Twin Cities Degree Programs and Faculty

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.

Member/Advising (M2)—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-advise 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 assume the same responsibilities as member/advising, but not to participate in governance.

Member (M)—Authorization 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 serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.

Affiliate Member (AM)—Authorization to assume the same responsibilities as member, but not to participate in governance.

Examining Status (E)—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/macc).

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

Professor

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

Senior Lecturer

Frank J. Beil, M
Gary W. Carter, AM2
Paul G. Gutterman, M2
Larry Kallio, M2
Mark Sellner
Terry L. Tranter, AM2

Along with the program specific requirements listed below, 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.

Courses—Refer to Accounting (ACCT), Tax (MBT), Operation Management Science (OMS), Finance (FINA), and Information and Decision Sciences (IDSC) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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. Luskin, Mathematics, SM
Ivan Marusic, ASM
Thomas W. Shield, SM
Ellad Tadmor, SM
Yiyuan J. Zhao, SM

Associate Professor

Demoz Gebre-Egziabher, SM
Yohannes Ketema, AM
Krishnan Mahesh, SM

Assistant Professor

Ryan S. Elliott, SM
Bernard Mettler, SM
Thomas D. Schwartzentruber, SM
Jian Sheng, SM

Teaching Specialist

Jeffrey Hammar, M2

Other

Francesco Borrelli, AM
Dale F. Enns, ASM

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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, dynamical systems, material properties, and fluid and solid behavior. Plan A requires 30 graduate credits, a minimum of 20 course credits and 10 thesis credits. No seminar credits can be used to satisfy the 20-course credit requirement. Plan B requires 30 credits including the 3-credit Plan B project course. Of the remaining 27 credits, a minimum of 24 credits of coursework is required and no seminar credits can be used to satisfy this requirement. If seminar credits are used to meet the 30 credit requirement, they must be in one-credit modules.

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 8 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 about two years of coursework, but the heart of the program is the thesis research. The program must contain a minimum of 42 credits of approved courses and four semesters of colloquium attendance. Of the 42 credits, a minimum of 36 credits must be in approved coursework, not including seminar credits. If seminar credits are used to meet the 42 credit minimum requirement they must be in 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 Bioproducts and Biosystems Science Engineering and Management.

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

Richard D. Leppert, Cultural Studies and Comparative Literature, SM
Elaine Tyler May, SM
Steven Ruggles, History, SM
Eric Sheppard, Geography, 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
Maria Damon, English, SM
Gail Dubrow, Graduate School, ASM
Penny A. Edgell, Sociology, 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
Regina Kunzel, Gender Women, and Sexuality Studies, ASM
Alex J. Lubet, Music, SM
Judith A. Martin, Geography-Urban and Regional Planning, SM
Lary L. May, 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 Prell, SM
Paula Rabinowitz, English, SM
Harvey B. Sarles, Cultural Studies and Comparative Literature, 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 Albrecht, 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
Jigna Desai, Gender, Women, and Sexuality Studies, ASM
Roderick Ferguson, SM
Kirsten Fischer, History, SM
Vinay Gidwani, Geography, ASM
Ronald Greene, Communication Studies, ASM
Douglas Hartmann, Sociology, SM
Trica Keaton, SM
Erika Lee, History, SM
Josephine D. Lee, English, SM
Richard Lee, Psychology, SM
Patrick McNamara, History, ASM
Louis G. Mendoza, Chicano Studies, SM
Roger P. Miller, Geography, SM
Kevin P. Murphy, History, ASM
Lisa A. Norling, History, SM
Jean M. O'Brien-Kehoe, History, SM
Joanna O'Connell, Spanish and Portuguese, SM
Laurie Ouellette, Communication Studies, ASM
Daniel J. Philippon, English, SM
Jennifer L. Pierce, SM
Gilbert B. Rodman, Communication Studies, ASM
Jani Scandura, English, ASM
Robert B. Silberman, Art History, SM
Katherine M. Solomonson, Architecture, SM
Brian G. Southwell, Journalism and Mass Communications, ASM
Dara Zippora Strolovitch, Political Science, ASM
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
Keith A. Mayes, African American and African Studies, M2
Hoon Song, Anthropology,M2
Omise'eke Natasha Tinsley, English, M2
David Valentine, Anthropology, M2

Senior Fellow

Harry C. Boyte, Public Affairs, AM

Along with the program-specific requirements listed below, 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 develop subfields (understood as a more specific focus of research and teaching) and also pursue broad training in analyzing the development of cultural and historical processes that shaped the nation and its diverse cultures, as well as analyzing contemporary practices.

Prerequisites for Admission—An undergraduate major in a field related to American studies or other preparation acceptable to the Admissions Committee for American studies is required.

Special Application Requirements—American studies admits for graduate study at the Ph.D. level only. Ph.D. students may obtain a M.A. during the course of their studies, but no students are admitted for a terminal M.A. Students entering the Ph.D. program must hold at least a bachelor's level degree from a recognized institution of higher education. The deadline for application to the Department of American Studies is *December 1* of the year prior to intended entry. Refer to the Web site http://americanstudies.umn.edu/grad/admission.html for application procedures and additional information.

Courses—Refer to American Studies (AMST) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 Ph.D. coursework is applicable. Current graduate students seeking to obtain the M.A. should review the information in the current *Graduate Handbook* on the Web at http://americanstudies.umn.edu/pdf/GradHandbook3-08.pdf.

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; AMST 8401—Practicum in American Studies; and Dissertation Seminar, AMST 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 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, Saint Paul, MN 55108 (612-624-3491; fax 612-625-5789; ansci@umn.edu; www.ansci.umn.edu/gradprogram/index.html).

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

Professor

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
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. Reneau, 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, Saint 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
Scott C. Fahrenkrug, SM
Laura J. Mauro, SM
Srinand Sreevatsan, Veterinary Clinical Sciences, SM

Assistant Professor

Yuzhi Li, M2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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 395 Hubert H. Humphrey Center 301 19th Avenue South, Minneapolis, MN 55455 (612-625-3400; fax 612-625-3095; anth@umn.edu; http://anthropology.umn.edu).

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. Gibbon, SM
Stephen F. Gudeman, SM
John M. Ingham, SM
David M. Lipset, SM
Riv-Ellen Prell, American Studies, ASM
Gloria G. Raheja, SM
Peter S. Wells, SM
Joseph J. Westermeyer, Psychiatry, AM2

Associate Professor

Karen Ho, SM
Stuart McLean, SM
Jean M. Langford, SM
Martha Tappen, SM
Karen-Sue Taussig, SM
Gilbert B. Tostevin, SM
Thomas Wolfe, History, ASM

Assistant Professor

Katherine Hayes, SM
Kieran McNulty, SM
Gilliane Monier, SM
Susan C. Mulholland, ASM
Hoon Song, SM
David Valentine, SM
Michael Wilson, SM

Lecturer

Scott F. Anfinson, ASM
John A. Soderberg, AM
Michelle M. Terrell, AM

Fellow

Sonia E. Pattern, Family Medicine and Community Health, AM

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

Curriculum—The Department of 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 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 semiotics; and the anthropology of language styles. Regional specializations include the Middle East and the urban United States.

The program in biological anthropology offers training and research opportunities in two main areas, paleoanthropology and behavioral biology. The paleoanthropology specialty combines biological anthropologists and Paleolithic archaeologists in the reconstruction of hominin evolution and behavior through the application of evolutionary theory to the analysis of skeletal morphology, faunal remains, site taphonomy, and lithic technology. The behavioral biology specialty combines the department's biological anthropologists as well as primatologists in the Jane Goodall Institute's Center for Primate Studies in the study of non-human primates, human foragers, evolutionary ecology, and evolutionary theory. Regional 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) through the M.A. program in cultural heritage management. Regional specialization includes Europe, Southwest Asia, Central Asia, and North America.

See the *Graduate Student Handbook* and faculty profiles in the graduate section of the department's 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 December 1.

Courses—Refer to Anthropology (ANTH) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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; borde021@umn.edu; http://education.umn.edu/fields/Appdev.htm).

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

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.

Certificate Requirements—CPSY 8360 Section 7 (2 cr) gives an overview of applied developmental science problems and provides a framework for the second two components of the program. CPSY 8301 (4 cr) and 8302 (4 cr) are the core courses in developmental psychology covering biological, cognitive, and social aspects of development. They are fundamental to understanding the developmental perspective. CPSY 8996 (5 cr) integrates and applies information learned in coursework. The course is individually designed based on each student's prior experience and interests. Students focus on practical and/or public policy applications of developmental research in settings such as the Search Institute, the Minnesota Children's Museum, the guardian ad litem program in the local courts, the Center for 4-H Youth Development, and the National Institute on Media and the Family. This field experience may be taken in one to three semesters or a summer session, but must be at least 5 credits and total 188 hours. A major paper describing the field experience and integrating relevant basic research literature with practical availability taking place in the field setting is expected. Electives (6 cr) may include 5xxx or 8xxx courses approved by the training directors and chosen to complement the student's area of interest.

