwin D. Hendel, Educational Policy and Administration, AM
Wilma Koustaal, SM
Richard M. Lee, SM
Monica Luciana, SM
Michael H. Miner, Family Medicine and Community Health, AM
Andrew J. Oxenham, M
Gail Burton Peterson, SM
Nic Ward, Mechanical Engineering, AM

Assistant Professor
Kathy J. Christensen, Neurology, AM
Celia W. Gershenson, AM
Abigail Gewirtz, Child Development, AM
John C. Gonser, AM
Harriett L. C. Haynes, University Counseling and Consulting Services, AM
Degree Programs and Faculty

Nathan R. Kuncel, SM
Angus MacDonald III, SM
Cheryl A. Olman, M2
Patricia J. Pardo, Psychiatry, AM2
Carol B. Peterson, Psychiatry, AM
Joe Rausch, M2
Paul R. Schrater, SM
Scott R. Spoonheim, AM2
Mark J. Thomas, M2
Linda K. Van Egelen, AM2

Research Associate
Carol B. Peterson, Psychiatry, AM

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

Curriculum—Students are admitted only for the Ph.D. degree. Doctoral program specialties are offered in biological psychopathology, clinical science and psychopathology research, cognitive and biological psychology, counseling psychology, industrial/organizational psychology, personality, individual differences, and behavior genetics, quantitative/psychometric methods, school psychology, and social psychology.

Prerequisites for Admission—Prospective students generally have completed 12 credits (three to four courses) of psychology work beyond introductory psychology, including one course in statistics or psychological measurement. For the clinical science program, a course in abnormal psychology is required. An undergraduate major in psychology is desirable, but not necessary.

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, a photocopy of transcripts, and scores from the General Test of the GRE should accompany applications. The GRE Subject Test in psychology is recommended. Although there are no specific required minimums for GPAs and GRE scores, the range of scores for those admitted in previous years, as well as other specific requirements, are available from the psychology Web site at www.psych.umn.edu.

Courses—Refer to Psychology (PSY) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Certain 4xxx courses may be taken for graduate credit. Students should consult the instructor or director of graduate studies.

M.A. Degree Requirements
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.

Language Requirements—None.

Minor Requirements for Students

Majoring in Other Fields—A master’s minor requires a minimum of 6 credits, with specific courses determined in consultation with an adviser and other faculty.

Ph.D. Degree Requirements
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 area 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.

Language Requirement—None.

Minor Requirements for Students

Majoring in Other Fields—The doctoral minor requires a minimum of 12 credits and is designed according to student needs.

Public Affairs
Contact Information—Director of Admissions, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455, (612-624-3800; fax 612-626-0002; hhhadmit@umn.edu; www.hhh.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
G. Edward Schuh (emeritus), M2

Professor
Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John E. Brandl, M2
John M. Bryson, M2
Nancy N. Eastis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoeneck, M2
Lawrence R. Jacobs, M2
Kenneth H. Keller, M2
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Ann R. Markusen, M2
Samuel L. Myers, M2

Associate Professor
Barbara Crosby, M2
Maria J. Hanratty, M2
Deborah Levison, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa M. Stone, M2
Judy Temple, M2

Assistant Professor
Carissa Schively, M2
Paul C. Stone, M2
Elizabeth J. Wilson, M2

Other
Harry C. Boyte, M2
Gary M. DeCramer, M2
Ali K. Galadly, AM2
P. Jay Kriedrowski, M2
Jennifer Kuzma, M2
Lee Munnich, M2
Joseph H. Nathan, M2
Timothy Penny, AM

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

Curriculum—The master of public affairs (M.P.A.) is intended for mid-career professionals. It is a broad, generalist program that emphasizes leadership and policy making. Completion of degree requirements is possible within a calendar year (two semesters and a summer) of full-time enrollment, or two to three years of part-time enrollment. Structured concentrations include advanced policy analysis methods; economic and community development; 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.

Prerequisites for Admission—Ten years or more of career or public affairs experience, basic competency in computers, and a U.S. bachelor’s degree or foreign equivalent is required.

Special Application Requirements—In addition to the materials submitted to the Graduate School, applicants must submit to the Humphrey Institute a photocopy of the Graduate School admission application, a Humphrey Institute Applicant Data form, copies of all transcripts, a statement of purpose, at least three letters of recommendation, and a professional résumé. Entry is for fall and spring semesters. The deadline for applications is April 1 of the preceding academic year for fall and October 15 for spring.

Courses—Refer to Public Affairs (PA) in the course section of this catalog for courses pertaining to the program.
Use of 4xxx Courses—Use of 4xxx courses degree program forms is permitted with instructor’s and adviser’s permission.

M.P.A. Degree Requirements
The M.P.A. requires 30 credits, including PA 5941—Leadership for the Common Good (4 cr), PA 8001—Transforming Public Policy (4 cr), and PA 8002—Synthesis Workshop or an equivalent capstone workshop (4 cr); 9 credits in concentration courses; 6 credits in skills courses; and 3 credits of electives.

Language Requirements—None.

Public Art
Minor Only
Public art will begin admitting students for fall 2008. Please contact the program for additional details about this minor.

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).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
Thomas A. Rose, Art, M

Associate Professor
Lynel I. King, Art History, M
Kristine F. Miller, Landscape Architecture, M

Assistant Professor
Christine A. Baeumler, Art, M

Lecturer
Craig A. Amundsen, Public Space Design M
Diane A. Mullin, Art History, M

Curriculum—The graduate minor in public art 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, dance, 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.

Prerequisites for Admission—This graduate minor is available to master’s and doctoral students. Preference will be given to students with backgrounds in art, architecture, landscape architecture, urban design, and public policy. The PArt Admissions Committee screens applications and determines admission. Admission is limited to 25 students annually.

Courses—Contact the minor program office for the most current information on relevant coursework pertaining to this program.

Minor Requirements—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.

Public Health
Minor Only
Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax 612-624-4498; sphp.ssc.umn.edu; www.sph.umn.edu).
For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
Michael Baizerman, Social Work, M
Judith M. Garrard, M
Ann W. Garwick, Nursing, M
Susan G. Gerberich, M
Robert W. Jeffery, M
Barbara J. Leonard, Nursing, M
A. Marshall McBean, M
Patricia M. McGovern, M
Michael D. Resnick, Pediatrics, M

Associate Professor
Jeff Blaine Bender, M
Leslie A. Grant, M
Joan M. Patterson, M

Curriculum—The public health minor is available to master’s (M.A. and M.S.) and doctoral students.

Prerequisites for Admission—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School. Students enrolled in graduate programs within the School of Public Health are not eligible for this minor.

Special Application Requirements—Students declaring a minor in public health should contact the director of graduate studies in public health. Suggested courses include PUBH 6101—Environmental Health or PUBH 6102 Issues in Environmental Health; PUBH 6320—Fundamentals of Epidemiology or PUBH—6330 Epidemiology 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.

Language Requirements—None.

Public Policy
Contact Information—Director of Admissions, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002; hhhadmit@umn.edu; www.hhh.umn.edu).
For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Regents Professor
G. Edward Schuh (emeritus), M2

Professor
Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John E. Brandl, M2
John M. Bryson, M2
Nancy N. Eustis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoenack, M2
C. David Hollister, AM
Lawrence R. Jacobs, M2
Kenneth H. Keller, M2
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Ann R. Markusen, M2
Samuel L. Myers, M2

Associate Professor
Barbara Crosby, M2
Maria J. Hanratty, M2
Deborah Levison, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa Stone, M2
Judy Temple, M2

Assistant Professor
Carissa Schively, M2
Paul C. Stone, M2
Elizabeth J. Wilson, M2

Other
Sheila D. Ards, AM2
Harry C. Boyle, M2
Gary DeCramer, M2
Ali K. Galadwy, AM2
P. Jay Kiedrowski, M2
Jennifer Kuzma, M2

health. Suggested courses include PUBH 6101—Environmental Health or PUBH 6102 Issues in Environmental Health; PUBH 6320—Fundamentals of Epidemiology or PUBH—6330 Epidemiology I; and PUBH 6414—Biostatistical Methods I or PUBH 6450—Biostatistics I.
Students are

Admission is

none.

In

language requirements, complete the professional paper. Remaining
courses, a three-course concentration (9
The M.P.P. requires 45 credits—
M.P.P. Degree Requirements

The M.P.P. requires 45 credits—

approximately 20 credits in required core

courses, a three-course concentration (9

credits minimum), and a 3-credit course to

complete the professional paper. Remaining

credits are taken in elective courses. A

non-credit internship is also required, unless

the student is exempted based on previous

relevant employment. Students may pursue

a minor.

Language Requirements

None.

Final Exam—Final oral presentation is required.

Minor Requirements for Students

Majoring in Other Fields—A minor is constructed in consultation with the student’s

minor adviser.

Quaternary Paleocology

Minor Only

Contact Information—Emi Ito, Director of Graduate Studies, Quaternary Paleocology

Graduate Program, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive S.E.,

Minneapolis, MN 55455 (612-624-7881; fax 612-624-3819; qpminor@umn.edu).

For latest graduate faculty listings, see

www.grad.umn.edu/faculty_rosters/faculty.html

Professor

Subir K. Banerjee, Geology and Geophysics, M

Lawrence Edwards, Geology and Geophysics, M

Guy E. Gibbon, Anthropology, M

Emi Ito, Geology and Geophysics, M

Thomas C. Johnson, Large Lakes Observatory, Duluth, M

Edward A. Nater, Soil, Water, and Climate, M

Richard H. Skaggs, Geography, M

Peter S. Wells, Anthropology, M

Associate Professor

James Cotner, Ecology, Evolution, and Behavior, M

David L. Fox, Geology and Geophysics, M

Katherine Klink, Geography, M

Bryan N. Shuman, Geography, M

Martha Tappen, Anthropology, M

Assistant Professor

Kurt F. Kieftmuller, Geography, M

Shinya Sugita, Ecology, Evolution, and Behavior, M

William Zanner, Soil, Water and Climate, AM

Susy S. Ziegler, Geography, M

Adjunct Professor

Daniel R. Engstrom, Geology and Geophysics, AM

Curriculum—The faculty of the graduate minor in quaternary paleocology 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.

Use of 4xxx Courses—Use of 4xxx courses towards degree requirements is permitted with

instructor’s and adviser’s permission.

M.P.P. Degree Requirements

Courses—See http://lrc.geo.umn.edu

QPcourses.pdf and contact the director of

graduate studies at qpminor@umn.edu for

information on relevant coursework.

Use of 4xxx Courses—Any 4xxx course

included in the published list at http://lrc

geo.umn.edu/QPcourses.pdf may be used to

satisfy the minor requirement.

Minor Only Requirements

Students develop their curricula in consultation with their major advisers and

the director of graduate studies in quaternary paleocology. Students choose courses from

two lists found at http://lrc

geo.umn.edu/QPcourses.pdf. Master’s students must

take one or two courses from List A

plus one or more courses from List B for a total of 6 credits. Ph.D. students take two

of the three courses from List A plus one

additional course from List B for a total of 9

credits. Some requirements may be waived

depending on the student’s background.

In all cases, the selected courses must be

outside the student’s major field for List A

and outside the cluster that includes the

student’s major field in List B.

Recreation, Park, and Leisure Studies

Contact Information—Marta Fahrenz, Coordinator of Graduate Studies, School of

Kinesiology, University of Minnesota, 223B

Cooke Hall, 1900 University Avenue S.E.,

Minneapolis, MN 55455 (612-624-5300; fax 612-624-7700; ppa@umn.edu). http://
education.umn.edu/kpe

For latest graduate faculty listings, see

www.grad.umn.edu/faculty_rosters/faculty.html

Professor

Dorothy H. Anderson, Forest Resources, AM2

Bill Gartner, Applied Economics, AM2

Mary Jo Kane, M2

Leo H. McAvoy, Jr. (emeritus), AM2

Michael G. Wade, M2

Associate Professor

Kenneth Bartlett, Work and Human Resource

Education, AM2

Keith C. Russell, M2

Carla E. S. Tabourne, M2

Diane M. Wiese-Bjornstal, M2

Assistant Professor

Lisa A. Kihl, M2

Stephen D. Ross, M2

Instructor

Rayla Allison, M2

Jo Ann Buysse, M2

Robert Danforth, AM2

Research Associate

Carol A. Leitschuh, M2

Ingrid E. Schneider, Forest Resources, AM2

Along with the program-specific

requirements listed below, please read the

General Information section of this catalog

for Graduate School requirements that apply

to all major fields.
Curriculum—Emphasis areas in the master’s program are park and recreation administration, outdoor education/recreation, and sport management.

Prerequisites for Admission—Although prospective students generally have an undergraduate degree in recreation, park, and leisure studies, others with a baccalaureate degree, including related preparation and a significant background and interest in the scientific study of recreation, park, and leisure studies may be admitted. Admitted students may be required to complete background preparation in undergraduate and graduate recreation, park, and leisure studies and related coursework.

Special Application Requirements—Applicants must submit a completed University of Minnesota-Twin Cities Graduate School application form; a School of Kinesiology application form, including a clearly written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal and quantitative) that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; a scholarly paper, and photocopies of official transcripts. Students may apply at any time; however, submission of all application materials by December 15 is strongly encouraged to ensure priority consideration as well as teaching and research assistantships awarded for the next academic year. The three letters of recommendation must be sent directly to the department. Students can be admitted any term.


Courses—Refer to Recreation, Park, and Leisure Studies (REC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.A. Degree Requirements

Students select an emphasis in park and recreation administration, outdoor education/recreation, or sport management. The M.A. is offered under Plan A and Plan B. Plan A requires 30 credits, including at least 14 credits in recreation, park, and leisure studies, 6 credits in a minor or related field, and 10 thesis credits (REC 8777). Plan B also requires 30 credits, including at least 14 credits in recreation, park, and leisure studies, 6 credits in a minor or related field, and 4 credits of a research project (REC 8995). A 3.00 minimum GPA is required to maintain good standing and to graduate.

Language Requirements—None.

Final Exam—The final exam is oral.

Rehabilitation Science

Contact Information—Program in Rehabilitation Science, MMC 388, 420 Delaware Street S.E., Minneapolis, MN 55455. (612-625-3966; fax 612-625-4274: adamc002@umn.edu, web.rehabsciencumn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty rosters/faculty.html.

Professor

James Carey, SM
Richard DiFabio, SM
Carl Kukulka, SM
Robert Patterson, SM

Associate Professor

Dennis Dykstra, SM
Paula Ludewig, SM
Virgil Mathiowetz, SM
Erica Stern, SM
LaDora Thompson, SM

Assistant Professor

Lori Dorsey, SM
Teresa Jacobson Kimberly, SM
Dawn Lowe, SM
Patricia Schaber, SM

Research Associate

LeAnn Snow, SM

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

Curriculum—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.

Prerequisites for Admission—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. A GPA of 3.00 is preferred and applicants must have an agreement from a rehabilitation science faculty member to serve as an adviser. Compatibility of research interests is a major determinant in the selection of a student/adviser relationship.

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.

Courses—Refer to Rehabilitation Science (RSC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms requires adviser and director of graduate studies approval. The use of 4xxx courses on degree program forms is highly discouraged.

M.S. Degree Requirements

Plan A (thesis) requires a minimum of 33 credits: a minimum of 14 credits in the major, including 4 credits of rehabilitation science seminar (RSC 8100) and a research design course in rehabilitation science; a minimum of 6 credits in a minor or related field; 3 credits in statistics (EPSY 5261 or equivalent); and a minimum of 10 thesis credits (RSC 8777). In place of the 10 thesis credits for Plan A, Plan B (without thesis) requires courses chosen in consultation with an adviser and a Plan B project. Students must maintain a 3.00 minimum GPA for all coursework taken in the program. The Graduate School requires ethics in research training. Students should work with an adviser to identify a plan to meet this requirement. For additional information, visit www.research.umn.edu/ethics or contact the program.

Language Requirements—None.

Final Exam—For Plan A, the final exam is oral; for Plan B, it may be written, oral, or both.

Ph.D. Degree Requirements

The Ph.D. requires a minimum of 36 course credits: 16 credits in core courses, including 6 credits of rehabilitation science seminar RSC 8100; 12 credits in a minor or supporting program; 8 credits in statistics (credits earned in core courses and statistics cannot be applied to the minor or supporting program); and 24 thesis credits. Students must maintain a 3.00 minimum GPA for all coursework taken in the program. In addition to these minimum requirements, the adviser may require additional courses. The Graduate School requires ethics in research training. Students should work with an adviser to identify a plan to meet this requirement. For additional information, visit www.research.umn.edu/ethics or contact the program.

Language Requirements—None.

Religions in Antiquity

See Classical and Near Eastern Studies.
Religious Studies

Minor Only

Contact Information—Director of Graduate Studies, Department of Classical and Near Eastern Studies, University of Minnesota, 245 Nicholson Hall, 216 Pillsbury Avenue S.E., Minneapolis, MN 55455 (612-625-5353).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html].

Professor
Frederick M. Asher, Art History, M
Bernard S. Bachrach, History, M
Caesar E. Farah, African American and African Studies, M
Jasper S. Hopkins, Philosophy, M
Riv-Ellen Prell, American Studies, M
Calvin J. Roetzel, Classical Near Eastern Studies, M
Theofanis G. Stavrakos, History, M
James D. Tracy, History, M

Associate Professor
Bernard M. Levinson, Classical Near Eastern Studies, M
Philip H. Sellew, Classical Near Eastern Studies, M

Curriculum—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.

Prerequisites for Admission—Admission is contingent on prior admission to a master’s or doctoral degree-granting program within the Graduate School.

Special Application Requirements—Students should consult with the director of graduate studies for the program as early as possible, and in any case no later than their third semester of study. The director of graduate studies must approve the student’s proposed course of study and sign the student’s degree program form.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to approval by the director of graduate studies.

Minor Only Requirements
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 committee. All students enrolled in the minor take RELA 5521—Theory and Method in Religious Studies, and choose two (M.A.) or three (Ph.D.) from the following courses to complete the program: AFRO 5036, AMST 5101, ANE 5501/2, 5503/4, ANTH 5059, ARAB 5542, ARTH 5795, CNES 5088/9, 5252, JWST 5013, 5960, 5111, PHIL 8081, 8550, RELA 5071, 5072, 5073, 5080, 8190, SALC 5412/3.

Language Requirements—There are no special language requirements beyond those of the student’s major program.

Rhetoric and Scientific and Technical Communication

Contact Information—Department of Writing Studies, University of Minnesota, 180 Westbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455; (612-624-3445; fax 612-624-3617; [WRIT@umn.edu](mailto:WRIT@umn.edu); [www.Writingstudies.umn.edu](http://www.Writingstudies.umn.edu)).

For latest graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/faculty.html].

Professor
Carol Ann Berkenkotter, SM
Karyn K. Campbell, Communication Studies, ASM
Ann Hill Duin, SM
Shirley N. Garner, English, ASM
Alan G. Gross, SM
Laura J. Gurak, SM
Joseph A. Konstan, Computer Science and Engineering, ASM
Earl E. McDowell, SM
Victoria M. Mikelenis, SM
Donald J. Ross, Jr., English, AM
Edward A. Schiappa, Communication Studies, ASM
Mary M. Lay Schuster, SM
Robert L. Scott (emeritus), Communication Studies, ASM
Elaine E. Tarone, ILES, ASM
Billie J. Wahlstrom, SM
Arthur E. Walzer, SM

Associate Professor
Lisa Albrecht, School of Social Work, AM
Lee-Ann Kastman Breuch, SM
Robert L. Brown, Jr., Cultural Studies and Comparative Literature, ASM
Patrick L. Bruch, Jr., Postsecondary Teaching and Learning, AM2
Richard J. Graff, SM
Ronald W. Greene, Communication Studies, ASM
Simon Hooper, Curriculum and Instruction, AM
John Logie, SM
Bernadette C. Longo, SM
Daniel J. Philipp, SM
Kiri H. Wilson, Communication Studies, ASM

Assistant Professor
Chris Russell, M2

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

Curriculum—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 and research, and practice in rhetoric and scientific and technical communication, analysis of scientific or technical discourse, and course work 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.

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 have a January 15 deadline.

Courses—Refer to Writing Studies (WRIT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to approval by the adviser and the director of graduate studies.

M.A. Degree Requirements
Students may choose between Plan B (paper option) or an exam option. Plan B is recommended for most students.

Plan B requires students to complete 33 credits of coursework, all with a grade of B or better, and to write a paper that in the judgment of the faculty committee is prepared to be submitted to a targeted academic journal.

Under the coursework and exam option, students complete 33 credits of coursework with a grade of B or better and work with their committee to create a reading list of 20-30 works related to your interests and coursework. Students are then required to do a essay and oral exam on these works.

M.A. students take at least one course in rhetorical theory and criticism (WRIT 5775 is required; WRIT 5776 is highly recommended), one course in technical communication research and theory (WRIT 8011 is required; WRIT 8012 is highly recommended), six credits in a selected specialty area, six credits in a minor or support program, 12 electives to fulfill the minimum 33-credit course requirement, and
Use of 4xxx courses

Language Requirements—M.A. students must demonstrate proficiency in a foreign language of their choice either by taking 3 credits of a beginning level language course or having their adviser and the director of graduate studies certify that they have reading comprehension in a particular language. Students can fulfill this requirement by taking a beginning 3-credit course or by completing a noncredit course such as FREN 100—Reading French in the Arts and Sciences or GER 222—Beginning German. These courses are offered through the College of Continuing Education, usually in the summer.

Final Exam—Both the paper and the exam option require final oral exams. For the paper option students must defend their paper, both in terms of its substance and its appropriateness for the targeted publication. For the exam option, students must defend their answers on the written exam and answer questions related to their reading list.

Minor Requirements for Students Majoring in Other Fields—For masters students, the minor requires 6 credits in 5xxx and 8xxx WRIT courses.

Ph.D. Degree Requirements
Ph.D. students in rhetoric and scientific and technical communication are required to earn a minimum of 42 credits. This plan requires a minimum of 21 credits in rhetorical seminars and courses—two of those seminars must be in rhetorical theory and criticism within departmental course offerings. Students take two courses (6 credits) in rhetorical theory and criticism; two courses in technical communication research and theory (6 credits), including WRIT 8011 and 8012; and a total of 12 credits divided between a substantive area of study, such as the rhetoric of science or feminist theory in scientific and technical communication (6-12 credits) and research methods courses (0-6 credits); and 12 credits in a minor or related field. Minor or supporting programs may focus on areas such as communication studies, English, curriculum and instruction, women's studies, cognitive psychology, or history of science. In addition, 6 elective credits are needed to fulfill the minimum credit requirement. Students may fulfill 18 credits of Ph.D. work in completing M.A. requirements (usually two courses in rhetorical theory and three courses in other core areas). Twenty-four thesis credits are also required. The preliminary exams are both written (based on coursework and reading lists) and oral (based on the written preliminary exam).

Language Requirements—Ph.D. students must demonstrate proficiency in a foreign language of their choice either by taking 3 credits of a language course or having their adviser and the director of graduate studies certify that they have reading comprehension in a particular language. A student could also fulfill this requirement by taking a beginning 3 credit course or by completing a non-credit course such as FREN 100—Reading French in the Arts and Sciences or GER 222—Beginning German. These courses are offered through the College of Continuing Education, usually in the summer.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—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.

Scandinavian Studies
See Germanic Studies.

School Psychology
See Educational Psychology.

Science Education
See Education, Curriculum, and Instruction.

Science, Technology, and Environmental Policy

Contact Information—Director of Admissions, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002; hjhgradmit@umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
G. Edward Schuh (emeritus), M2

Professor
Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John E. Brandl, M2
John M. Bryson, M2
K. William Easter, Applied Economics, AM2
Nancy N. Eastis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoenack, M2
Lawrence R. Jacobs, M2
Anne Kapuscinski, Fisheries, Wildlife, and Conservation Biology, AM
Kenneth H. Keller, M2
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Ann R. Markusen, M2
Samuel L. Myers, M2
Philip G. Pardey, Applied Economics, AM2

Associate Professor
Barbara Crosby, M2
Maria J. Hanratty, M2
Deborah Lehman, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa M. Stone, M2
Judy Temple, M2

Assistant Professor
Carissa Schively, M2
Paul C. Stone, M2
Elizabeth J. Wilson, M2

Other
Harry C. Boyte, M2
Gary DeCramer, M2
Ali K. Galaydh, AM2
P. Jay Kiedrowski, M2
Jennifer Kuzma, M2
Lee W. Munnich, M2
Joseph H. Nathan, M2
Timothy Penny, AM

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

Curriculum—The M.S. program provides students with an understanding of the role of science and technology in food and health, the economy, energy and the environment, security, and education; the impact of science and technology on the political and economic relationships 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. An M.S./juris doctor dual degree program is available.

Prerequisites for Admission—Students typically have undergraduate degrees or advanced coursework in one of the natural or engineering sciences. They are also expected to have completed the equivalent of an introductory course in microeconomics, one semester of calculus and have a U.S. bachelor’s degree or foreign equivalent.

Special Application Requirements—In addition to the materials submitted to the Graduate School, applicants must submit to the Humphrey Institute a photocopy of the Graduate School application, the Humphrey Institute Applicant Data Form, copies of all academic transcripts, a statement of purpose, at least three letters of recommendation, a GRE official score report, and a professional résumé or C.V. Students who wish to be considered for financial aid should apply no later than January 5 of the preceding academic year. Deadline for admission only is April 1. Entry is for fall semester.

Courses—Refer to Public Affairs (PA) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted with instructor’s and adviser’s permission.
M.S. Degree Requirements

The M.S., which is offered under both Plan A (thesis) and Plan B (without thesis), requires 40 credits, including at least 21 credits in five core areas—12 credits in the area of science, technology, and environmental policy and 9 credits of the politics of public affairs, economic reasoning, and empirical analysis. Students should take an additional 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. Plan A also requires 10 thesis credits. Plan B requires completion of a Plan B paper (3 credits). The remaining elective credits are chosen in consultation with the student’s adviser. Students may pursue a minor.

Language Requirements—None.

Final Exam—The final exam is oral.