Applied Economics

Contact Information—Applied Economics Graduate Program, University of Minnesota, 231 Classroom-Office Building, 1994 Buford Avenue, Saint Paul, MN 55108 (612-625-3777, apecdgs@umn.edu, www.apecgrad.umn.edu/)

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

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
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 Mohtadi, M2
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 Polasky, SM
Terry L. Roe, SM
C. Ford Runge, SM
Benjamin H. Senauer, SM
Thomas F. Stinson, SM

Associate Professor

Jay S. Coggins, SM
Elizabeth E. Davis, SM
Jeremiah E. Fruin, SM
Maria J. Hanratty, SM
Frances R. Homans, SM
Terrance M. Hurley, SM
Laura T. Kalambokidis, SM
Deborah Levison, SM
Gerard McCullough, SM
Joseph A. Ritter, SM
Pamela J. Smith, SM
Rodney B. Smith, SM
Steven J. Taff, SM
Judy Temple, SM
Robert J. Town, SM

Assistant Professor

Jean M. Abraham, M2
Caroline Carlin, M2
Qiuqiong Huang, M2
Pinar Karaca Mandic, M2
Colleen Flaherty Manchester, M2
Elton Mykerezi, M2
Clarissa A. Yeap, M2
Chengyan Yue, M2

Research Associate

Naomi Zeitouni, M2

Along with the program-specific requirements listed below, 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. 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.

Applicants for the Ph.D. degree should have completed an M.S. degree in economics, applied 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 (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 graduate faculty member not from the 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, Saint Paul, MN 55108 (612-625-4742; fax 612-625-1268; apsc@umn.edu; www.appliedplantsciences.umn.edu).

For latest graduate faculty listings, see 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
John A. Lamb, Soil, Water, and Climate, 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
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. Muehlbauer, SM
Seth L. Naeve, 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

Jeffrey Coulter, M2
Milton J. Haar, SM
Adrian D. Hegeman, SM
Karen E. Hokanson, AM
Helene Murray, SM
Nathan Springer, SM
Robert M. Stupar, SM
Eric Watkins, SM
Jochum J. Wiersma, SM
Chengyan Yue, SM

Adjunct Assistant Professor

David F. Garvin, SM

Other

Raymie A. Porter, M2

Along with the program-specific requirements listed below, 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/molecular genetics. 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 Biology; 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/feed/fiber/fuel 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 science. Students with a B.S. or B.A. degree outside these areas may be admitted with the requirement that they take the prerequisite courses noted above at the undergraduate level in addition to their graduate coursework.

Special Application Requirements—Applicants must submit scores from the General (Aptitude) Test of the GRE, three letters of recommendation from persons familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written 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 or in Twin Cities Courses on the University Catalog Web site 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 (with project). Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits. Students are required to complete the courses in the common curriculum and the requirements for their specialization, and to present one graduate seminar. Additional course requirements are flexible and are determined in consultation with the student's adviser(s) and advisory committee.

Language Requirements—None.

Final Exam—The final exam is oral.

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.

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).

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

Professor

Renee Cheng, AIA, M2
Thomas Fisher, M2
Lance A. LaVine, M2
Julia Robinson, M2
Ignacio San Martin, M2
Leon G. Satkowski, M2
Leslie Van Duzer, M2

Adjunct Professor

Robert Mack, FAIA, AM2
Dale M. Mulfinger, FAIA, AM2
Duane Thorbeck, FAIA, AM2

Associate Professor

Lee B. Anderson, M
Arthur H. Chen, M2
William F. Conway, AIA, M2
Gunter Dittmar, M2
Mary M. Guzowski, M2
Cynthia Jara, M2
Andrzej Piotrowski, M2
Katherine M. Solomonson, M2
J. Stephen Weeks, AIA, M2

Adjunct Associate Professor

James Lutz, AIA, AM
Thomas A. Meyer, FAIA, AM2
Ralph K. Nelson, AIA, AM2
Todd J. Rhoades, AIA, AM2
Lee E. Tollefson, FAIA, AM2

Assistant Professor

Ritu Bhatt, M2
Blaine Brownell, M2
Joihn Comazzi, M2
Gregory Donofrio, M2
Benjamin Ibarar-Sevilla, M2
Ozayr Saloojee, M2
Mark Swackhamer, M2

Adjunct Assistant Professor

Loren Abraham, AIA, AM
William Anthony Blanski, AIA, AM
Dave Dimond, AIA, LEED-AP, AM
Nina Ebbighasuen, AIA, AM
Mic Johnson, AIA, AM
Martha McQuade, AIA, AM
Nancy A. Miller, M2
Mark Tambornino, AM
Jennifer A. Yoos, AIA, AM

Lecturer

Jim Dozier, AM
Sharon Roe, AM2

Adjunct Instructor

Lucas Alm, AIA, AM
Christian Dean, AIA, M
Kristen S. Paulsen, AM
Douglas Pierce, AIA, LEED AP, AM2
Marcelo Valdes, AIA, AM

Research Associate

Louise Goldberg, AM
Kathleen Harder, AM
Research Fellow
Jonee K. Brigham, AIA, LEED-AP, M2
Virajita Singh, M2
Richard B. Strong, M2
William Weber, M2

Director

John Carmody, M2

Along with the program-specific requirements listed below, 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 one NAAB accredited professional degree, the master of architecture, and two non-professional research degrees, the M.S. in architecture-with a sustainable design track and the M.S. in architecture with concentration in heritage conservation and preservation.

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

The master of science in architecture is a nonprofessional degree offering advanced studies and research methods in sustainable design and in heritage preservation and conservation. The nonprofessional M.S. seeks advanced students from architecture, building science, art history, geography, archaeology, landscape architecture, environmental design, or related disciplines to pursue multidisciplinary graduate study and research in sustainable building practices and historic preservation. The School of Architecture also offers a dual degree program that combines the M.Arch. professional degree and the M.S. in architecture with a sustainable design track.

Prerequisites for Admissionto the M.Arch—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 with a major 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. The majority of candidates have earned an undergraduate degree with a major in architecture or in a preprofessional architecture program at an NAAB accredited school of architecture. All M.Arch candidates complete the master of Aarchitecture as either a Plan C with a master's design project or a Plan A thesis in their final studio in the spring semester. Information about each of these paths and the requirements for admission appears on the following page.

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 a 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. three-year program candidates for the remaining complement of design studios and courses.

Advanced Standing/Post-Professional—The standard M.Arch professional degree program is three years in length. However, candidates may request admission with advanced standing, and if admitted, may complete the degree in two years; these are exceptional students with a B.S. with a major in architecture degree from accredited NAAB schools. Applications from students who already hold a five-year B.Arch. professional degree, often international students, may be admitted as post-professional degree students. The director of graduate studies tailors advanced and post-professional students' programs to comply with NAAB requirements upon graduation. Post-professional students must be in residence a minimum of three semesters and complete 33 credits.

Prerequisites for Admission to the M.S. in Architecture—Master of science in architecture sustainable design track applicants should have an undergraduate degree with a major in architecture, environmental or building sciences, engineering, or a related field. Applicants seeking a concentration in heritage preservation should have an undergraduate degree with a major in architecture, landscape architecture, art history, urban studies, geography, archaeology, or a related field. Application requirements include a statement of purpose, a writing sample related to the field, a portfolio of related works or design projects, transcripts of all coursework, and three faculty recommendations. The GRE is required. The two- to three-page statement must 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. The statement and portfolio are submitted directly to the school of architecture by January 15.

Special Application Requirements—Admission to the M.Arch. program is highly competitive. In addition to meeting Graduate School application requirements, all students applying to the M.Arch program, whether Plan A or Plan C option, 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 school of architecture questions posted on the electronic application. GRE scores are only required if selecting the Plan A Thesis option. 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.

For an online application or for more information about Graduate School admissions, see the General Information section of this catalog, or visit the Graduate School Web site at www.grad.umn.edu/prospective_students/Application_Information/index.html.

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 Twin Cities Courses on the University Catalog Web site 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 thesis studio design. The fall semesters include integrated core curriculum of studio, building and environmental technologies, history-theory, or digital methods. The spring semesters are organized as half-semester elective modules" in studio-like projects and seminars in urban/suburban-rural, building technology and sustainable practices, history-theory-culture themes. May term study abroad options are available for qualified students in any summer semester.

Language Requirements—None.

Final Exam—An individual design proposal and submission of the written research are required for both the Plan A or Plan C M.Arch professional degree.