Scientific and Technical Communication

Contact Information—Department of Writing Studies, University of Minnesota, 180 Westbook Hall, 77 Pleasant St. S.E., Minneapolis, MN 55455; (612-624-3445; fax 612-624-3617; WRIT@umn.edu; www.writingstudies.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Carol Ann Berkenkotter, M2
Ann Hill Duin, M2
Alan G. Gross, M2
Laura J. Gurak, M2
Earl E. McDowell, M2
Victoria M. Mikelonis, M2
Mary M. Lay Schuster, M2
Billie J. Wahlstrom, M2
Arthur E. Walzer, M2

Associate Professor
Lee-Ann Kastman Breuch, M2
Richard J. Graff, M2
John Logie, M2
Bernadette C. Longo, M2
Daniel J. Philippin, M2

Assistant Professor
Chris Russell, M2

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

Curriculum—The M.S. in scientific and technical communication is a professional degree that focuses on applying technical communication theory and research to the practice of scientific and technical communication in the workplace and the laboratory. It is designed for those students planning to be technical communicators or information developers in business and industry.

All M.S. applicants must meet the admission requirements of the Graduate School. M.S. students are expected to have completed coursework or have equivalent experience in advanced communication (e.g., writing/editing, oral communication, visual communication, organizational communication, or communication theory) and one of the following areas: computer science, management information systems, science, technology, mathematics, engineering, or other related fields.

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. M.S. deadlines are June 15 for fall semester admission and October 15 for spring semester admission.

Courses—Refer to Writing Studies (WRIT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to approval by the adviser and the director of graduate studies. Currently two 4xxx courses are part of the degree program requirements.

M.S. Degree Requirements

A minimum of 33 credits are required as follows: The program is made up of a core course area (18 credits) which includes an introduction to the field, usability and human factors, editing, information design, research, and visual rhetoric, all with an emphasis in scientific and technical communication. The competency area (12 credits) is a group of courses in a scientific or technical field, such as health sciences, international technical communication, technical communication and law, technical communication and environmental science, or technical communication and software engineering, to name a few possibilities. The final course is the capstone course (3 credits) where the student works with an extended problem-solving situation in business, government, industry, or academia. The student acts as consultant to explore a problem, identify possible solutions, introduce a solution, and apply it. For more information on this degree please see www.mstc.umn.edu.

Language Requirements—None.

Final Exam—The final exam is an oral presentation of a research project in the capstone course.

Minor Requirements for Students Majoring in Other Fields—For master’s students, the minor requires 6 credits in 5xxx and 8xxx rhetoric courses.

Scientific Computation

Contact Information—Scientific Computation Program, University of Minnesota, 6-145 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-626-1458; fax 612-626-5009; www.scicomp.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
Apostolos P. Georgopoulos, Neuroscience, SM
Donald G. Truhlar, Chemistry, SM

Professor
Douglas N. Arnold, Mathematics, SM
Daniel L. Boyce, Computer Science and Engineering, SM
Graham V. Candler, Aerospace Engineering and Mechanics, SM
J. Bernardo Cockburn, Mathematics, SM
Christopher J. Cramer, Chemistry, SM
Jeffrey J. Derby, Chemical Engineering and Materials Science, SM
Timothy J. Ebner, Neuroscience, SM
David M. Ferguson, Medicinal Chemistry, Pharmacognosy, SM
Efi Foufoula-Georgiou, Civil Engineering, SM
Jiali Gao, Chemistry, SM
Alexander Y. Grosberg, Physics and Astronomy, SM
Thomas W. Jones, Astronomy, SM
Daniel D. Joseph, Aerospace Engineering and Mechanics, SM
Daniel J. Kersten, Psychology, SM
Vipin Kumar, Computer Science and Engineering, SM
David J. Lilja, Electrical and Computer Engineering, SM
Mitchell B. Luskin, Mathematics, SM
John L. Nieber, Biosystems and Agricultural Engineering, SM
Hans G. Othmer, Mathematics, SM
N. P. Papanikolopoulos, Computer Science and Engineering, SM
Yousef Saad, Computer Science and Engineering, SM
Guillermo R. Sapiro, Electrical and Computer Engineering, SM
George R. Sell, Mathematics, SM
J. Ilja Siepmann, Chemistry, SM
Iaikep Srivastava, Computer Science and Engineering, SM
Harlan W. Stech, Mathematics and Statistics, Duluth, SM
David D. Thomas, Biochemistry, SM
Vaughan R. Voller, Civil Engineering, SM
Renata M. Wentzcovitch, Chemical Engineering and Materials Science, SM
George L. Wilcox, Neuroscience, SM
Paul R. Woodward, Astronomy, SM
David A. Yuen, Electrical and Computer Engineering, SM

Associate Professor
Vichet H. Barocas, Biomedical Engineering, SM
George Karypis, Computer Science and Engineering, M2
Krishnan Mahesh, Aerospace Engineering, SM
Darrin M. York, Chemistry, SM

Assistant Professor
Bragat Amirikian, Neuroscience, M2
Degree Programs and Faculty

Lecturer
Norman J. Trouiller, Chemistry, M2

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

Curriculum—This program encompasses coursework and research on the fundamental principles for using intensive computation to support research in the physical, biological, and social sciences and engineering. Emphasis is on research issues, state-of-the-art methods, and applying 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. A handbook that describes the program and degree requirements in detail is available from the program.

Prerequisites for Admission—Applicants fill out a form provided by the program as well as applicable Graduate School forms. A bachelor’s degree in a field that uses scientific computation is required for admission.

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 clearly written statement of career interests, goals, and objectives. Students may apply at any time; however, submission of all application materials by January 1 is strongly encouraged to ensure priority consideration for fellowships and assistantships.

Courses—Refer to the Scientific Computation (SCIC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval. Students from other majors may include such courses subject to their own program’s approval.

M.S. Plan A Degree Requirements
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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The master’s minor requires approval of the director of graduate studies and a minimum of 4 credits from the core curriculum; the credits may not be from courses in the student’s major field.

Ph.D. Degree Requirements
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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—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.

Second Languages and Cultures Education
See Education, Curriculum, and Instruction.

Social, Administrative, and Clinical Pharmacy

Contact Information—College of Pharmacy, University of Minnesota, 7-155 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-2973; fax 612-625-9931; grad@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Barbara Brandt, Pharmaceutical Care and Health Systems, SM
Robert J. Cipolle, Pharmaceutical Care and Health Systems, SM
James C. Floyd, Experimental and Clinical Pharmacology, SM
William F. Elmquist, Experimental and Clinical Pharmacology SM
Judith M. Garrard, School of Public Health, SM
Cynthia R. Gross, Experimental and Clinical Pharmacology, SM
David R. Guay, Experimental and Clinical Pharmacology, SM

Ronald S. Hadnall, Pharmaceutical Care and Health Systems, SM
Charles E Haltenson, Experimental and Clinical Pharmacology, ASM
Thomas E. Lackner, Experimental and Clinical Pharmacology, M2
Tom Alan Larson, Pharmaceutical Care and Health Systems, M2
Ilo E. Leppik, Experimental and Clinical Pharmacology, M2
Henry J. Mann, Experimental and Clinical Pharmacology, SM
Peter C. Morley, Pharmaceutical Care and Health Systems, SM
Paul L. Randell, Pharmaceutical Care and Health Systems, SM
Rory P. Remmel, Medicinal Chemistry, SM
John C. Rotschafer, Experimental and Clinical Pharmacology, SM
Ronald Sawchuk, Experimental and Clinical Pharmacology SM
Jon C. Schommer, Pharmaceutical Care and Health Systems, SM
Stephen W. Schondelmeyer, Pharmaceutical Care and Health Systems, SM
Stuart M. Speedie, Health Informatics, Medical School, SM
Linda M. Strand, Pharmaceutical Care and Health Systems, SM
Timothy S. Tracy, Experimental and Clinical Pharmacology, SM
Donald L. Uden, Pharmaceutical Care and Health Systems, M2
Vernon E. Weckwerth, Health Services Administration, SM
Cheryl L. Zimmerman, Pharmaceutics, SM

Adjunct Professor
Paul C. Langley, Pharmaceutical Care and Health Systems, ASM
Leo J. Storrs, Experimental and Clinical Pharmacology, M2

Associate Professor
Sidney B. Benson, Pharmaceutical Care and Health Systems, M2
Angela K. Birnbaum, Experimental and Clinical Pharmacology, SM
Richard C. Brundage, Experimental and Clinical Pharmacology, SM
Richard R. Cline, Pharmaceutical Care and Health Systems, SM
Brian J. Isetts, Pharmaceutical Care and Health Systems, M2
Pamela A. Jacobson, Experimental and Clinical Pharmacology, SM
Kristin K. Janke, Pharmaceutical Care and Health Systems, M2
Michael Kotlyar, Experimental and Clinical Pharmacology, M2
Ayman M. Noreddin, Pharmaceutical Care and Health Systems, SM
John C. Rotschafer, Experimental and Clinical Pharmacology, SM
Pamala A. Jacobson, Experimental and Clinical Pharmacology, SM
William M. Noredin, Pharmacy Practice and Pharmaceutical Sciences, Duluth, M2
William S. Oetting, Experimental and Clinical Pharmacology, SM
James Cloyd, Experimental and Clinical Pharmacology, SM
William Cline, Pharmaceutical Care and Health Systems, SM
Robert J. Straka, Experimental and Clinical Pharmacology, M2
Timothy P. Stratton, Pharmaceutical Care and Health Systems, SM
Craig Weinert, Experimental and Clinical Pharmacology, AM2
Although None.

A interdisciplinary knowledge, theory, and high quality research and problem solving understand the process of conducting Those who complete the program will mentored to become professional scientists. Societal level. Students are educated and patient outcomes at the individual and psychogenesis and public affairs.

The program focuses on the discovery health, geriatrics, management, sociology, and social science departments. Programs resources of the University's many health

include courses and offerings from public and social science departments. Programs involve the drug use process. This flexible

physical factors in social settings that

involve the translation of both laboratory and clinical research to the medical use process.

Prerequisites for Admission—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 department supplementary application form in addition to the Graduate School forms. The supplementary form along with three letters of recommendation should be sent directly to the department. GRE scores are required and a performance level of 580 is preferred on the TOEFL for all international applicants whose native language is not English.

Courses—Refer to Social, Administrative, and Clinical Pharmacy (SACP), Social and Administrative Pharmacy (SAPH), and Experimental and Clinical Pharmacology (ECP) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses towards degree requirements is permitted with director of graduate studies approval.

M.S. Degree Requirements

Two program tracks are available. The emphasis of the social and administrative pharmacy (SAPH) track 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.

The emphasis of the experimental and clinical pharmacology (ECP) track is to advance the science of human pharmacology and therapeutics to improve the safe, effective, and economical use of drugs by patients. This includes the translation of both laboratory and clinical research to the medical use process.

Ph.D. Degree Requirements

Plan A requires at least 31 credits, including 15 credits in the major field, at least 6 credits in a minor or related field, and 10 thesis credits. Plan B requires at least 30 credits, including 15 credits in the major field and at least 6 credits in a minor or related field; the balance of coursework is determined in consultation with the director of graduate studies.

Minor Requirements for Students

Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits in program courses determined in consultation with the director of graduate studies.

Social and Philosophic Studies of Education

Minor Only

Contact Information—Department of Educational Policy and Administration, University of Minnesota, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax 612-624-3377; http://education.umn.edu/EdPA).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor

John J. Cogan (emeritus), Educational Policy and Administration, M
Josef A. Mestenhauser (emeritus), Educational Policy and Administration, AM
R. Michael Paige, Educational Policy and Administration, M
Karen Rose Seashore, Educational Policy and Administration, M

Associate Professor

Arthur M. Harkins, Educational Policy and Administration, M

Instructor

Richard D. Nunneley, Educational Policy and Administration, AM

Curriculum—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 Educational Policy and Administration (EdPA), 5xxx and 8xxx courses are selected both in EDPA and in related fields.

Prerequisites for Admission—Admission is contingent upon prior admission to a master's or doctoral degree-granting program within the Graduate School. Interested students should consult with a faculty member in social and philosophic studies of education in the Department of Educational Policy and Administration to develop a proposed course of study.
Degree Programs and Faculty

Special Application Requirements—The director of graduate studies in the Department of Educational Policy and Administration must approve the applicant’s proposed course of study by signing the student’s degree program form.

Courses—Please contact the minor program office for information on relevant coursework.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

Minor Only Requirements
M.A. students must complete at least 9 graduate credits (at least one course each) in the two areas of study below. Doctoral students must complete at least 12 graduate credits (at least two courses each) in the two areas of study.

Area I—history and philosophy of education: EDPA 5021, 5023, 5024, 5032, PHIL 4324, GWSS 5103.

Area II—social sciences and education: EDPA 5041, 5044, 5103, 5128, 5302, 8002, 8104.

Social Work Education
See Education, Curriculum, and Instruction.

Social Work

Contact Information—School of Social Work, University of Minnesota, 105 Peters Hall, 1404 Gortner Avenue, St. Paul, MN 55108 (612-625-1220 or 1-800-779-8636; fax 612-624-3744; jreinard@umn.edu; http://ssw.che.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Michael Baizerman, SM
Velmer S. Burton, Jr., SM
Jeffrey L. Edleson, SM
Jane F. Gilgun, SM
C. David Hollister, SM
Rosalie A. Kane, Public Health, SM
Helan Q. Kivnick, SM
David J. Klaassen, AM2
Dario Menanteau-Horta, SM
Jean K. Quam, SM
Ronald H. Rooney, SM
Mark S. Umbreit, SM
Esther Wattenberg (emeritus), ASM
Susan Wells, SM
Oliver J. Williams, SM

Associate Professor
Lisa Albrecht, SM
Priscilla Gibson, SM
Linda E. Jones, SM
Elizabeth Lightfoot, SM
Yat-Sang (Terry) Lum, SM
James R. Reinardy, SM
Edward Taylor, SM

Assistant Professor
Hee Yun Lee, M2
Ross R. VeLure Roholt, M2

Other
Sonia Davila-Williams, M2
Peter Dimock, M2
M. J. Gilbert, M2
Trude D. Hendrickson, M2
Marcie Jefferys, M2
Nancy J. Johnston, M2
Nan L. Kalke, M2
Steve Maxwell, M2
Janelle Rae Miedema, M2
Megan H. Morrissey, M2
Tamiko Thomas, M2
Victoria Van Slyke, M2
Anne W. Vande Berg, Rochester, M2
Kate Wahlour, M2

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

Curriculum—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.

The School of Social Work and the Humphrey Institute of Public Affairs offer two dual master’s degrees: the master of social work/master of public policy (M.S.W./M.P.P.), and the master of social work/master of urban and regional planning (M.S.W./M.URP). Dual degree students generally take coursework in each department for the first two years, and in the third year, take courses concurrently in two departments, facilitating the integration of content from both fields. Students may apply some credits taken in the dual degree programs toward requirements in both departments. Each dual degree option is a minimum sequence of three years of full-time study. Students who choose an M.S.W. concentration in direct practice will need longer than six semesters to complete both programs. Students may begin their studies in either program. A dual master of social work/master of public health (M.S.W./M.P.H.) is offered with the School of Public Health. The M.S.W./M.P.H. degree provides exposure to a blend of course offerings in biometry, community health education, environmental health, epidemiology, health services administration, maternal and child health, and public health nutrition. The purpose of this degree is to educate and prepare professional public health social workers who are competent in the practice of professional social work with the additional outlook, skills, and expertise of public health. Students are able to complete the requirements for both degrees in approximately six to eight academic semesters or less, depending upon the number of credits carried each semester. The Ph.D. program 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.

Prerequisites for Admission—Applicants to the M.S.W. program must have a background in the liberal arts that includes coursework in history and social sciences, the humanities and the arts, physical and biological sciences and mathematics and a college-level course in statistics. A college-level biology course with content on human anatomical and physiological development is also required. Strong preference is given to applicants with paid or volunteer experience in social service settings. Please review the current application packet available on the School of Social Work Web site at http://ssw.che.umn.edu for the most current application requirements. Doctoral applicants must meet requirements and standards set by the Graduate School and the School of Social Work. It is preferred that applicants have earned the master’s degree in social work from a school of social work accredited by the Council on Social Work Education; however, applicants with a master’s degree in a closely related discipline will be considered for admission. Preference is also given to candidates with at least two years of post-M.S.W. practice experience. Candidates for the Ph.D. program who do not have an M.S.W. may be required to take several master’s level foundation courses.

Special Application Requirements—Three letters of recommendation, a resume documenting social service experience, a complete set of transcripts (in addition to that required by the Graduate School), an example of academic or scholarly writing, a personal statement, and a department application form are required of all applicants. GRE scores are not required for admission to the master’s program, but are required from applicants who do not have an official grade point average from their undergraduate degree. GRE scores are required for admission to the Ph.D. program. The application deadline for the M.S.W. program and for the Ph.D. program is in early January. The Ph.D. program has a second review deadline in early March. Beginning students in either program are admitted fall semester only. Please check the School of Social Work Web site at http://ssw.che.umn.edu for specific dates.

Courses—Refer to Social Work (SW) in the course section of this catalog for courses pertaining to the program.
Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted with director of graduate studies approval.

M.S.W. Coursework Only Degree Requirements

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 credits), courses from a selected concentration, 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, 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.

Language Requirements—None.

Ph.D. Degree Requirements

The Ph.D. program emphasizes mastery of student-and program-determined objectives rather than an accumulation of course credits. Degree requirements vary according to 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.

Language Requirements—None.

Sociology

Contact Information—Graduate Program Associate, Department of Sociology, University of Minnesota, 909 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455 (612-624-4300; fax 612-624-7020; socdept@soc.umn.edu; www.soc.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Ronald R. Aminzade, SM
John Arthur, Sociology/Anthropology, Duluth, AM2
Yanjie Bian, SM
Rose M. Brewer, African American and African Studies, AM2
Penny A. Edgel, SM
Barry C. Feld, Law School, AM2
David Knoke, SM
Candace M. Kruttschnitt, SM
Carl P. Malquist, SM
Dario Menanteau, Social Work, AM2
Phyllis Moen, SM
Jeylan T. Mortimer, SM
Steven Ruggles, History, AM2
Joel B. Samaha, SM
Joachim J. Savelsgberg, SM
Karen R. Seashore, Educational Policy and Administration, AM2
Mark Snyder, Psychology, AM2
Robin S. Stryker, SM
Christopher Uggan, SM

Associate Professor

Elizabeth H. Boyle, SM
Jeffrey P. Broadbent, SM
Kathleen T. Call, Public Health, AM2
Scott R. Eliason, SM
Joseph Gerteis, SM
Michael R. Goldman, SM
Douglas Hartmann, SM
Ann M. Hironaka, SM
Kathleen E. Hull, M2
Walt Jacobs, Postsecondary Teaching and Learning, AM2
Erin L. Kelly, M2
Jeffrey R. Maahs, Sociology/Anthropology, Duluth, AM
Ian Ross Macmullan, SM
Donna D. McAlpine, Health Services Research, Policy, and Administration, AM2
J. Michael Oakes, Epidemiology, ASM
Jennifer L. Pierce, American Studies, ASM
Evan A. Schofer, SM
Rachel Schurman, SM
John Robert Warren, SM

Adjunct Associate Professor

Michael David Finch, Health Services Research, Policy, and Administration, AM2

Assistant Professor

Teresa Gowen, M2
Enid L. Logan, M2
Ann Meier, M2
Joshua Page, M2
Teresa T. Swartz, M2

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

Curriculum—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; 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 both academic and applied employment is generally available.

Prerequisites for Admission—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 is recommended. Individuals who have completed fewer than 18 credits 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, applicants must submit the following: valid GRE scores; a complete set of transcripts in addition to that required by the Graduate School; a departmental application; a sample of written work, usually a term paper, written in English; three letters of recommendation; and a statement of professional objectives. The department accepts new students for full admission only. The final application deadline for admittance and financial aid is December 1.

Courses—Refer to Sociology (SOC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses is not permitted toward degree requirements.

M.A. Degree Requirements

Students are admitted only for the Ph.D.; the M.A. is an optional degree for students in the doctoral program.

Students must take six required core courses (17 credits) and two additional substantive courses in sociology (6 credits). 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.

Language Requirements—None.

Final Exam—The final exam is oral.
Ph.D. Degree Requirements
The doctoral program is for students planning to do research or teach.

Students take six required core courses (17 credits), including two courses on professional skills development. Beyond that, each student’s program is individually planned in consultation with the adviser and program committee to meet both the student’s goals and broad program requirements. Those requirements include four substantive courses in sociology (12-credit minimum) and at least one semester of training in advanced methods (3-credit minimum). Students must also complete a minimum of 12 credits in a minor or supporting program and 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 for which they have petitioned equivalents from other institutions. 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 work. Three representatives from the sociology department must serve on the student’s preliminary oral examining and prospects hearing committees.

Language Requirements—None. However, coursework in a foreign language may be used as minor or supporting program coursework for those students who conduct research in comparative sociology.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—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.

Software Engineering

Contact Information—Software Engineering Graduate Program, University of Minnesota Software Engineering Center, 1991 Upper Buford Circle, St. Paul, MN 55108 (612-625-1244; fax 612-625-2208; ams@soils.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Deborah L. Allan, SM
James L. Anderson, SM
Jay C. Bell, SM
Paul R. Bloom, SM
Terence H. Cooper, SM
Peter H. Graham, SM
Satish C. Gupta, SM
Thomas Halbach, M2
John A. Lamb, SM
Gary L. Malzer, SM
Jean-Alex E. Molina, SM
John F. Moncrief, SM
David J. Mullna, SM
Edward A. Nater, SM
Gyles W. Randall, SM
Carl Rosen, SM
Michael J. Sadowsky, SM
Michael A. Schmitt, SM
Mark W. Seeley, SM

Adjunct Professor
John M. Baker, SM
Charles E. Clapp, SM
William C. Koskinen, SM
Donald C. Reicosky, AM2
Michael P. Russelle, SM

Associate Professor
Timothy J. Grifitis, SM
Albert L. Sims, M2
Jeffrey S. Strock, SM

Adjunct Associate Professor
Dong Wang, ASM

Assistant Professor
Jennifer Y. King, M2
Jennifer S. Powers, M2
C. William Zaner, M2

Adjunct Assistant Professor
Jane Johnson, AM2
Randall Kolka, AM2
Tyson Ochsner, AM2
Pamela J. Rice, AM2
Rodney T. Venterea, AM2

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

Curriculum—The program offers two concentrations: soil science and climatology. This multidisciplinary program encompasses aspects of chemistry, physics, biology, atmospheric sciences, and geology. The discipline is divided into five subdisciplines: climatology, soil chemistry/fertility, soil classification/genesis, soil microbiology/biochemistry, and soil
physics. The soil science concentration focuses on the study of soil as it applies to environmental and agricultural issues. The climatology concentration focuses on the interdisciplinary study of earth-atmosphere interactions as well as climate variability as it applies to environmental and agricultural issues. This concentration requires competence in both atmospheric sciences and related areas of soil science. The minor, supporting, or related fields area is usually selected from some allied field such as agronomy, botany, chemistry, microbiology, biochemistry, physics, geology, economics, forestry, agricultural engineering, or atmospheric science.

Prerequisites for Admission—The academic background normally required includes standard courses in college physics, chemistry, geology, microbiology, and mathematics, including one course in calculus, and an introductory course in soil science. For agricultural climatology, additional courses in mathematics, physics, meteorology, and engineering may be substituted. Candidates for the Ph.D. degree are normally required to have completed an acceptable master's degree thesis.

Special Application Requirements—A statement of career goals and three letters of recommendation evaluating the applicant’s potential for graduate study should accompany applications to both the M.S. and Ph.D. programs. Submission of GRE scores is required (in addition to the TOEFL requirement); students whose native language is not English are expected to have ranked in the top 20 percent of their class. Students may be admitted in any semester.

Program-specific requirements and procedures for electronic application for admittance to the soil science graduate program are listed and updated on the department’s Web site at www.soils.umn.edu

Use of 4xxx Courses—Use of 4xxx courses is permitted toward degree requirements per adviser and/or director of graduate studies approval.

Courses—Refer to Soil, Water, and Climate (SOIL) in the course section of this catalog for courses pertaining to the program or at the departmental Web site for an updated list of courses.

M.S. Degree Requirements
All M.S. students must complete a minimum of 30 credits: 14 credits in the major area, one seminar (1 credit) 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 course 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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students

Majoring in Other Fields—Students may minor in soil science with the approval of the director of graduate studies and under the direction of a soil science graduate faculty member serving as the minor adviser. The master’s minor requires completion of a minimum of two of the four core area courses in soil science and a seminar.

Ph.D. Degree Requirements
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 courses in soil science.

Language Requirement—None.

Minor Requirements for Students

Majoring in Other Fields—Students may minor in soil science with the approval of the director of graduate studies and under the direction of a soil science graduate faculty member serving as the minor adviser. The doctoral minor requires a minimum of 12 credits in soil science, including a minimum of three of the four core area courses in soil science, a seminar, and teaching experience.

Spanish
See Hispanic and Luso-Brazilian Literatures and Linguistics.

Special Education
See Educational Psychology.

Speech-Language-Hearing Sciences

Contact Information—Department of Speech-Language-Hearing Sciences, University of Minnesota, 115 Shevlin Hall, 164 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-3322; fax 612-624-7586; slhs@umn.edu; www.slhs.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm

Professor
Arlene E. Carney, SM
Karlind T. Moller, SM
David A. Nelson (emeritus), ASM
Joe E. Reichle, SM
Charles E. Speaks, SM
Dianne Van Tasell, ASM
Jennifer Windsor, SM

Associate Professor
David A. Fabry, AM
Mary R. T. Kennedy, M2
Kathryn Kohner, M2
Benjamin Munson, M2
Peggy B. Nelson, M2
Robert S. Schlauch, SM

Assistant Professor
Timothy D. Trine, AM
Peter Watson, M2
Yang Zhang, M2

Clinical Specialist
Sarah Angerman, M2
Mark DeRuiter, M2
Leslie E. Glaze, M2

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

Curriculum—Emphasis in the master’s program is speech-language pathology. Emphases in the Ph.D. programs are speech-language pathology, speech science, language science, audiology, and hearing science.

The emphases in the Au.D. program focuses 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.

Prerequisites for Admission—Prospective students must have completed an undergraduate degree. Individuals from speech-language-hearing sciences or other academic areas are welcome. Students entering the M.A. program with minimal background in speech-language-hearing sciences should expect their program to extend beyond the usual two years.