M.S. Degree Requirements

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

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

M.S./M.Arch. Dual Degree Requirements

Students earn both the master of architecture (M.Arch.) and a master of science in architecture–sustainable design track (M.S.-S.D.) by careful coordination of coursework. Typically, students achieve both professional degrees in three-and-a-half to four years by overlapping up to 24 credits of specified courses, depending on the preprofessional academic preparation. Students elect the Plan A or Plan C option for the M.Arch. and have the option of Plan A or B for the M.S.-

S.D. part of the dual degree. Consult with the director of graduate studies for details. Refer to the School of Architecture M.S. in architecture–sustainable design track Web site (http://arch.cdes.umn.edu/graduate/MS/MS_SD/index.html) for more specific dual degree requirements.

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 South, 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

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
Tetsuya Yamada, M2

Assistant Professor

Christine A. Baeumler, M2
Jenny Schmid, M2
Andrea Stanislav, M2
Diane Willow, M2

Along with the program-specific requirements listed below, 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 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 submitting the 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, the supplementary application and the statement of artistic and academic intent 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 or in Twin Cities Courses on the University Catalog Web site 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 recommends 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 in the history of art and one course from another academic department pertinent to the student's program). Candidates must be reviewed annually for progress through the program. At the end of the thesis year, candidates demonstrate their visual research accomplishments through a solo, creative thesis exhibition on campus, a supporting paper, and a final oral exam.

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.html.

Professor

W. John Archer, ASM
Catherine B. Asher, SM
Frederick M. Asher, SM
***Frederick A. Cooper,** SM
Gail Lee Dubrow, ASM
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
Michael Gaudio, SM
Robert B. Silberman, SM
Ketherine M. Solomonson, ASM
***John W. Steyaert,** SM

Assistant Professor

Angélica Afanador-Pujol, SM
Ritu Bhatt, AM
Jennifer Marshall, SM

Other

Lyndel I. King, Weisman Art Museum, AM
Diane Mullin, Weisman Art Museum, AM

** Not accepting new students.*

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

Curriculum—Areas of specialization: American art and architecture; Baroque art and architecture; early modern art; East Asian art and Bronze Age archaeology; Greek and Roman art and archaeology; Islamic art and architecture; late Gothic and northern Renaissance art; modern art and theory, including film and photography studies as well as 19th- through 21st-century art; Latin American art and architecture, and South Asian art and architecture.

Prerequisites for Admission—For the M.A. program, a bachelor's degree is required, preferably in art history or a closely related field. Ability and scholarly promise must be demonstrated by a past record of academic excellence. For the Ph.D. program, an M.A. degree in art history or in a field closely related to the chosen area of specialization is required, as well as coursework or other experience indicating substantial background in art historical methods and knowledge.

Special Application Requirements—For the M.A. program, results from the GRE General Test, at least one substantial research paper in art history, and three letters of recommendation from persons well acquainted with the applicant's research and writing skills are required. In addition, M.A. applicants must provide a detailed statement describing previous experience and academic training as related to the projected course of study and academic goals.

For the Ph.D. program, results from the GRE General Test, an M.A. thesis or a minimum of two substantial M.A. papers in art history, and three letters of recommendation from persons well acquainted with the applicant's research and writing skills are required. In addition, Ph.D. applicants must provide a statement describing previous experience and academic training as related to the projected course of study and academic goals. Ph.D. candidates are urged to contact the director of graduate studies before applying.

Applications for the Ph.D. program (if not previously enrolled in the department) and M.A. program are reviewed in December for admission in the fall. For both of these, the application form, statement of purpose, official transcripts, and official GRE scores must reach the Graduate School by late November (contact the Department of Art History for the precise date). Three letters of recommendation and research paper(s) must reach the department by the same deadline. Internal Ph.D. applicants should contact the department for details and deadlines. All applications for financial aid are due on the same date as the applications for admission.

College of Liberal Arts Office of Information Technology Visual Resources Center—The CLA-OIT Visual Resources Center (VRC) is located in 460 Heller Hall. The VRC works with the many departments and centers within CLA to digitize their materials and make them available via an online database (www.dcl.umn.edu). The center also manages art history's approximately 250,000 slides, 100,000 photo archives, and 400 films, with content ranging from the prehistoric to the contemporary, in architecture, sculpture, painting, and other media, from all areas of the world.

Courses—Refer to Art History (ARTH) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx art history courses on the Degree Program Form 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. 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, Latin American, 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* (PDF) 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 6 courses) must be in an area of primary concentration within art history, while a minimum of 9 credits (about 3 courses) must be in an area of secondary concentration in art history. In addition, at least 6 credits (about 2 courses) must be outside the field of art history in the minor or supporting program beyond work done at the M.A. level; a minimum of 12 credits in a minor or supporting field is required.

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 (612-625-6534; fax 612-624-5513; alcmdgs@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. Waltner, 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
Guriqbal 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, 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

The Ph.D. requires 53 credits plus 24 thesis credits (toward the Ph.D. dissertation). See program Web site at www.all.umn.edu/graduate/index.htm for details.

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 (612-624-4811; 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
Shaul Hanany, Physics, ASM
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
Yong-zhong Qian, Physics, ASM
Lawrence Rudnick, SM
Evan D. Skillman, SM
Charles E. Woodward, SM
Paul R. Woodward, SM
John R. Wygant, Physics, ASM

Associate Professor

Alexander Heger, ASM
Marco Pelose, ASM
Liliya L. R. Williams, SM

Adjunct Associate Professor

Kim A. Venn, ASM

Assistant Professor

Vuk Mandic, ASM

Along with the program-specific requirements listed below, 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, 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 five percent share in the Large Binocular Telescope (LBT) on Mount Graham in southeastern Arizona. The LBT is currently completing commissioning 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 Mount 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 Mount 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 Minnesota Supercomputing Institute 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; Arecibo 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 or in Twin Cities Courses on the University Catalog Web site 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

See Speech-Language-Hearing Sciences.

Biochemistry, Molecular Biology, and Biophysics

Contact Information—Director of Graduate Studies, Department of Biochemistry, Molecular Biology, and Biophysics, University of Minnesota, 6-155 Jackson Hall, 321 Church Street S.E., Minneapolis, MN 55455 (612-625-5179; fax 612-625-2163; bmbbgp@umn.edu; www.cbs.umn.edu/bmbb/graduate).

For information on the master's and doctoral degree programs offered in conjunction with the University of Minnesota Duluth, contact the Associate Director of Graduate Studies, Department of Biochemistry and Molecular Biology, University of Minnesota, 251 School of Medicine, 1035 University Drive, Duluth, MN 55812 (218-726-7922).

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

Regents Professor

Lawrence Que Jr., Chemistry, SM

Professor

Matthew T. Andrews, Biology, Duluth, SM
Ian M. Armitage, SM
Leonard J. Banaszak, (emeritus), SM
David A. Bernlohr, SM
Victor A. Bloomfield, SM
Robert J. Brooker, Genetics, Cell Biology and Development, SM
Anath Das, SM
Antony Michael Dean, Biotechnology Institute, SM
Lester R. Drewes, Biochemistry and Molecular Biology, Duluth, SM
James Ervasti, SM
James A. Fuchs, SM
Thomas S. Hays, Genetics, Cell Biology and Development, SM
Eric Hendrickson, SM
Alan B. Hooper, SM
Romas J. Kazlauskas, SM
David C. LaPorte, SM
John D. Lipscomb, SM
Dennis M. Livingston, SM
Kevin H. Mayo, SM
Sharon E. Murphy, SM
Gary L. Nelsestuen, SM
Michael B. O'Connor, Genetics, Cell Biology and Development, SM
Douglas H. Ohlendorf, SM
Harry T. Orr, Laboratory Medicine and Pathology, SM

Joseph R. Prohaska, Biochemistry and Molecular Biology, Duluth, SM
Michael J. Sadowsky, Soil, Water, and Climate, SM
Michel M. Sanders, SM
Janet L. Schottel, SM
Jeffrey A. Simon, Genetics, Cell Biology and Development, SM
David D. Thomas, SM
Howard C. Towle, SM
Brian G. Van Ness, SM
Lawrence P. Wackett, SM
Kendall B. Wallace, Biochemistry and Molecular Biology, Duluth, SM
David A. Zarkower, Genetics, Cell Biology and Development, SM

Associate Professor

Kenneth W. Adolph, SM
Vivian J. Bardwell, Genetics, Cell Biology and Development, SM
Anja K. Bielinsky, SM
Benjamin L. Clarke, Medical Microbiology and Immunology, Duluth, SM
Deborah A. Ferrington, Ophthalmology, SM
Reuben S. Harris, SM
Fumiaki Katagiri, SM
Arkady B. Khodursky, SM
Alex J. Lange, SM
Hiroshi Matsuo, SM
Laura J. Mauro, Animal Science, SM
Lincoln R. Potter, SM
Robert J. Roon, SM
Claudia Schmidt-Dannert, SM
Paul G. Siliciano, SM
Natalia Tretyakova, Pharmacy, SM
Gianluigi Veglia, SM
Kylie J. Walters, SM
Carrie M. Wilmot, SM

Assistant Professor

Hideki Aihara, SM
Grant Anderson, Biochemistry and Molecular Biology, Duluth, SM
Daniel Bond, SM
Robert Cormier, Biochemistry and Molecular Biology, Duluth, SM
Jeffrey A Gralnick, SM
Timothy J. Griffin, SM
Do-Hyung Kim, SM
Burckhard Seelig, SM

Adjunct Instructor

Julio E. Herrera, SM

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

Curriculum—The biochemistry, molecular biology, and biophysics program focuses on an explanation at the molecular level of the structures and processes that occur in living organisms. In the broadest sense, the program encompasses the chemistry, physics, and biology of living systems. Included is the study of the structure and function of biomolecules (proteins, nucleic acids, lipids, and carbohydrates), enzyme catalysis, metabolic pathways, bioenergetics, and the biochemical nature of genetic information storage and transmission, as well as the control, regulation, and integration of these processes. The program has four areas of emphasis: regulatory biochemistry, molecular biology, microbial biotechnology, and molecular biophysics. All students are expected to demonstrate a minimum level of competence in these areas but emphasize that area most related to their thesis project. The program involves faculty from the Department of Biochemistry, Molecular Biology, and Biophysics, as well as many faculty members from several other departments in the College of Biological Sciences, Medical School, Institute of Technology, and College of Veterinary Medicine.