Special Application Requirements—Three letters of recommendation evaluating the applicant’s scholarship (two from professorial-rank faculty are recommended), a complete set of transcripts (in addition to that required by the Graduate School), and GRE scores are required. TOEFL is required for nonnative English speaking applicants. Deadline for application to the master's and Au.D. programs is January 1; late applications are considered only if space
is available. Master’s students ordinarily begin graduate study during fall semester. Review of applicants to the doctoral program is continuous.

Courses—Refer to Speech-Language-Hearing Sciences (SLHS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

M.A. Degree Requirements

Emphasis in the master’s program is speech-language pathology, which is accredited by the American Speech-Language-Hearing Association’s Council on Academic Accreditation. Students who complete the M.A. are eligible for clinical certification by the Association.

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.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A minimum of 12 credits, approved by the director of graduate studies, is required for a master’s minor.

Au.D. Degree Requirements

The Au.D. is a four year plan of study for students entering with a background in speech-language-hearing sciences. Students without a background should expect a more lengthy plan of study. The Au.D. requires a total of 98 semester credit hours. Ninety of these are in the major area of study. Additionally, 8 credits of related field coursework are required. Two summative evaluations must be completed including: 1) a written comprehensive examination during the third year of the program, and 2) a written capstone project that includes an oral presentation and oral defense of the project.

Language Requirements—None.

Ph.D. Degree Requirements

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. 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 8420) 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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A minimum of 15 credits, approved by the director of graduate studies, is required for a doctoral minor.
Ph.D. Degree Requirements
The Ph.D. program core courses cover statistical theory (STAT 8101, 8102, 8111, 8112, 14 credits), statistical methods (STAT 8051, 8052, 8053, 8054, 14 credits), and statistical practice (STAT 8802, 8055, 4 credits). 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.

Language Requirements—None.

Minor Requirements for Students
Majoring in Other Fields—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. Please note: STAT 4101 and 4102 are available to graduate students from other programs, but not to statistics majors.

Curriculum—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 the communication industry is changing rapidly and is more volatile than ever. With the Internet in its infancy, and massive organizational and global forces reshaping the U.S. economy, communications leaders face significant challenges and can prepare themselves by in-depth study of strategic process management.

Prerequisites for Admission—The minimum requirement for admission is a B.A. or equivalent. Professors in strategic communication—currently employed in an advertising, public relations or marketing firm, 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.

Special Application Requirements—Applications to both the School of Journalism and Mass Communication and the University of Minnesota Graduate School must be received before June 15. Acceptance is on a rolling basis, with a maximum of 20 students accepted. Applications are processed only when they are complete and accompanied by the application fee, which is nonrefundable.

Courses—Refer to Journalism and Mass Communications (JOUR) in the course section of this catalog for courses pertaining to this program.

Use of 4XXX Courses—Use of 4xxx courses is not permitted.

M.A. Degree Requirements
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 SJMC) 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.

Language Requirements—Foreign language study is recommended for students who plan to work internationally.

Stream Restoration Science and Engineering
Postbaccalaureate Certificate
Contact Information—Stream Restoration Graduate Certificate Program, National Center for Earth-surface Dynamics, St. Anthony Falls Laboratory, 2 Third Avenue S.E., Minneapolis, MN 55414 (612-624-4606; fax 612-624-0066; essegrad@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Ken Brooks, Forest Resources, M
Efi Foufoula-Georgiou, Civil Engineering, M
Susan Galatowitsch, Horticultural Science, M
John Gulliver, Civil Engineering, M
Miki Hondo, Civil Engineering, M
Claudia Neuhausser, Ecology, Evolution, and Behavior, M
Ray Newman, Fisheries, Wildlife, and Conservation Biology, M
John Nieber, Bioproducts and Biotssystems Engineering, M
Chris Paola, Geology and Geophysics, M
James Perry, Fisheries, Wildlife, and Conservation Biology, M
David Pitt, Landscape Architecture, M
Vaughan Voller, Civil Engineering, M
Bruce Wilson, Bioproducts and Biosystems Engineering, M

Adjunct Professor
Bruce Vondracek, Fisheries, Wildlife, and Conservation Biology, M

Associate Professor
Bill Arnold, Civil Engineering, M
David Fulton, Fisheries, Wildlife, and Conservation Biology, M

Assistant Professor
Jacques Finlay, Eology, Evolution, and Behavior, M
Lesley Perg, Geology and Geophysics, M

Senior Research Associates
Lucinda Johnson, National Resources Research Institute, Duluth, M
Curriculum—A one-year 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 (see Web site for detailed listings: www.nced.umn.edu/sr_certificate_uofm).

Admission Requirements—Applicants must have a bachelor’s degree in a related field from an accredited postsecondary U.S. institution or its foreign equivalent. A GPA of 3.00 or higher is preferred. Admission is based primarily on the applicant’s academic record and letter of reference.

Special Application Requirements—In addition to the Graduate School application, students must submit a program application and submit one letter of reference. The program application and directions for submission can be found at www.nced.umn.edu/sr_certificate_application.html.

Facilities—The stream restoration science and engineering program is run through the National Center for Earth-surface Dynamics (NCED), which is housed at the St. Anthony Falls Laboratory (SAFL). SAFL is home to two new outdoor research facilities dedicated to understanding the science behind stream restoration, including interactions between the channel, floodplain, and vegetation. SAFL also contains extensive indoor facilities for studying geomorphology, sedimentology, hydraulics, environmental engineering, and fluid mechanics (www.safl.umn.edu).

Certificate Requirements—GEO/CE/EEB 8601—Introduction to Stream Restoration (3 cr, offered fall term) covers key background topics and skills involved in stream restoration. GEO/CE/EEB 8602—Stream Restoration Practice (2 cr, offered May term) is a two-week course where 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 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 (at least 3 cr; up 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 in the Graduate Program Handbook at www.nced.umn.edu/sr_certificate_uofm.

Studies in Africa and the African Diaspora

Minor Only

Contact Information—Department of African American and African Studies, University of Minnesota, 808 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455 (612-624-9847; fax 612-624-9383).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Regents Professor
Joanne B. Eicher, Design, Housing, and Apparel, AM
Allen F. Isaacman, History, AM

Professor
Rose M. Brewer, African American and African Studies, M
Samuel Myers, Public Affairs, AM
August H. Nimtz, Jr., Political Science, AM
Earl P. Scott, Geography, M
John S. Wright, African American and African Studies, M

Associate Professor
Kelesto E. Atkins, African American and African Studies, M
Louis R. Bellamy, Theatre Arts, AM
Roderick Ferguson, American Studies, AM
Priscilla Gibson, Gender, Women, and Sexuality Studies, AM
Gloria Williams, Design, Housing, and Apparel, AM
Kirt H. Wilson, Communication Studies, AM

Assistant Professor
Pearl Barner II, African American and African Studies, M
Victoria B. Coffman, African American and African Studies, M
Keith A. Mayes, African American and African Studies, M
Charles Ben Pike, African American and African Studies, M
Michele Wagner, History, AM

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

Curriculum—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 African descent. 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.

Prerequisites for Admission—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School.

Special Application Requirements—Students must complete an application form by the end of spring semester to be considered for acceptance for the following academic year. It is expected that no more than 15 students will be admitted to this minor each year. An undergraduate major or minor in African American and/or African studies is not required for admission to the program, but students are expected to have had sufficient background to begin graduate level study.

Courses—Refer to Afro-American Studies (AFRO) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses towards degree requirements is subject to adviser and/or director of graduate studies approval.

Minor Only Requirements
Students develop their program in consultation with the director of graduate 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.

Studies of Science and Technology

Minor Only

Contact Information—Director of Graduate Studies, Studies of Science and Technology, University of Minnesota, 746 Heller Hall, 271 19th Ave. S., Minneapolis, MN 55455; (612-625-6635; fax 612-626-8380; http://sst.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Carl Elliott, Bioethics, M
John M. Eyler, History of Medicine, M
Alan G. Gross, Rhetoric, M
Keith Gunderson, Philosophy, M
Alan G. Gross, Rhetoric, M
John M. Eyler, History of Medicine, M
Keith Gunderson, Philosophy, M
William H. Hanson, Philosophy, M
Geoffrey Hellman, Philosophy, M
Jeffrey P. Kahn, Bioethics, M
Kenneth H. Keller, Center for Science, Technology, Public Affairs, M
Sally G. Kohlstedt, Geology and Geophysics, M
Minor Only Requirements
A master’s minor requires 7 graduate credits and a doctoral minor requires 12 graduate credits. Both minors must include HSCI 8111; 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.

Language Requirements—None.

Surgery
Contact Information—Department of Surgery, University of Minnesota, 420 Delaware Street S.E., MMC 195, Minneapolis, MN 55455 (612-626-2590; surgww@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Regents Professor
John S. Najarian, SM

Professor
Roderick A. Barke, SM
Gregory J. Beilman, M2
Henry Buchwald, SM
Frank B. Cerra, SM
Bruce L. Cunningham, M2
Agustin P. Dalmasso, SM
David L. Dunn, SM
William C. Engelandel, Neuroscience, SM
John E. Foker, SM
Rainer W. G. Graessner, M2
Bernhard J. Hering, M2
Arnold S. Leonard, ASM
Michael A. Maddaus, M2
Robert D. Madoff, M2
Arthur J. Matas, SM
J. Ernesto Molina, M2
William D. Payne, M2
David A. Rothenberger, M2
Steven M. Santilli, M2
Sara J. Shumway, M2
David E. R. Sutherland, SM
Herbert B. Ward, M2

Adjunct Professor
Arnold S. Leonard, SM

Associate Professor
Jerome H. Abrams, M2
Angelika C. Grauessner, M2
Daniel Saltzman, M2

Assistant Professor
Robert D. Acton, M2
Rafael S. Andrade, M2
Peter S. Dahlig, M2
Ranjit John, M2
Brett K. Levay-Young, M2
Timothy D. Sieraff, SM
Karen R. Wasiluk, SM

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

Curriculum—The general surgery program trains medical doctors for the practice of surgery and for academic positions. See the Medical School 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).

Prerequisites for Admission—Prospective students must be in the general surgery training program and have 2-3 clinical years of training completed.

Courses—Refer to Surgery (SURG) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses is not permitted toward minor requirements.

M.S.Surg. Plan A Degree Requirements
The 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.

Final Exam—The final exam is oral.

Language Requirements—None.

Ph.D.Surg. Degree Requirements
Students spend two to three years in the Medical School’s general surgery program. A minimum of 79 course credits (67 in the major plus 12 to 16 in the minor or supporting program) is required; 24 thesis credits are also required.

Language Requirements—None.
Degree Programs and Faculty

Sustainable Agriculture Systems

Minor Only

Contact Information—Director of Graduate Studies, Sustainable Agriculture Systems Minor, Minnesota Institute for Sustainable Agriculture, University of Minnesota, 411 Borlaug Hall, 1991 Upper Buford Circle, St. Paul, MN 55108 (612-625-8235; fax 612-625-1268; ford020@umn.edu; www.misa.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Deborah L. Allan, Soil, Water, and Climate, M
David A. Andow, Entomology, M
David D. Biesboer, Plant Biology, M
Vernon B. Cardwell, Agronomy and Plant Genetics, M
Iris D. Charvat, Plant Biology, M
Sharon M. Danes, Family Social Science, M
Susan M. Galatowitsch, Horticultural Science, M
Peter H. Graham, Soil, Water, and Climate, M
Jeffrey Lynn Gunsolus, Agronomy and Plant Genetics, M
Emily E. Hoover, Horticultural Science, M
Nicholas R. Jordan, Agronomy and Plant Genetics, M
Robert Philip King, Applied Economics, M
Albert H. Markhart III, Horticultural Science, M
Roger D. Moore, Entomology, M
D. J. Mulla, Soil, Water, and Climate, M
Kent D. Olson, Applied Economics, M
James H. Ort, Agronomy and Plant Genetics, M
Paul Porter, Agronomy and Plant Genetics, M
Edward B. Radcliffe, Entomology, M
Paul C. Rosenblatt, Family Social Science, M
Michael P. Russelle, Soil, Water, and Climate, M
Craig A. Hassel, Food Science and Nutrition, M
John Logie, M
Richard J. Graff, M
Lee-Ann Kastman Breuch, M
Ann Hill Duin, M
Carol Ann Berkenkotter, M
Anita M. Berkenkotter, M
John M. Shutske, Biosystems and Agricultural Engineering, M
Steve R. Simmons, Agronomy and Plant Genetics, M
Marla Spivak, Entomology, M
William F. Wilcke, Biosystems and Agricultural Engineering, M
Donald Wyse, Agronomy and Plant Genetics, M

Assistant Professor
Helene Murray, Agronomy and Plant Genetics, M

Fellow
Carla V. Phillips, Minnesota Center for the Philosophy of Science, M

Curriculum—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.

Requisites for Admission—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School.

Special Application Requirements—Contact the director of graduate studies in sustainable agriculture systems for an Intent to Enroll form. Students are admitted each semester.

Courses—Refer to Sustainable Agriculture Systems (SAGR) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses are permitted toward minor requirements based on director of graduate studies approval.

Minor Only Requirements
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.

Technical Communication

Postbaccalaureate Certificate

Contact Information—Department of Writing Studies, University of Minnesota, 180 Wesbrook Hall, 77 Pleasant St. S.E., Minneapolis, MN 55455; (612-624-3445; fax 612-624-3617; WRIT@umn.edu; www.Writingstudies.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

Professor
Carol Ann Berkemotter, M
Ann Hill Duin, M
Alan G. Gross, M
Laura J. Gurak, M
Earl E. McDowell, M
Victoria M. Mikelonis, M
Mary M. Lay Schuster, M
Billie J. Wahlstrom, M
Arthur E. Walzer, M

Associate Professor
Lee-Ann Kastman Breuch, M
Richard J. Graff, M
John Logie, M
Bernadette C. Longo, M
Daniel J. Philipson, M

Assistant Professor
Chris Russill, M

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

Curriculum—The postbaccalaureate certificate in technical communication is designed to provide instruction for working technical and scientific communicators and graduate-level communication students to enhance their knowledge and skills base. After completing this certificate program, students should be able to apply technical communication principles to analyze a project’s audience and purpose, and based on this analysis, produce technical documents in several media that are of professional quality and appropriate for the communication situation.

The certificate 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.

Special Application Requirements—To be admitted into the technical communication graduate certificate program, students must have a bachelor’s degree from an accredited institution and a preferred performance level for their GPA of 3.00. (If students have relevant professional experience, but don’t have a 3.00 GPA, they should contact an adviser.)

Admission to the certificate program is recommended no later than after completion of the first course in the program.

Courses—Refer to Writing Studies (WRIT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to approval by the adviser and the director of graduate studies. Two 4xxx courses are currently part of this program.

Certificate Requirements—Fifteen credits are required for this certificate: twelve credits in core requirement courses that include an introduction to graduate studies in the field, editing, information design, and visual display, all as they are applied to technical communication; and three credits in an elective class in either usability or technical communication. The certificate provides opportunities for students to apply relevant professional experience, but don’t have a 3.00 GPA, they should contact an adviser.)

Admission to the certificate program is recommended no later than after completion of the first course in the program.

Courses—Refer to Writing Studies (WRIT) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to approval by the adviser and the director of graduate studies. Two 4xxx courses are currently part of this program.

Certificate Requirements—Fifteen credits are required for this certificate: twelve credits in core requirement courses that include an introduction to graduate studies in the field, editing, information design, and visual display, all as they are applied to technical communication; and three credits in an elective class in either usability or research in the field.

If interested, a student may apply up to twelve credits from the certificate program towards the M.S. in scientific and technical communication (upon successful admission to the M.S. program).

For more information on this degree please see www.msstc.umn.edu/certificate.htm and www.cce.umn.edu/certificates/techcomm.

Language Requirements—None.
Theatre Arts

Contact Information—Department of Theatre Arts and Dance, University of Minnesota, 580 Rarig Center, 330 21st Avenue S., Minneapolis, MN 55455 (612-625-5029; fax 612-625-6334; theater@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
C. Lance Brockman, M2
Michal Kobialka, SM

Associate Professor
Louis R. Bellamy, M2
Ananya Chatterjee, M2
Carl L. Flink, M2
Martin B. Gwinup, M2
Sonja Arsham Kuftinec, M2
Mathew J. LeFebvre, M2
Margaret L. Maddux, M2
Jean A. Montgomery, M2
Elizabeth H. Nash, M2
Joan A. Smith, M2

Assistant Professor
Michael Sommers, AM
Margaret L. Werry, M2

Education Specialist
Susan M. Binder, M
Brent “Mickey” Henry, M
Sherry L. Wagner-Henry, M

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

Curriculum—Theatre arts programs provide practical and theoretical education for the performer, artist, educator, scholar, and audience member. Training the historian, theorist, artist, and craftsperson is linked to and centered in the laboratory experience of live performance as well as in the academic classroom. The programs serve the dual roles of examining the various historical and contextual relationships of past and present theatre while educating audiences and theatre artisans/educators of tomorrow. The programs prepare students for careers in professional or academic theatre and related artistic fields.

Prerequisites for Admission—Students are admitted for fall semester only. The M.A./Ph.D. program and the M.F.A. design/technology program admit every year. Prerequisites for the initial screening phase of admission include a U.S. bachelor’s degree or comparable foreign degree from a recognized college or university, a minimum of 18 undergraduate credits or the equivalent in theatre arts, and a 3.00 GPA. Applicants for the M.A./Ph.D. must submit scores from the GRE by February 1. International students’ TOEFL scores must be submitted by January 15. A score of 550 (paper), 213 (computer), or 79 (Internet) is preferred.

The master’s degree is a prerequisite for admission to the Ph.D. program. Students without a master’s degree are admitted to the Ph.D. with the intention that the M.A. will be attained in route to the Ph.D. For admission to the M.A./Ph.D. or Ph.D. program, students must have a working knowledge/reading proficiency of at least one foreign language (or a sign language). A computer language will not satisfy this requirement.

Special Application Requirements—The application deadline for all degree programs is January 5. Applications received after that date will be considered only if there is an opening in the particular program. M.A./Ph.D. students wishing to have materials reviewed for the Graduate School fellowship (for support of first-year students) must have materials submitted by January 5. All programs require a current résumé, statement of purpose/intent, and three letters of recommendation to accompany the department application.

The M.F.A. design and technology program requires a portfolio review either through the Chicago URTA or by submitting materials to be received by February 1. The program also interviews by pre-arrangement during the annual USITT conference.

The M.A./Ph.D. program requires a submitted sample of research writing.

Courses—Refer to Theatre Arts (TH) and Dance (DNCE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx theatre and dance courses on graduate degree program forms is subject to approval by the director of graduate studies. Such courses must be taught by a member of the graduate faculty. Students from other programs may include these courses with their own program’s approval.

M.A. Degree Requirements
The M.A. degree emphasizes academic pursuits and is considered a prerequisite for the Ph.D. The areas of study for the M.A./Ph.D. are theatre historiography, design and technical production, and performances practices. Any of these may serve as a concentration of study, although the Ph.D. ordinarily focuses on the first. Candidates must complete coursework in both academic and performance areas.

For both Plan A and B, 30 credits are required from the following: three of the six sequence courses (8111-8116) plus 8102, totaling 12 credits; 3 credits from a course in performance conventions; 3 credits in independent seminar; 6 elective credits from inside or outside the department; 6 credits at the graduate level from outside the department (outside courses must be at least 3 credits each). For Plan A, 10 additional thesis credits (TH 8777) and an oral defense of the thesis are required. For Plan B, three papers are required.

Language Requirements—See the requirements for the Ph.D.

Final Exam—For Plan A, the final exam is written and oral. For Plan B, the final exam is written; an oral exam typically is not required, but one may be requested by the M.A. committee.

Minor Requirements for Students

Majoring in Other Fields—A master’s minor requires a minimum of 9 credits as approved by the director of graduate studies.

M.F.A. Degree Requirements

The three-year, performance-oriented M.F.A. degree offers two areas of specialization: directing and design and technical production. For the M.F.A. in design and technology, 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, costume, 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.

Language Requirements—None.

Final Exam—Students must take a final oral exam related to the final creative project and must submit a written record of the project and the research related to it.

Ph.D. Degree Requirements

The Ph.D. certifies that a degree recipient has a knowledge and understanding of theatre historiography and practice as well as pedagogical and professional strategies for communicating and applying that knowledge. The areas of study for the M.A./Ph.D. are theatre historiography, design and technical production, and performance practices. Any of these may serve as a concentration of study, although the Ph.D. ordinarily focuses on the first. Candidates must complete coursework in both academic and performance areas.

The core curriculum, designed to help students finish the program within five years, consists of two parts: part I—coursework (three years); and part II—research and dissertation writing. The three years of coursework are tailored so that the first
two years are structured, and the third year is more open, allowing students to pursue their individual areas of interest in depth. Students are required to successfully complete six required courses over the three-year sequence: three courses must be in specific areas of theatre historiography, to be chosen from six seminars (TH 8111-6 sequence); historiography (TH 8102); a course in performance conventions; and an independent seminar in which students refine and materialize their work. This seminar, which can take the form of an independent study, directed reading/production, or a regular course format designed by the student and the adviser, usually takes place at the beginning of the third year. Students must also take coursework in a supporting program or a minor (12 credits); and 24 thesis credits, for a minimum total of 54 credits beyond the B.A. Topics courses and seminars supplement the core curriculum. Students must demonstrate a research technique appropriate to the thesis. This could take the form of a foreign language or a discipline research methodology which might increase the total number of credits required for the degree.

Language Requirements—Ph.D. students are expected to demonstrate proficiency in at least one foreign language as certified by the adviser or program faculty in the language.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits as approved by the director of graduate studies.

**Theriogenology**

See Veterinary Medicine.

**Toxicology**

Contact Information—Luanne Petcoff, Office Specialist, Toxicology Graduate Program, Medical School Duluth, 276 SMed, 1035 University Drive, Duluth, MN 55812 (218-726-8892; fax 218-726-8014; toxgrad@d.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor

Yusuf J. Abul-Hajj, Medicinal Chemistry, Pharmacognosy, SM
David R. Brown, Veterinary and Biomedical Sciences, SM
Robert M. Carlson, Chemistry, Duluth, SM
Lester R. Drewes, Biochemistry, Duluth, SM
Vincent F. Garry, Laboratory Medicine and Pathology, SM
Patrick E. Hanna, Medicinal Chemistry, Pharmacognosy, SM
Michael J. Murphy, Veterinary Population Medicine, SM
Gerald J. Niemi, National Resources Research Institute, Duluth, SM
Lisa A. Peterson, School of Public Health, SM
Joseph R. Prohaska, Biochemistry, Duluth, SM
Jean F. L. Regal, Pharmacology, Duluth, SM
W. Thomas Shier, Medicinal Chemistry, Pharmacognosy, SM
Lawrence P. Wackett, Biochemistry, SM
Kendall B. Wallace, Biochemistry, Duluth, SM

Adjunct Professor

Subhash C. Basak, National Resources Research Institute, Duluth, AM2
John L. Butenoff, 3M, AM2
Glenn G. Hardin, Veterinary Diagnostic Labs, AM2
N. Lebrec, Veterinary Diagnostic Medicine, AM2
John W. Nichols, Duluth, AM2
Robert R. Roy, 3M, AM2
Robert S. Skoglund, 3M, AM2

Associate Professor

Gerald T. Ankley, Environmental Protection Agency, Duluth, AM2
Anthony Kiorpes, MGI Pharma Inc., ASM
Mark S. Rutherford, Veterinary and Biomedical Sciences, SM
Ashok K. Singh, Veterinary Population Medicine, SM

Adjunct Associate Professor

Lawrence J. Felice, SurModics, AM2

Assistant Professor

Robert T. Cortner, Biochemistry, Duluth, SM
Yinduo Ji, Veterinary and Biomedical Sciences, SM

Edward L. Perkins, Biochemistry, Duluth, SM

Adjunct Assistant Professor

Hillary Carpenter, Minnesota Department of Health

Verkateswaralu Pothaprageda, 3M, AM2

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

Curriculum—This University-wide program provides comprehensive training in the broad scope of toxicology. The science of toxicology is devoted to identifying and characterizing the risk associated with exposures to 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, environmental organisms, or ecosystems. Accordingly, the essence of the science of toxicology is defining the line that distinguishes a risk from a residue. This requires scientific expertise in analytical and environmental chemistry, biology, and mathematics, with advanced training in human health risk assessment, epidemiology, environmental chemistry, toxicology, and environmental impacts. Students must also complete 12 credits in toxicology. Students must also complete 12 credits in toxicology. Students must also complete 12 credits in toxicology. Students must also complete 12 credits in toxicology.

Additional advanced courses in toxicology or related fields may be specified by the adviser. Students must complete and defend an original research project.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires 12 credits as approved by the director of graduate studies.

**Prerequisites for Admission**—A B.S. in basic science is required. All applicants should have completed a full year of biology, chemistry, and physics, and have completed mathematics through calculus.

**Special Application Requirements**—Applicants must submit scores from the General (Aptitude) Test of the GRE, three letters of recommendation from college-level faculty or equivalent persons who are familiar with the applicant’s scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. The application deadline is February 1.

**Courses**—Refer to Toxicology (TXCL) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—Use of 4xxx courses toward degree requirements is permitted with director of graduate studies’ approval.

**M.S. Degree requirements**

The M.S. is offered under plan A and Plan B. Plan A requires 20 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.

**Language Requirements**—None.

**Final Exam**—The final exam is written and oral.

**Ph.D. Degree Requirements**

The Ph.D. requires core courses in physiology, biochemistry, statistics, and toxicology. Students must also complete 12 credits in minor or supporting program and 24 thesis credits. Because the program spans the Duluth and Twin Cities campuses, the required course numbers 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.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—A doctoral minor requires 12 credits: 8 credits of core courses and 6 credits of advanced toxicology courses.

**Transportation Studies**

Postbaccalaureate Certificate

Contact Information—Transportation Studies Certificate, Information Center, College of Continuing Education, University of Minnesota, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4000; fax 612-625-6381; info@cee.umn.edu; cts@umn.edu; www.cts.umn.edu). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.
Degree Programs and Faculty

**Prerequisites for Admission**—Admission requirements include a B.S. or B.A. from an accredited U.S. institution or its foreign counterpart. The degree must be in a field related to transportation. Applicants who hold a degree in an unrelated field must demonstrate familiarity with the transportation-related issues through work experience, community involvement, political leadership, or other activity. A preferred performance level is required. Applicants should have a minimum undergraduate GPA of 3.00. (If you do not meet the preferred performance level of 3.00 GPA, your application should describe relevant nonacademic experience as well as explain any other relevant factors for the Graduate School’s and program faculty’s consideration.)