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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is only 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 cr), approved by the director of graduate studies, to meet the minimum requirement of 12 credits total. In extenuating cases, students may petition the director of graduate studies for substitution of a required course.

Bioethics

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

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

Professor

Muriel Bebeau, Preventive Sciences, M
Carl Elliott, Pediatrics, M2
John Eyler, History of Medicine, M
Jasper Hopkins, Philosophy, M

Jeffrey Kahn, Medicine, M
Rosalie Kane, Public Health, M2
Joan Liaschenko, Nursing, M2
Mary Faith Marshall, Medicine, M2
Steven Miles, Medicine, M2
Naomi Scheman, Philosophy, M
Beth Virnig, Health Policy and Management, M
Susan M. Wolf, Law School, M2

Associate Professor

Edward Ratner, Medicine, M
Karen-Sue Taussig, Anthropology, M
Leigh Turner, Center for Bioethics, M2

Assistant Professor

Dianne Bartels, Center for Bioethics, M2
Debra DeBruin, Medicine, M2
John Song, Medicine, M2
Maryam Valapour, Medicine, M2

Curriculum—The Center for Bioethics offers a master's degree and a graduate minor in bioethics. Although bioethics has deep roots in the discipline of philosophy and maintains strong ties to that discipline, it has grown to be an essentially interdisciplinary field. Similarly, over its 20-plus year history, the Center for Bioethics has become a well-established and internationally recognized interdisciplinary center. This truly interdisciplinary approach is endorsed by the University, since the Center is a program that spans the Academic Health Center and interacts throughout the University. The Center's faculty represents a broad array of fields, with backgrounds in philosophy, medicine, nursing, public health, health policy, law, education, family social science, and religious studies. The faculty has expertise in clinical ethics, research ethics, and ethics in health policy. The Center embraces a robust mission of public engagement. Its faculty influences policy nationally and internationally on a number of issues including decision-making at end of life, research on human subjects, ethics and genetic technologies, and public health preparedness.

M.A. Plan A Degree Requirements

Prerequisites for Admission—A bachelor's degree is required for admission. Students are encouraged to link their degree in bioethics to a degree in a related field (either before entering the bioethics M.A. program or at the same time). Given the fundamentally interdisciplinary nature of bioethics, prospective students are advised against viewing the bioethics M.A. as a stand-alone degree that prepares them for career placement. This model prompts students to acquire a firm disciplinary grounding as well as interdisciplinary bioethics expertise—a practice that best prepares students for bioethics-related career placement. Thus, the admissions process will give preference to students who have already earned or are in the process of earning an advanced degree in a related field, although this will not strictly be required for admission.

Special Application Requirements—The M.A. program in bioethics admits students only for matriculation in the fall semester. Applications will begin to be reviewed November 1, with offers of admission being extended on a rolling basis. Preference will be given to early applicants. Applications will close April 30.

Applicants must submit scores from the GRE General Test. LSAT or MCAT scores may be submitted in lieu of GRE scores. Standardized test scores will not be required from applicants who have completed a doctoral-level degree at a U.S. institution of higher learning. Applicants without such a degree but with significant professional experience (e.g. experienced RNs) may petition to have the standardized test requirement waived. Applicants for whom English is a second language should supply TOEFL scores. The Center for Bioethics may also require an interview to verify English fluency. Transcripts of all postsecondary academic work, a personal statement, a writing sample (preferably on a topic in bioethics), a description of research or relevant work experience, a C.V. or résumé, and at least three letters of reference are required.

Use of 4xxx-level Courses—No 4xxx courses may be included in degree programs for the bioethics M.A.

Master's Degree Requirements

Students in this Plan A (thesis-based) master's degree program are required to take at least 20 credits of courses including 9 credits of required courses including one course fulfilling an area requirement, 5 credits of bioethics electives, and 6 credits of electives from a supporting field. A full listing of required courses can be found at www.ahc.umn.edu/bioethics/education/gradprogram/degreq/home.html. A complete list of bioethics courses that can be used to fulfill the elective requirement is available at www.ahc.umn.edu/bioethics/education/completebthx/home.html. A sample list of courses appropriate to the related field requirement can be found at www.ahc.umn.edu/bioethics/prod/groups/ahc/@pub/@ahc/documents/asset/ahc_96014.pdf. Courses fulfilling this requirement must be chosen in consultation with the student's adviser to ensure their appropriateness for the student's course of study. Students may elect a graduate minor to fulfill this requirement. However, students may also elect to take courses from different programs, for example, a health policy course from the School of Public Health and a health law course from the Law School.

Note: Of the 20 total course credits required, at least one BTHX course and at least two courses total are to be taken at the 8xxx level. Thesis credits do not count toward this requirement.

Master's Thesis—Students are also required to complete at least 10 thesis credits and write a thesis. The thesis committee includes two bioethics graduate faculty members and one graduate faculty member outside of Bioethics. The "outside" member of the committee is from the graduate faculty of the minor field, if the student has completed a graduate minor. The final oral for the master's degree is conducted as a closed examination, attended by only the student and the examining committee.

Language Requirements—None

Final Exam—The final exam is oral.

Minor Only Requirements

The Center for Bioethics 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 a 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.

A doctoral student must complete a minimum of 14 graduate credits in bioethics offered outside the major field: 8 credits of required courses and 6 credits of electives. A master's student must complete a minimum of 8 graduate credits in bioethics offered outside the major field: 6 credits of required courses and 2 credits of electives. All students must take BTHX 5010—Bioethics Proseminar and one moral theory course. Courses that satisfy requirements and serve as electives can be found at www.ahc.umn.edu/bioethics/education/graduate/home.html.

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. The form is also available in a PDF of the *Graduate Minor in Bioethics* brochure, at www.ahc.umn.edu/img/assets/23396/grad_minor.pdf. Enrollment is contingent upon approval by the director of graduate studies for bioethics.

Courses—Contact the minor program office or the Center for Bioethics Web site at www.ahc.umn.edu/bioethics/education/graduate/home.html 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.ahc.umn.edu/bioethics/education/graduate/home.html.

Bioinformatics

Minor Only

Contact Information—Graduate Minor Program in Bioinformatics, Institute of Health Informatics, University of Minnesota, MMC 912, 330 Diehl Hall, 505 Essex Street S.E., Minneapolis, MN 55455 (612-625-8440; fax 612-625-7166; www.binf.umn.edu).

For latest graduate faculty listings, see 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
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
Yang Da, Animal Science, M
Scott Fahrenkrug, Animal Science, M
George Karypis, Computer Science, M
Yiannis Kaznessis, Chemical Engineering and Materials Science, M
Arkady Khodursky, Biochemistry, Molecular Biology, and Biophysics, M
Georgiana 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 in advance by 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.

Use of 4xxx Courses—BIOL 4003—Genetics, BIOC 4950—Computer Simulation and Data Analysis in Biochemistry, 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 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.