Study in any one or more of the following technical course topics, demonstrating proficiency in physical science and/or quantitative analysis: intermediate economics, theory, statistics, calculus, physics.

**Use of 4xxx Courses**—Use of 4xxx courses toward requirements is subject to director of graduate studies approval.

**Certificate Requirements**—Completion of two or more cognate elective courses chosen by the student in consultation with the director of graduate studies, and at least 16 graduate level credits are required.

**Urban and Regional Planning**

**Contact Information**—Director of Admissions, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-626-0002; hhadmmt@umn.edu; www.hhh.umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

**Regents Professor**

G. Edward Schuh (emeritus), M2

**Professor**

Dorothy H. Anderson, AM
Ragi A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John E. Brandl, M2
John M. Bryson, M2
Nancy N. Eustis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoemann, M2
C. David Hollister, AM2
Lawrence R. Jacobs, M2

Anne R. D. Kapuscinski, Fisheries, Wildlife, and Conservation Biology, AM
Kenneth H. Keller, M2
Sally J. Kenney, M2
Morris M. Klein, M2
Robert T. Kudre, M2
Ann R. Markusen, M2
Samuel L. Myers, M2
David G. Pitt, Landscape Architecture, AM2
Carlisle F. Runge, Applied Economics, AM

**Associate Professor**

Barbara Crosby, M2
Maria J. Hanratty, M2
Laura T. Kalamkakis, AM
David M. Levinson, Civil Engineering, AM2
Deborah Levison, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa M. Stone, M2
Judy Temple, M2

**Assistant Professor**

William Craig, Geography, AM
Julian Marshall, Civil Engineering, AM
Richard E. Martinez, Chicano Studies, AM2
Carissa Schively, M2
Paul C. Stone, M2
Elizabeth J. Wilson, M2

**Other**

Harry C. Boyte, M2
Gary DeCramer, M2
Ali K. Galadly, AM2
P. Jay Kiedrowski, M2
Jennifer Kozma, M2
Lee W. Munnich, M2
Joe Nathan, M2
Myron W. Orfield, Jr., AM
Timothy Penny, AM

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

**Curriculum**—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. Dual degrees include M.U.R.P./jurs doctor, M.U.R.P./master of landscape architecture, M.U.R.P./master of science in civil engineering, and M.U.R.P./master of social work.

**Prerequisites for Admission**—Students are expected to have a U.S. bachelor’s degree or foreign equivalent. Basic competence in college algebra and computers is required. Introductory coursework in microeconomics and political science is recommended.
Degree Programs and Faculty

Special Application Requirements—In addition to the materials submitted to the Graduate School, applicants must submit to the Humphrey Institute a photocopy of their Graduate School application, the Humphrey Institute Applicant Data Form, copies of all academic transcripts, a statement of purpose, at least three letters of recommendation, a GRE official score report, and a professional résumé or C.V. Students who wish to be considered for financial aid should apply no later than January 5 of the preceding academic year. Deadline for admission only is April 1. Entry is for fall semester.

Courses—Refer to Public Affairs (PA) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted with instructor’s and adviser’s permission.

M.U.R.P. Degree Requirements
The M.U.R.P., which is offered under coursework only and Plan A, requires 48 credits including core courses (26 credits), specialization electives (9 credits), and 10 credits of electives. Each student completes an internship in a public or private planning agency usually during the summer after the first year of the program. All students also take a capstone workshop (3 credits) that constitutes a final professional-level project. Students in the Coursework Only option complete a professional paper. Students selecting the Plan A option register for 10 thesis credits and complete a thesis. Specializations for the degree include housing and community development; regional, economic, and workforce development; transportation planning; land use/urban design planning; and environmental planning. Students may pursue a minor.

Language Requirements—None.

Final Exam—The final exam is oral for Plan A. The client presentation in the capstone workshop fulfills the requirement for the final exam for Coursework Only.

Minor Requirements for Students Majoring in Other Fields—A minor is constructed in consultation with the student’s minor adviser.

Veterinary Medicine

Contact Information—Director of Graduate Studies, Veterinary Medicine Graduate Program, College of Veterinary Medicine, 443 VMC, 1365 Gortner Ave., St. Paul, MN 55108 (612-624-7413; fax 612-625-4734; cvmmmsphd@umn.edu).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html.

Professor
Trevor R. Ames, Veterinary Population Medicine, SM
P. Jane Armstrong, Veterinary Clinical Sciences, SM
Alvin Beitz, Veterinary Biomedical Sciences, SM
Russell F. Bey, Veterinary and Biomedical Sciences, SM
David R. Brown, Veterinary and Biomedical Sciences, SM
Cathy S. Carlson, Veterinary Population Medicine, SM
James E. Collins, Veterinary Population Medicine, SM
Michael G. Conzemius, Veterinary Clinical Sciences, SM
Peter Davies, Veterinary Population Medicine, SM
Scott A. Dee, Veterinary Population Medicine, SM
Ronald Del Vecchio, Agriculture, Crookston, M2
Melvyn L. Fahning, Veterinary Population Medicine, SM
Daniel A. Feeney, Veterinary Clinical Sciences, SM
John Fetrow, Veterinary Population Medicine, SM
Douglas N. Foster, Animal Science, SM
Sagar M. Goyal, Veterinary Population Medicine, SM
David A. Halvorson, Veterinary and Biomedical Sciences, SM
Robert M. Hardy, Veterinary Clinical Sciences, M2
David W. Hayden, Veterinary Population Medicine, SM
William D. Hueston, Veterinary Population Medicine, SM
Richard Isaacson, Veterinary and Biomedical Sciences, SM
Han S. Joo, Veterinary Population Medicine, SM
Mathur S. Kannan, Veterinary and Biomedical Sciences, SM
Vivek Kapur, Microbiology, SM
Jody P. Kulich, Veterinary Clinical Sciences, SM
Louis Mansky, Diagnostic and Biological Sciences, SM
Thomas W. Molitor, Veterinary Population Medicine, SM
Roger D. Moon, Entomology, SM
Robert B. Morrison, Veterinary Population Medicine, SM
Michael P. Murtaugh, Veterinary and Biomedical Sciences, SM
Kukambhi V. Nagaraja, Veterinary and Biomedical Sciences, SM
Timothy D. O’Brien, Veterinary Population Medicine, SM
Carl A. Osborne, Veterinary Clinical Sciences, SM
Phillip K. Peterson, Medicine, M2
David J. Polzin, Veterinary Clinical Sciences, SM
Patrick T. Redig, Veterinary Clinical Sciences, M2
Jagdev M. Sharma, Veterinary and Biomedical Sciences, SM
Bert E. Stromberg, Veterinary and Biomedical Sciences, SM
Stephanie J. Valberg, Veterinary Population Medicine, SM
Larry J. Wallace, Veterinary Clinical Sciences, SM
Robert Washabau, Veterinary Clinical Sciences, SM
Douglas J. Weiss, Veterinary and Biomedical Sciences, SM

Clinical Professor
Betty A. Heffernan, Veterinary Clinical Sciences, M2

Associate Professor
Jeff B. Bender, Veterinary Population Medicine, SM
John Deen, Veterinary Population Medicine, SM
Kay S. Faaberg, Veterinary and Biomedical Sciences, SM
Sandra M. Godden, Veterinary Population Medicine, SM
James R. Lokengard, Medicine, M2
Ron Mandsgard, Veterinary Clinical Sciences, M2
Moses K. Njenga, Veterinary and Biomedical Sciences, M2
Kenneth Roberts, Urologic Surgery, SM
Juan Romano, Veterinary Population Medicine, M2
Margaret V. Root Kustritz, Veterinary Clinical Sciences, M2
Mark S. Rutherford, Veterinary and Biomedical Sciences, SM
Leslie Sharkey, Veterinary Population Medicine, M2
Randall Singer, Veterinary and Biomedical Sciences, SM
Srinand Sreevatsan, Veterinary Population Medicine, SM
Anthony Tobias, Veterinary Clinical Sciences, SM
Sheila M. Torres, Veterinary Clinical Sciences, SM
Ava M. Trent, Veterinary Population Medicine, M2
Scott J. Wells, Veterinary Population Medicine, SM
Julia Wilson, Veterinary Population Medicine, M2

Associate Clinical Professor
Mostafa Bouljihad, Veterinary Population Medicine, M2
Lynelle Graham, Veterinary Clinical Sciences, M2
Erin D. Malone, Veterinary Population Medicine, M2
Paul Rapnicki, Veterinary Population Medicine, M2
Kurt D. Rossow, Veterinary Population Medicine, SM
Jerry Torrison, Veterinary Population Medicine, M2

Assistant Professor
Hwa Choi, Veterinary Clinical Sciences, M2
Connie J. Gebbhart, Veterinary and Biomedical Sciences, SM
Yinduo Ji, Veterinary and Biomedical Sciences, M2
Ilze Matise, Veterinary Population Medicine, M2
Petra A. Mertens, Veterinary Clinical Sciences, M2
Claudia Munoz-Zanzi, School of Public Health, M2
Ned Patterson, Veterinary Clinical Sciences, M2
Douglas Plager, Mayo Clinic, M2
Elizabeth Pluhar, Veterinary Clinical Sciences, SM
Pamela Skinner, Veterinary and Biomedical Sciences, M2
Arno Wunschmann, Veterinary Population Medicine, M2

Assistant Clinical Professor
Anibal Armien, Veterinary Population Medicine, M2
Julie Ann Churchill, Veterinary Clinical Sciences, M2
Rebecca Davies, Veterinary Population Medicine, M2
Roberto Novo, Veterinary Clinical Sciences, M2
Simone Oliveira, Veterinary Population Medicine, M2
Jane E. Quandt, Veterinary Clinical Sciences, M2
Instructor
Montserrat Torremorell, Veterinary Population Medicine, M2

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

Curriculum—The veterinary medicine graduate program encompasses the clinical and applied graduate education of the College of Veterinary Medicine. The program is divided into five specialty tracks: comparative medicine and pathology; infectious disease; population medicine; surgery, radiology, and anesthesiology; and theriogenology. Program faculty is drawn from all departments of the college as well as from other colleges within the University.

The program emphasizes quality clinical training with state-of-the-art research in animal diseases at the individual and the population levels. All species of domestic animals are the subject of study; the program being particularly strong in population-based medicine and epidemiology. Other areas of strength include feline and canine urology, radiology, pain alleviation, molecular epidemiology, comparative medicine, microbiology, virology, and immunology.

Prerequisites for Admission—A majority of applicants have a D.V.M. degree or its equivalent. Applicants lacking a D.V.M. degree, including those currently enrolled in a D.V.M. degree program, may be accepted upon approval by the program advisory committee.

Special Application Requirements—Applicants must submit a clearly written statement outlining their career interests and goals, any previous research experience, and identifying the specialty track desired. Also required is a complete set of official transcripts, a CV or résumé, and three letters of recommendation from individuals knowledgeable about the applicant’s academic performance. Applicants are requested but not required to take the GRE prior to consideration for admission. International students are required to submit an official TOEFL score. Students may apply at any time; however, submission of all application materials by a March 1 deadline is required for full consideration for fellowships and research assistantships awarded for the next academic year. Students are typically admitted for fall semester, though there is an October 1st deadline for spring semester admission consideration.

Research Facilities—Research facilities available to the veterinary medicine graduate student include the Advanced Genetic Analysis Center, the Clinical Investigation Center, the Raptor Center, the Swine Center, the Swine Disease Eradication Center, and the Avian Disease Research Center.

Courses—Refer to Veterinary Medicine (VMED) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of selected 4xxx courses to meet degree requirements is acceptable with prior approval from the adviser and director of graduate studies.

M.S. Degree Requirements
The M.S. is offered under Plan A and Plan B. Plan A requires 20 course credits; 14 course credits in the major, 6 course credits in a minor or related field, plus 10 thesis credits. Plan B requires 30 course credits; 14 - 20 course credits in the major and 10 - 16 credits in a minor or related field. Three papers are also required (e.g., a case report, a research project, and a literature review).

Language Requirements—None.

Final Exam—The final exam is written and oral.

Minor Requirements for Students
Majoring in Other Fields—A master’s minor requires 6 course credits taken from recommended courses in the veterinary medicine major.

Ph.D. Degree Requirements
There are no minimum requirements but students usually take 24 to 30 credits in the major field and 12 credits minimum for official minor or supporting program. In addition, 24 thesis credits are required.

Language Requirements—None.

Minor Requirements for Students
Majoring in Other Fields—A doctoral minor requires 12 course credits taken from recommended courses in the veterinary medicine major.

Water Resources Science

Contact Information—Director of Graduate Studies-Twin Cities, Water Resources Science, University of Minnesota, 173 McNeal Hall, 1985 Buford Avenue, St. Paul, MN 55108 (612-624-9282; fax 612-625-1263; wrs@umn.edu; http://wrs.umn.edu); and Associate Director of Graduate Studies-Duluth, Water Resources Science, 213 RLB, University of Minnesota, Duluth, MN 55812 (218-726-8891; fax 218-726-6979).