Biological Science

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

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

Professor

Karen Ashe, AM2
Henry H. Balfour Jr., Laboratory Medicine and Pathology, AM2
Gregory J. Beilman, Surgery, 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
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. Hillmyer, Chemistry, AM2
Ralph W. Holzenthal, Entomology, AM
Christopher N. Honda, Neuroscience. 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, Biochemistry, Molecular Biology and Biophysics, M2
John H. Kersey, Laboratory Medicine and Pathology, AM2
Youngki Kim, Pediatrics, AM2
Richard King, Pediatrics, AM2
Mindy S. Kurzer, Food Science and Nutrition, AM2
David A. Largaespada, Molecular, Cellular, Developmental Biology and Genetics, AM2
Jack L. Lewis, Orthopedic Surgery, AM
Michael Mauer, Pediatrics, M2
Gary L. Nelsestuen, 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, Molecular, Cellular, Developmental Biology and Genetics, M2
Gary A. Reineccius, Food Science and Nutrition, AM2
Michael J. Sadowsky, Soil, Water, and Climate, AM2
Leslie A. Schiff, Microbiology, AM2
Patrick M. Schlievert, Microbiology, AM2
Janet L. Schottel, Biochemistry, Molecular Biology and Biophysics, M2
Michael J. Simmons, Molecular, Cellular, Developmental Biology and Genetics, M2

Joanne L. Slavin, Food Science and Nutrition, AM2
D. Peter Snustad, Plant Biology, M2
George R. Spangler, Fisheries, Wildlife, and Conservation Biology, AM
Friedrich Srienc, Biotechnology Institute, AM2
Clifford J. Steer, Medicine, SM
David Thomas, Biochemistry, Molecular Bology, and Biophysics, M2
Howard Towle, Biochemistry, Molecular Biology, and Biophysics, M2
Daniel A. Vallera, Therapeutic Radiology, AM2
Brian G. Van Ness, Molecular, Cellular, Developmental Biology and Genetics, M2
Lawrence P. Wackett, BioTechnology Institute, M2
Chester B. Whitley, Pediatrics, AM2

Adjunct Professor

Bruce Vondracek, Fisheries, Wildlife, and Conservation Biology, AM2

Associate Professor

Vivian J. Bardwell, Genetics, Cell Biology and Development, M2
Richard W. Bianco, Surgery, AM
Anja K. Bielinsky, Biochemistry, Molecular Biology, and Biophysics, AM
Wei Chen, Pediatrics, AM2
Kathleen F. Conklin, Molecular, Cellular, Developmental Biology and Genetics, M2
Joellen Feirtag, Food Science and Nutrition, AM2
Cheryl A. Gale, Pediatrics, AM2
Craig A. Hassel, Food Science and Nutrition, AM2
Sharon Jansa, Ecology, Evolution and Behavior, M2
Stephen A. Katz, Integrative Biology/ Physiology, AM2
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, AM2
Christopher A. Pennell, Laboratory Medicine and Pathology, AM2
Anna Petryk, Pediatrics, AM2
Mark S. Rutherford, Veterinary and Biomedical Sciences, AM2
Nikunj V. Somia, Molecular, Cellular, Developmental Biology and Genetics, AM2
Peter Southern, Microbiology, AM2
John M. Ward, Plant Biology, M2

Adjunct Associate Professor

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

Assistant Professor

Vincent A. Barnett, Physiology, AM2
Daniel R. Bond, BioTechmology Institute,M2
Susan E. Marino, Experimental/Clinical Pharmacology, AM2
Daniel A. Saltzman, Pediatrics, AM
Sangwon Suh, Bioproducts and Biosystems Engineering, AM2
Lucy Vulchanova, Veterinary and Biomedical Sciences AM2

Adjunct Assistant Professor

Nicole Kirchhof, Veterinary Population Medicine, AM2

Research Associate

Kevin A. Silverstein, Plant Biology, M2

Along with the program-specific requirements listed below, 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. This 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—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 coursework marked with I is completed.

Language Requirements—None.

Final Exam—A capstone project is required.

Biomedical Engineering

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

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

Regents Professor

Robert P. Hebbel, Medicine, SM

Professor

James Ashe, Neuroscience, SM
Roberto Ballarini, Civil Engineering, ASM
Victor H. Barocas, SM
David G. Benditt, Medicine, SM
John C. Bischof, Mechanical Engineering, SM
Wei Chen, Radiology, SM
William K. Durfee, Mechanical Engineering, SM
Emad Ebbini, Electrical and Computer Engineering, SM
Timothy J. Ebner, Neuroscience, SM
Arthur G. Erdman, Mechanical Engineering, SM
Stanley M. Finkelstein, Laboratory Medicine and Pathology, SM
John E. Foker, Surgery, 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, Duluth, SM
Wei-Shou Hu, Chemical Engineering and Materials Science, SM
Kenneth H. Keller, Chemical Engineering and Materials Science, SM
Robert LaPrade, Orthopaedic Surgery, M2
Paul C. Letourneau, Neuroscience, SM
Jack L. Lewis, Orthopaedic Surgery, SM
Keith G. Lurie, Emergency Medicine, M2
James B. McCarthy, Laboratory Medicine and Pathology, SM
Jeffrey McCullough, Laboratory Medicine and Pathology, M2
David Odde, SM
Hans G. Othmer, School of Mathematics, ASM
Dennis L. Polla, Center for the Development of Technological Leadership, SM
Rajesh Rajamani, Mechanical Engineering, ASM
Ronald A. Siegel, Pharmaceutics, SM

Ephraim M. Sparrow, Mechanical Engineering, SM
Doris Taylor, Integrative Biology and Physiology, SM
Gerald Timm, Urological Surgery, ASM
Robert T. Tranquillo, Biomedical Engineering, SM
Charles L. Truwit, Pediatrics, M2
Kamil Ugurbil, Radiology, SM
J. Thomas Vaughan, Radiology, SM
Timothy S. Wiedmann, Pharmaceutics, SM
Jay Zhang, Medicine, SM

Adjunct Professor

Paul A. Iaizzo, Anesthesiology, SM

Associate Professor

Jerome H. Abrams, Surgery, SM
Edgar A. Arriaga, Chemistry, SM
Alan J. Bank, Medicine, M2
Joan E. Bechtold, Orthopaedic Surgery, M2
Michael Bowser, Chemistry, SM
William B. Gleason, Laboratory Medicine and Pathology, SM
James E. Holte, Electrical and Computer Engineering, SM
Allison Hubel, Mechanical Engineering, SM
Susanta K. Hui, Therapeutic Radiology, AM2
Paula Ludewig, Physical Medicine and Rehabilitation, AM2
Greg Metzger, Radiology, ASM
Joachim Mueller, Physics and Astronomy, ASM
Tom Novacheck, Orthopaedic Surgery, AM
A. David Redish, Neuroscience, SM
Michael H. Schwartz, Orthopaedic Surgery, SM
Carl S. Smith, Urologic Surgery, M2

Adjunct Associate Professor

Euisik Yoon, Electrical and Computer Engineering, SM

Assistant Professor

Taner Akkin, Biomedical Engineering, SM
Alptekin Aksan, Mechanical Engineering, ASM
Shai Ashkenazi, Biomedical Engineering, SM
Patrick Bolan, Radiology, AM2
Matthew Chafee, Neuroscience, AM2
Michel Cramer-Bornemann, M.D., Neurology, AM2
Kevin Dorfman, Chemical Engineering and Materials Science, ASM
Geoffrey M. Ghose, Neuroscience, M2
Efrosini Kokkoli, Chemical Engineering and Materials Science, SM
Tay Netoff, Biomedical Engineering, SM
David Nuckley, Physical Therapy, ASM
Sang-Hyun Oh, Electrical and Computer Engineering, ASM
Klearchos K. Papas, Surgery, SM
Osha Roopnarine, Biochemistry, Molecular Biology, and Biophysics, SM
Jonathan N. Sachs, SM
Wei Shen, Biomedical Engineering, SM
Alena Talkachova, Biomedical Engineering, SM
Chun Wang, SM

Along with the program-specific requirements listed below, 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) or 89 (Internet).

Courses—Refer to Biomedical Engineering (BMEN) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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, 5351 or 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 two BMEN core courses (5001, 5101, 5201, 5311, 5351 or 5401), one course with a biological sciences emphasis (may be BMEN 5501), and one course with an engineering emphasis. All courses must be at 5xxx or higher.

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.html.

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
Bruce E. Hammer, Radiology, SM
Patrick Higgins, Therapeutic Radiology, M2
Robert H. Margolis, Otolaryngology, SM
Scott M. O'Grady, Animal Science, SM
Robert P. Patterson, Physical Medicine and Rehabilitation, SM
E. Russell Ritenour, Radiology, SM
Chang W. Song, Therapeutic Radiology, SM
David D. Thomas, Biochemistry, Molecular Biology, and Biophysics, SM
Kamil Ugurbil, Radiology, SM
Daniel A. Vallera, Therapeutic Radiology, M2
Warren J. Warwick, Pediatrics, SM

Associate Professor

Parham Alaei, Therapeutic Radiology, M2
Alan J. Bank, Medicine, M2
James E. Holte, Electrical Engineering, SM
Susanta K. Hui, Therapeutic Radiology, M2
Yoichi Wantanabe, Therapeutic Radiology, M2
Richard S. Ziegler, Pediatrics, M2

Adjunct Associate Professor

Richard A. Geise, Radiology, ASM

Assistant Professor

Vincent A. Barnett, Physiology, M2
Erik Cressman, Radiology, M2
Yuriy Nesmelov, Biochemistry, Molecular Biology, and Biophysics, M2
Osha Roopnarine, Biochemistry, Molecular Biology, and Biophysics, M2
Essa S. Yacoub, Radiology, M2
Jie Zhang, Radiology, M2

Assistant Professor

Thomas Odea, Radiology, M2

Senior Research Associate

David H. Live, Biochemistry, Molecular Biology, and Biophysics, M2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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, (with project). Plan A is considered suitable for students with full-time employment whose thesis can be related to their work assignments. Plan B is more suitable for students planning to work in government or hospital settings where technical knowledge is more germane than research experience. Plan B students complete a project under the direction of a faculty member and present the work to their faculty committee in an oral exam. A total of 30 credits is required, including 14 in the major and 6 in a related field or minor.