For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.html

Professor
E. Calvin Alexander, Jr., Earth Science, Geology and Geophysics, SM
Donn Branstrator, Biology, Duluth, SM
Stephen A. Bortone, Biology, Duluth, SM
David C. Bouska, Plant Biology, SM
John S. Gulliver, Civil Engineering, SM
Randall Hicks, Biology, Duluth, SM
Miki Honkaz, Civil Engineering, SM
Emi Ito, Earth Science, Geology and Geophysics, SM

Steve M. Colman, Geological Sciences, Duluth, SM
K. William Easter, Applied Economics, SM
Leonard C. Ferrington, Entomology, SM
Eff Foufoula, Civil Engineering, SM
Susan M. Galalowitsch, Horticultural Science, SM
Philip J. Gersmehl, Geography, SM
Florence K. Gleason, Plant Biology, SM
Sagar M. Goyal, Veterinary Diagnostic Medicine, SM
John S. Gulliver, Civil Engineering, SM
Sathis C. Gupta, Soil, Water, and Climate, SM
Randall Hicks, Biology, Duluth, SM
Miki Honkaz, Civil Engineering, SM
Emi Ito, Earth Science, Geology and Geophysics, SM
Thomas C. Johnson, Geological Sciences, Duluth, SM
John F. Moncrief, Soil, Water, and Climate, SM
Howard Mooers, Geological Sciences, Duluth, SM
David J. Mulla, Soil, Water, and Climate, SM
Edward A. Nater, Soil, Water, and Climate, SM
Raymond M. Newman, Fisheries, Wildlife, and Conservation Biology, SM
John L. Nieber, Bioproducts and Biosystems Engineering, SM
Christopher Paola, Earth Science, Geology and Geophysics, SM
John J. Pastor, Biology, Duluth, SM
James A. Perry, Fisheries, Wildlife, and Conservation Biology, SM
Hans-Olof Pfannkuch, Earth Science, Geology and Geophysics, SM
David G. Pitt, Landscape Architecture, SM
Steve Polasky, Applied Economics, SM
Carl Richards, Biology, Duluth, SM
Carl J. Rosen, Soil, Water, and Climate, SM
Carlisle Ford Runde, Applied Economics, SM
Michael Sadowsky, Soil, Water, and Climate, SM
Mark W. Seeley, Soil, Water, and Climate, SM
Michael J. Semmens, Civil Engineering, SM
Peter Sorensen, Fisheries, Wildlife, and Conservation Biology, SM
Fotis Sotiropoulos, Civil Engineering, SM
Susan Stafford, Forest Resources, SM
Heinz G. Stefan, Civil Engineering, SM
Robert W. Sterner, Ecology, Evolution, and Behavior, SM
Deborah L. Swackhamer, Environmental Health Sciences, SM
Michael Sydor, Physics, Duluth, SM
Harvey Thorleifson, Minnesota Geological Survey, SM
Elon S. Verry, Forest Resources, ASM
Vaughan R. Voller, Civil Engineering, SM
Bruce N. Wilson, Bioproducts and Biosystems Engineering, SM

Adjunct Professor
Daniel Engstrom, Earth Science, Geology and Geophysics, AM2
Janet R. Keough, Biology, Duluth, AM2
Anthony Runkel, Earth Science, Geology and Geophysics, AM2
Bruce Vondracek, Fisheries, Wildlife, and Conservation Biology, SM

Associate Professor
William Arnold, Civil Engineering, SM
Todd W. Arnold, Fisheries, Wildlife and Conservation Biology, SM
Randall J. Barnes, Civil Engineering, SM
Donn Branstrator, Biology, Duluth, SM

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James B. Cotner, Ecology, Evolution, and Behavior, SM
Christina Gallup, Geological Sciences, Duluth, SM
Sarah E. Hobbie, Ecology, Evolution, and Behavior, SM
Frances R. Homans, Applied Economics, SM
Raymond N. Hoalski, Civil Engineering, SM
Thomas Hrabik, Biology, Duluth, SM
Katherine Klink, Geography, SM
Timothy LaPara, Civil Engineering, SM
Kristopher McNieill, Chemistry, SM
Elizabeth C. Minor, Chemistry and Biochemistry, Duluth, SM
Tyson Ochsner, Soil, Water, and Climate, SM
Carrie Jennings, Geology and Geophysics, AM2
Mark Edlund, Earth Science, Geology and Geophysics, SM
Adjunct Assistant Professor
Paul Capel, Chemical Engineering, Duluth, SM
David Fulton, Fisheries, Wildlife, and Conservation Biology, SM
Jason D. Stockwell, Biology, Duluth, AM2
Assistant Professor
Jay Austin, Large Lakes Observatory, Duluth, M2
Dennis Becker, Forest Resources, M2
Jacques Finlay, Ecology, Evolution, and Behavior, M2
Jeffrey A. Granlick, Biotechnology Institute, M2
Qiujiong Huang, Applied Economics, M2
Kimberly M. Hill, Civil Engineering, SM
Katsumi Matsumoto, Earth Science, Geology, and Geophysics, M2
Jennifer King, Soil, Water, and Climate, SM
Joseph McFadden, Ecology, Evolution, and Behavior, M2
Lee Penn, Chemistry, M2
Martin Saar, Earth Science, Geology and Geophysics, M2
Sangwon Suh, Bioproducts and Biosystems Engineering, M2
Edward Swain, Fisheries, Wildlife, and Conservation Biology, AM2
Josef Werne, Chemistry, Duluth, SM
Adjunct Assistant Professor
James Almendinger, Fisheries, Wildlife, and Conservation Biology, AM2
Mark Edlund, Earth Science, Geology and Geophysics, ASM
Carrie Jennings, Geology and Geophysics, AM2
Joe Magner, Fisheries, Wildlife, and Conservation Biology, AM2
Tyson Ochsner, Soil, Water, and Climate, AM2
Pamela Rice, Soil, Water, and Climate, AM2
Senior Research Associate
Richard Axler, Natural Resources Research Institute, Duluth, SM
Brian Hill, Biology, Duluth, ASM
George Host, Natural Resources Research Institute, Duluth, SM
Lucinda Johnson, Natural Resources Research Institute, Duluth, SM
Research Associate
Euan Reavey, Natural Resources Research Institute, Duluth, M2
Naomi Zeitouni, Applied Economics, SM
Senior Fellow
Lawrence Baker, Water Resources Center, SM
Other
Lorin Hatch, HDR Engineering Inc, AM2
Along with the program-specific requirements, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—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 the hydrologic cycle and associated ecosystems, interconnectedness of the sciences involved in managing aquatic resources, and interplay between the biophysical sciences and social sciences in developing and implementing public policies related to water.

The program involves faculty from the following departments on the Twin Cities campus: Applied Economics; Bioproducts and Biosystems Engineering; Civil Engineering; Ecology, Evolution, and Behavior; Entomology; Environmental and Occupational Health; Fisheries, Wildlife, and Conservation Biology; Geology and Geophysics; Hydrogeology; Natural Resources Research Institute; and the Humphrey Institute of Public Affairs. It also involves faculty from the following departments on the Duluth campus: Biological Science; Chemical Engineering; Chemistry, Geography, Geological Sciences; Economics; Political Science; and the Large Lakes Observatory and the Natural Resources Research Institute in Duluth.

Prerequisites for Admission—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. Further preparation may be expected from students wishing to specialize in certain areas of the program. Students who do not have a master’s degree in a related area are admitted to the M.S. program first, even if their long-term goal is a Ph.D. degree. Availability of funding and willingness of a member of the graduate faculty to serve as an advisor 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 Web site. 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. These letters also may be used in applying for financial aid.

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; only rarely, under extenuating circumstances, will students be considered for admission without GRE scores. Students may be admitted any semester but are strongly encouraged to begin fall semester and to submit their application by January 1 in the year they expect to begin their studies.

Courses—Refer to Water Resources Science (WRS) in the course section of this catalog for courses pertaining to the program. Check the program Web site at http://wrs.umn.edu for additional course information.

Use of 4xxx Courses—Use of 4xxx courses is permitted for degree requirements based on approval by the advisor and the director of graduate studies.

M.S. Degree Requirements

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: hydrology (surface and/or groundwater); environmental/water chemistry; limnology; and 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 supporting courses (at least 6 credits) outside of aquatic science also are required. Training in responsible conduct of research and ethics is also required. Approved core and area of emphasis courses are listed on the program Web site at http://wrs.umn.edu.
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 the Graduate School minimum credit requirements.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—A master’s minor requires 9 credits, including WRS 5101 (3 cr) or in Duluth POL 4201 (4 cr) and two of the other core courses described under M.S. degree requirements.

**Ph.D. Degree Requirements**
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 minor or supporting program.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—Doctoral students must complete 12 credits, including WRS 5101 (3 cr) or in Duluth POL 4201 (4 cr), a core course described under the M.S. degree requirements, and two electives from one of the areas of emphasis.

**Work and Human Resource Education**

**Contact Information**—Professor Jim Brown, Director of Graduate Studies, Department of Work and Human Resource Education, University of Minnesota, 210 Vocational and Technical Education Building, 1954 Buford Avenue, St. Paul, MN 55108 (612-624-1221; fax 612-624-2231; whre@umn.edu, www.education.umn.edu/whre). For latest graduate faculty listings, see www.grad.umn.edu/faculty_rosters/faculty.htm.

**Professor**
James M. Brown, SM
Judith J. Lambrecht, SM
Theodore Lewis, SM
Gary N. McLean, SM
James R. Stone III, SM
Baiyin Yang, SM

**Associate Professor**
Kenneth R. Bartlett, SM
Richard M. Joerger, M2
Rosemarie J. Park, SM

**Assistant Professor**
Brad Greiman, M2
Shari L. Peterson, SM

**Other**
Jerome A. Stein, Social Work, AM2

**Curriculum**—The program offers specializations in adult education; agricultural food and environmental education; business and industry 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.

**Prerequisites for Admission**—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 term.

**Courses**—Refer to Adult Education (ADED), Agricultural, Food, and Environmental Education (AFEE), Business and Industry Education (BIE), Human Resource Development (HRD), and Work and Human Resource Education (WHRE) in the course section of this catalog for courses pertaining to the program.

**Use of 4xxx Courses**—A maximum of 15 credits of 4xxx courses may be used in the related field or supporting program. Students who plan to use any 4xxx courses in their program are responsible for determining that the course is available for graduate credit. Degree programs must include rationale for the use of 4xxx course credits.

**M.A. Degree Requirements**
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.

**Language Requirements**—None.

**Final Exam**—The final exam is oral.

**Minor Requirements for Students Majoring in Other Fields**—The master’s minor requires a minimum of 6 credits in one of the specializations, approved by the director of graduate studies.

**Ph.D. Degree Requirements**
The Ph.D. requires 60 course credits and 24 thesis credits. Course credits include a minimum of 12 credits in general aspects, a minimum of 20 credits in research, and a minimum of 16 credits in the specialization. Course credits must also include 12 elective credits and 12 credits from outside the department, which may overlap with those in general aspects, research, and the specialization.

**Language Requirements**—None.

**Minor Requirements for Students Majoring in Other Fields**—The doctoral minor requires a minimum of 12 credits in one of the specializations, approved by the director of graduate studies.

**Ed.D. Degree Requirements**
The Ed.D. requires 60 course credits and 24 field study credits (thesis credits). Course credits include a minimum of 12 credits in general aspects, a minimum of 11 credits in research, and a minimum of 28 credits in the specialization, 4 of which must be internship credits. Course credits must also include 12 credits from outside the department, which may overlap with those in general aspects, research, and the specialization.

**Language Requirements**—None.

**Final Exam**—A written preliminary exam in each of the program areas (general aspects, research, and specialization) and a final oral exam are required.

**Minor Requirements for Students Majoring in Other Fields**—A doctoral minor requires a minimum of 12 credits in one of the specializations, approved by the director of graduate studies.
Related Fields
Graduate degree programs do not exist in the following fields. However, students may earn graduate credit in courses related to their program and use faculty members on their examining committees from these fields. For graduate courses, see the Courses section in this catalog.

Chicano Studies
Associate Professor
Guillermo Rojas, E

Neurosurgery
Professor
Walter A. Hall, E
Walter C. Low, E
Robert E. Maxwell, E
Gaylan L. Rockswold, E

Pediatrics
Regents Professor
Alfred F. Michael, E
James G. White, E
Professor
Carlyle C. Clawson, E
Patricia Ferrieri, E
Edward L. Kaplan, Epidemiology, E
James H. Moller, E
Harvey Sharp, E
Warren J. Warwick, E
Associate Professor
Pi-Nian Chang, E
Amos S. Deinard, E
Assistant Professor
Elizabeth E. Giles, E

Psychiatry
(ASPY and CAPY)
Professor
Gerald J. August, E
Marilyn E. Carroll, E
Scott J. Crow, E
Elke D. Eckert, E
William H. Frey, Pharmacy, E
Judith G. Garrard, Health Services Research, Policy and Administration, E
Dorothy Hatsukami, Epidemiology, E
Jerome L. Kroll, E
Thomas B. Mackenzie, E
Michael K. Popkin, E
Nancy C. Raymond, E
George Realmuto, E
Associate Professor
Daniel R. Hanson, E
Assistant Professor
Michael L. Bloomquist, E
Tonya J. White, E

Therapeutic Radiology
Professor
Bruce J. Gerbi, E
Patrick D. Higgins, E
John J. Kersey, Pediatrics, E
Chang W. Song, E
Assistant Professor
Parham Alaei, E