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.

Bioproducts and Biosystems Science Engineering and Management

Contact Information—Director of Graduate Studies, Department of Bioproducts and Biosystems Engineering, University of Minnesota, 1390 Eckles Avenue, Saint Paul, MN 55108-6005 (612-625-7733; fax 612-624-3005; bbe@umn.edu; www.bbe.umn.edu).

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

Professor

Mrinal Bhattacharya, SM
Charles J. Clanton, SM
Philip R. Goodrich, 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
Shri Ramaswamy, SM
Rongsheng R. Ruan, SM
Simo Sarkanen, SM
William F. Wilcke, SM
Bruce N. Wilson, SM

Adjunct Professor

John M. Shutske, University of Wisconsin-Madison, SM

Associate Professor

James J. Boedicker, M2
Jonathan Chaplin, SM
Philip R. Goodrich, SM
Patrick Huelman, M
Gary R. Sands, SM
Steve J. Severtson, SM
Tim Smith, SM
Sangwon Suh, SM
Ulrike W. Tschirner, SM
Ping Wang, SM
Jun Zhu, SM

Assistant Professor

Mindy L. Erickson, AM2
Harlan D. Petersen, M
Jonathan Schilling, SM
Sangwon Suh, SM
William Tze, SM

Research Associate

Robert T. Seavey, M

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

Curriculum—The bioproducts and biosystems science engineering and management (BBSEM) graduate program provides a strong foundation in the basic sciences, engineering and management

in support of the renewable bio-resources utilization, environmental quality, and national security while improving our global competitiveness. The areas of specialization include bioproducts science and engineering, biosystems science and engineering, and bioproducts marketing and management. Bioproducts science and engineering specialization focuses on the fundamental science and engineering of the various manufacturing processes used in the sustainable conversion of the biomass into bio-based industrial and consumer products and their effective end-use applications. Bioproducts include "green" materials, chemicals and energy derived from bio-resources including biofuels, bioenergy, biocomposites, bio-based plastics, adhesives, pulp and paper, building materials and more. Biosystems science and engineering specialization is designed for students who seek to develop a strong foundation in physical sciences and engineering principles which are applied to important problems involving biological systems. Potential areas of interest include water and soil management and protection; livestock environment; food engineering and value-added processing; machinery systems design; grain quality; safety, health, and risk management; renewable energy systems; and waste management. Bioproducts marketing and management specialization is designed for graduate students who seek to build on a strong diverse background encompassing liberal arts, basic sciences, communications and product development, and marketing and management of bioproducts.

Prerequisites for Admission—The BBSEM graduate program offer's master's (M.S.B.B.S.E.M. Plan A and Plan B) and doctorate (Ph.D) degrees. Students seeking a graduate degree should have a bachelor's degree in engineering, mathematics or the physical or biological sciences, or a related field from a recognized U.S. or international university. Applicants should have a preferred performance level of at least a 3.00 grade point average (on a 4.00 grading scale). Students having lower grade point averages may be admitted subject to review and approval by the graduate program committee and meeting prior conditions agreed upon by the adviser, student, and the graduate program committee. Students planning to work toward the Ph.D. may apply to the M.S.B.B.S.E.M. program and earn a master's degree on the way to earning the Ph.D, or may apply directly to the Ph.D. program.

Special Application Requirements—The Graduate Records Examination (GRE) is not required, but GRE scores are highly recommended for students who have degrees from institutions outside the United States, or have a low GPA. The GRE is required for consideration of graduate fellowships. Students are admitted each semester.

Courses—Refer to Bioproducts and Biosystems Engineering (BBE) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

M.S.B.B.S.E.M. 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 for master's degree. Major field is defined as subject areas directly in the area of study. Plan A students must take an additional 10 thesis credits (BBE 8777). Plan B is similar to the Plan A except that instead of completing a major research project and writing a thesis, students complete a smaller project or projects that involve a total of about 120 hours of work and write Plan B papers on their projects. Plan B students take 20 course credits plus 10 credits in areas agreed upon by the adviser and graduate faculty. The program of study with detailed coursework plan must be approved by the director of graduate studies and selected faculty member(s) from graduate program committee.

Language Requirements—None.

Final Exam—Students must present a public 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

The Ph.D. in bioproducts and biosystems science engineering and management requires extended study and intense intellectual effort conducting cutting edge research and advancing the forefront of knowledge in the subject matter area. Students develop skills that enable them to define problems or research questions, plan research, conduct independent research and/or lead research efforts, analyze data, and effectively communicate research results to a variety of audiences. All Ph.D. degree programs must include a minimum of 45 graduate course credits beyond the B.S. degree and a minimum of 24 doctoral thesis credits (BBE 8888). A minimum of 12 course credits must be in a minor field or in a supporting program. Ph.D. degree programs should contain a minimum of 9 course credits in a concentrated area of scientific or mathematical theoretical development that is related to the student's research.

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.

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; sph-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

Adjunct Professor

Daniel J. Sargent, AM2
Jeffrey A. Sloan, AM2

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 Mugglin, M2
Cavan S. Reilly, SM
William Thomas, M2
Melanie M. Wall, SM

Assistant Professor

Saonli Basu, M2
Tracy L. Bergemann, M2
Susan Duval, AM2
Hongfei Guo, M2
Na Li, M2
Xianghua Luo, M2
Richard Maclehose M2
David B. Nelson, M2
Kyle Rudser, M2
Baolin Wu, M2

Adjunct Assistant Professor

Karla Ballman, AM2
Judith A. Punyko, AM2

Research Associate

Katherine Huppler Hullsiek, M2
Robert E. Leduc, M2

Along with the program-specific requirements listed below, 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/pro.

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 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 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 in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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 seven core courses (including mathematical statistics, linear models, probability models, and Bayesian methodology) and three elective courses in biostatistical theory and methods, a preliminary written examination on the material from some of the required courses, a preliminary oral examination, a written dissertation, and dissertation defense in a final oral examination. This usually requires three years of full-time study after the M.S. degree.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A masters minor for students majoring in statistics consists of two required courses, PUBH 7420 and 7450, and a choice of two courses from the following: PUBH 7455, 8442, 8452, 8462, 8472, 8482.

A doctoral minor for students in programs other than statistics consists of two required courses: either PUBH 7401, PUBH 7402, or PUBH 7405, PUBH 7406; 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

See Bioproducts and Biosystems Science Engineering and Management.

Business Administration

Contact Information—Ph.D. Program in Business Administration, Carlson School of Management, Suite 4-205, 321 19th Avenue South, University of Minnesota, Minneapolis, MN 55455 (612-624-0875 or 612-624-5065; fax 612-624-8221; brons003@umn.edu; www.carlsonschool.umn.edu/Pag4497.aspx).

Master of Business Administration—Graduate School students who wish to take MBA courses must contact the Carlson School of Management MBA Office, 1-110 Carlson School of Management, Minneapolis, MN 55455 (612-625-5555; fax 612-626-7785).

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

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, ASM
Mark E. Bergen, Marketing and Logistics Management, SM
Norman E. Bowie, Strategic Management and Organization, SM
John H. Boyd, Finance, 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, (emeritus), Information and Decision Sciences, ASM
W. Bruce Erickson, Strategic Management and Organization, SM
Murray Z. Frank, Finance, SM
Frank B. Gigler, Accounting, SM
Robert Goldstein, Finance, SM
Alok Gupta, Information and Decision Sciences, SM
Arthur V. Hill, Operations and Management Science, 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
Barbara J. Loken, Marketing and Logistics Management, SM
Erzo Luttmer, 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. Nachtsheim, Operations and Management Science, SM
Timothy J. Nantell, Finance, SM
Mary L. Nichols, Strategic Management and Organization, SM
Akshay 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 Zaheer, Strategic Management and Organization, SM
Srilata Zaheer, Strategic Management and Organization, SM
Shaker A. Zahra, Strategic Management and Organization, SM
Mahmood A. Zaidi, Human Resources and Industrial Relations, ASM

Associate Professor

Gediminas Adomavicius, Information and Decision Sciences, SM
Rajesh K. Aggarwal, Finance, SM
Rohini Ahluwalia, Marketing and Logistics Management, SM
Stuart Albert, Strategic Management and Organization, SM
Ravi Bapna, Information and Decision Sciences, SM
Karen L. Donohue, Operations and Management Science, SM
Gordon L. Duke, Accounting, SM
Susan Meyer Goldstein, Operations and Management Science, SM
Zhaoyang Gu, Accounting, SM
Robert A. Hansen, Marketing and Logistics Management, SM
William Li, Operations and Management Science, SM
Kevin Linderman, Operations and Management Science, SM
Om Narasimhan, Marketing and Logistics Management, SM
Stephen T. Parente, Finance, SM
Paul E. M. Povel, Finance, SM
M. Johnny 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
Paul Vaaler, Strategic Management and Organization, SM
Kathleen D. Vohs, Marketing and Logistics Management, SM
Mary E. Zellmer-Bruhn, Strategic Management and Organization, SM

Assistant Professor

Santiago Bazdreshh, Finance, M2
Frederico Belo, Finance, M2
Tony H. Cui, Marketing and Logistics Management, M2
Mingcherng Deng, Accounting, MS
Jane E. Ebert, Marketing and Logistics Management, M2
Daniel Forbes, Strategic Management and Organization, M2
Clayton Forester, Accounting, M2
Yu Gao, Accounting, M2
Jeremy Graveline, Finance, M2
Vladas Griskevicius, Marketing and Logistics Management, M2
Thomas Issaevitch, Accounting, M2
Sophie LeRoy, Strategic Management and Organization, M2
Arik Lifschitz, Strategic Management and Organization, M2
Felix Meschke, Finance, M2
Prokriti Mukherji, Marketing and Logistics Management, M2
Gautam Ray, Information and Decision Sciences, M2
Joseph Redden, Marketing and Logistics Management, M2
Yuqing Ren, Information and Decision Sciences, M2
Doriana Ruffino, Finance, M2
Rachna Shah, Operations and Management Science, M2
Enno Siemson, Operations and Management Science, M2
Gurneeta V. Singh, Strategic Management and Organization, M2
P. K. Toh, Strategic Management and Organization, M2
Carlos Torelli, Marketing and Logistics Management, M2
Yue T. Wang, Finance, M2
Jianfeng Yu, Finance, M2`
Ivy Zhang, Accounting, M2

Lecturer

Gary W. Carter, AM2
James M. Gahlon, AM2
Thomas D. Legg, AM2
Terry Tranter, AM2

Along with the program-specific requirements listed below, 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 to the Carlson School Ph.D. Program Office the following items: 1) one copy of the Graduate School application (downloaded from the ApplyYourself online application system); 2) official copies of the GMAT or GRE scores taken no more than five years prior to application to the Ph.D. Program Office; and 3) official TOEFL or IELTS scores (international applicants only). All other application materials (official application, application fee, statement of purpose, and three letters of recommendation should be sent directly to the Graduate School through the ApplyYourself online application system. Applicants also need to have official transcripts submitted to the Graduate School from each college or university they have attended. Doctoral study begins in fall semester only. The 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); Management (MGMT); Marketing (MKTG); and Operations and Management Science (OMS) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 minimum 40 semester credits of graduate coursework. All areas require a written and oral examination at the end of the second year, as well as a research paper requirement and dissertation proposal defense.

Accounting—This area of concentration requires a minimum of 12 credits from accounting Ph.D. seminars and a total of at least 40 credits of degree program coursework. Students may take a minimum of 16 credits in a minor area outside the Carlson School of Management, or at least 16 credits in supporting programs taken across fields relevant to their research interests, e.g., finance, economics, statistics, or psychology.

Finance—Finance is viewed as a field of applied economics. Students achieve a strong foundation in economic theory and empirical methods, while taking finance seminars and supporting/methods coursework. A minimum of 40 degree credits are required to move to the prelim stage. 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 complete its Ph.D. seminars (at least 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 six 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 cr), which must include one course from each of three areas (strategy, organization studies, ethics-international management-entrepreneurship), plus all remaining Ph.D. seminars in the student's area of specialization (strategy, organization studies, etc.). 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 cr), 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, 3-110 Carlson School of Management, Minneapolis, MN 55455 (612-624-7511; fax 612-626-7795; mbt@umn.edu; www.carlsonschool.umn.edu/mbt).

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

Lecturer

Gary W. Carter, M2
Paul G. Gutterman, M2
Mark Sellner, M2

Along with the program-specific requirements listed below, 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); Economics (ECON); Finance (FINA); Information and Decision Sciences (IDSC); . Management (MGMT); Marketing (MKTG); Master of Business Taxation (MBT); and Operations and Management Science (OMS) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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; http://physiology.med.umn.edu/grad/index.html).

Additional information concerning the Duluth campus is available by contacting the Associate Director of Graduate Studies, Department of Physiology and Pharmacology, University of Minnesota, 308 and 345 School of Medicine, 1035 University Drive, Duluth, MN 55812 (phsl@d.umn.edu; www.med.umn.edu/duluth/about/Phys_Pharm/graduatePHSL.html as well as www.ahc.umn.edu/duluth/programs).

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
Robert J. Bache, ASM
David A. Bernlohr, Biochemistry, Molecular Biology, and Biophysics, ASM
Peter B. Bitterman, Medicine, ASM
Frank B. Cerra, Surgery, ASM
William C. Engeland, Surgery, ASM
John E. Foker, Surgery, ASM
Daniel J. Garry, SM
Goran B. Hellekant, Medical School Duluth, SM
Lois J. Heller, Medical School Duluth, SM
Paul A. Iaizzo, 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
Joseph M. Metzger, SM
Scott M. O'Grady, Animal Science, SM
John W. Osborn, Integrative Biology and Physiology, SM
Doris A. Taylor, Integrative Biology and Physiology, SM
LaDora V. Thompson, Physical Medicine and Rehabilitation, SM
Gerald W. Timm, 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. Fitzakerley, 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
Lorentz 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, 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 physiology of membranes, cells, transport, and organ systems. Individualized programs are structured to build on the student's strengths and to fill in gaps that would otherwise be an impediment to specific problem solving. Teaching experience is also available to all students.

The graduate programs in the Twin Cities have a cardiovascular emphasis, although other areas of specialization are represented.

Students enter the M.S. program from one of two sites. On the Duluth campus, students can enroll in coursework and participate in research in several basic areas. The Twin Cities campus has a 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 can enter the Ph.D. program from the Twin Cities or Duluth campus. Highly qualified individuals with solid quantitative backgrounds are encouraged to apply. In the Twin Cities, prospective students also 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.

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. The graduate program's Web site (above) contains step by step application instructions.

Courses—Refer to Physiology (PHSL) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 (with approval by the director of graduate studies).

Ph.D. Degree Requirements

The Ph.D. program requires courses in cellular physiology and medical physiology. 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, choose an adviser, and begin a research project. A preliminary written exam in physiology is given after the first year and examines the ability of the student to apply concepts learned in core courses. A preliminary oral exam is given at the end of the second year and tests the student's ability to apply principles of both physiology and the minor or supporting program to a proposed research based thesis. A minimum of 12 credits must be completed in the minor field or supporting program.

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. Approval is required by the director of graduate studies.

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
Lanny D. Schmidt, SM

Professor

Eray S. Aydil, SM
Roberto Ballarini, Civil Engineering, ASM
Victor H. Barocas, Biomedical Engineering, ASM
Raul Caretta, SM
Edward L. Cussler, SM
Prodromos 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
Wei-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
David A. Shores, SM
Ronald A. Siegel, Pharmacy, ASM
J. Ilja Siepmann, Chemistry ASM
William H. Smyrl, SM
Friedrich Srienc, SM
Robert T. Tranquillo, SM
Michael Tsapatsis, SM
Renata M. Wentzcovitch, SM

Associate Professor

Marcio D. Carvalho, ASM
Yiannis Kaznessis, SM
Satish Kumar, SM
Christopher Leighton, SM
David C. Morse, SM
Claudia Schmidt-Dannert, Biochemistry, Molecular Biology, and Biophysics, ASM
Beth Stadler, Electrical and Computer Engineering, ASM

Assistant Professor

Aditya Bhan, SM
Matteo Cococcioni, SM
Kevin D. Dorfman, SM
Russell J. Holmes, SM
Efrosini Kokkoli, SM
K. Andre Mkhoyan, SM
Chun Wang, Biomedical Engineering, ASM

Research Associate

Greg D. Haugstad, Characterization Facility, AM

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

Curriculum—Research activities are broadly organized in the areas of theory and computation; reaction engineering and chemical process synthesis; biotechnology and bioengineering; polymers; ceramics and metals; electronic and magnetic materials; and coating processes and interfacial engineering.

The graduate courses offered cover core areas of chemical engineering (fluid mechanics, applied mathematics: linear and nonlinear analysis, transport, chemical thermodynamics, statistical thermodynamics and kinetics, and analysis of chemical reactors) and core areas of materials science (structure and symmetry of materials, thermodynamics and kinetics, electronic properties of materials, and mechanical properties of materials). In addition, several specialized topics are offered, including biochemical engineering, biological transport processes, food processing technology, colloids, principles of mass transfer in engineering and biological engineering, rheology, coating process fundamentals, process control, finite elements methods of computer-aided analysis, ceramics, polymers, materials design and performance, materials processing, corrosion, introduction to polymer chemistry, polymer laboratory, contact and fracture properties of materials, electron microscopy, thin films and interfaces, composites, electrochemical engineering, physical chemistry of polymers, solid state reaction kinetics, electronic structure of materials, electronic properties and applications of organic materials, electronic ceramics, dislocations and interfaces, epitaxial thin film growth, and science of porous media.

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 adviser 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 560 (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 Supercomputing Institute for Advanced Computational Research, 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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 CHEN or MATS 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 master's in engineering degree is designed for employees of local industries who wish to pursue their studies part-time. 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; chmapply@umn.edu; www.chem.umn.edu/chemphys).

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

Regents Professor

Allen M. Goldman, Physics, SM
Lanny D. Schmidt, Chemical Engineering and Materials Science, SM
Donald G. Truhlar, Chemistry, SM

Professor

Christopher J. Cramer, Chemistry, SM
David M. Ferguson, Medicinal Chemistry, Pharmacognosy, SM
C. Daniel Frisbie, Chemical Engineering and Materials Science, SM
Jiali Gao, Chemistry, 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. Ilja Siepmann, Chemistry, SM
David D. Thomas, Biochemistry, SM
Renata M. Wentzcovitch, Chemical Engineering and Materials Science, SM
Xiaoyang Zhu, Chemistry, SM

Associate Professor

David A. Blank, Chemistry, SM
Philippe Bühlmann, 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

Kevin D. Dorfman, Chemical Engineering and Materials Science, SM
Christy L. Haynes, Chemistry, SM
Aaron M. Massari, Chemistry, SM

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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. Degree Requirements

The M.S. degree offered under Plan A (with thesis) requires at least 20 course credits and 10 thesis credits. M.S. Plan B requires 30 course credits, which would include 8 credits for the two Plan B project courses. The course credits must include at least 6 credits each in chemistry and physics or at least 3 credits each in quantum mechanics, thermodynamics, and statistical mechanics.

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; chmapply@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
Lawrence Que Jr., 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
Gunda Georg, Medicinal Chemistry, ASM
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
Alon V. McCormick, Chemical Engineering and Materials Science, ASM
Wayland E. Noland, SM
David J. Norris, Chemical Engineering and Materials Science, ASM
Jeffrey T. Roberts, SM
J. Ilja Siepmann, 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
R. Lee Penn, SM
T. Andrew Taton, SM
Gianluigi Veglia, SM
Darrin M. York, SM

Assistant Professor

Christopher J. Douglas, SM
Andrew M. Harned, SM
Christy L. Haynes, SM
Aaron M. Massari, SM
Valerie C. Pierre, SM

Along with the program-specific requirements listed below, 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.

Proficiency Examinations—Students in the Ph.D. program are expected to pass four of five proficiency examinations during their first year in residence. The exams, which are at the level of an advanced undergraduate course, are in analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, and physical chemistry. The exams are given during the chemistry first-year orientation program in August. In the event that a student does not pass the first exam, they are offered two more times during the academic year.

Courses—Refer to Chemistry (CHEM) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 project courses.

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/icd).

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
Xiaojia Ge, SM
Michael K. Georgieff, Pediatrics, SM
Harold D. Grotevant, Family Social Science, AM2
Susan C. Hupp, Educational Psychology, AM2
William Iacono, Psychology, ASM
Michael P. Maratsos, SM
Ann S. Masten, SM
Scott R. McConnell, Educational Psychology, AM2
Herbert L. Pick Jr., SM
Arthur J. Reynolds, SM
Maria D. Sera, SM
Elsa G. Shapiro, Pediatrics, AM2
Jeffry A. Simpson, Psychology, AM2
L. Alan Sroufe, SM
Richard A. Weinberg, SM
Albert Yonas, SM
Steven R. Yussen, SM
Philip David Zelazo, SM

Associate Professor

Stephanie M. Carlson, SM
Canan Karatekin, SM
Monica Luciana, Psychology, ASM
Kathleen Thomas, SM

Assistant Professor

Abigail Gewirtz, SM
Melissa Koenig, M2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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 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, 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; civesgs@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. Brezonik, SM
Steven L. Crouch, SM
Gary A. Davis, SM
Emmanuel M. Detournay, SM
Andrew Drescher, SM
Efi 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
Chris Paola, Geology and Geophysics, ASM
Arturo E. Schultz, SM
Michael J. Semmens, SM
Carol K. Shield, SM
Fotis Sotiropoulos, SM
Heinz G. Stefan, SM
Henryk K. Stolarski, SM
Otto D. L. Strack, SM
Vaughan R. Voller, SM
Bruce N. Wilson, Bioproducts and Biosystems Engineering, AM2

Adjunct Professor

Peter A. Cundall, ASM

Associate Professor

William A. Arnold, SM
Randal J. Barnes, SM
Bojan B. Guzina, SM
Raymond M. Hozalski, SM
Gerald Johnson, M2
Lev Khazanovich, SM
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

Jason Cao, Public Affairs, AM2
Nikolas Geroliminis, SM
Kimberly Hill, SM
Henry Liu, SM
Julian Marshall, SM
Dylan B. Millet, Soil, Water, and Climate, AM2
Taichiro Okazaki, SM
Sangwon Suh, Bioproducts and Biosystems Engineering, AM2
Brandy M Toner, Soil, Water, and Climate, AM2
Steven F. Wojtkiewicz, SM

Adjunct Assistant Professor

Paul D. Capel, AM2

Senior Research Associate

John Hourdos, AM2
Sofia G. Mogilevskaya, ASM
Omid Mohseni, AM2
Eugene Skok, AM2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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 cr); 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

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; cnes@umn.edu; http://cnes.cla.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. Roetzel, 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

Spencer Cole, M2
Andrew Gallia, History, AM2
Alex Jassen, M2

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

Curriculum—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—In addition to the online Graduate School application, applicants must send directly to the Department of Classical and Near Eastern Studies the department application (available on the department Web site); other supporting materials, including recommendations and a writing sample, can be uploaded directly into the Graduate School's online application. For nonnative speakers of English, a copy of 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 (application deadline: January 4).

Courses—Refer to Akkadian (AKKA), Aramaic (ARM), Classical and Near Eastern Studies (CNES), Coptic (COPT), Greek (GRK), Hebrew (HEBR), Latin (LAT), Religious Studies (RELS), and Sumerian (SUM) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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, 31 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.

Ancient and Medieval Art and Archaeology Track—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 60 credits, including at least 21 credits in the major, 12 in a supporting program, and 24 thesis credits.

Language Requirements—Reading proficiency in German and in a second modern research language as appropriate (usually French), and research knowledge of an ancient language are required.

Minor Requirements for Students Majoring in Other Fields—Students must complete CNES 5794, as well as 12 credits in graduate art/archaeology courses with a CNES designator.

Classics 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 44 credits (including 10 thesis credits), and for Plan B, 34 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 6 credits in graduate-level Latin courses (excluding LAT 8120) and 6 credits in graduate-level Greek courses (excluding GRK 8120).

Classics Track—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 credits or Plan B paper credits. A typical Ph.D. program is at least 71 credits, including at least 35 credits in the major, 12 in the supporting program, and 24 thesis credits.

Language Requirements—German, plus another modern language, preferably French or Italian, and proficiency in reading Greek

and Latin as demonstrated by a department exam based on a set reading list is required.

Minor Requirements for Students Majoring in Other Fields—Students must complete CNES 5794, as well as 9 graduate credits of Greek or Latin (excluding GRK/LAT 8120) and 6 graduate credits in the other language (excluding LAT 8120).

Greek 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 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).

Greek Track—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 at least 70 credits, including at least 15 credits in Greek, 15 credits in the supporting program, and 24 thesis credits.

Language Requirements—German and a second modern language, preferably French or Italian, and reading proficiency in ancient Greek as demonstrated by a department exam based on a set reading list is required.

Minor Requirements for Students Majoring in Other Fields—Students must complete CNES 5794, as well as 15 graduate credits in Greek (excluding GRK 8120).

Latin 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 German or French or Italian, and reading proficiency in Latin as demonstrated by a department exam based on a set reading list is required.

Final Exam—The final exams are written (Latin reading proficiency) and oral (general).

Minor Requirements for Students Majoring in Other Fields—Students must complete CNES 5794, as well as 9 graduate credits of Latin (excluding LAT 8120).

Latin Track—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 at least 70 credits, including at least 15 credits in Latin, 15 credits in the supporting program, and 24 thesis credits.

Language Requirements—German and a second modern research language, normally French or Italian, and reading proficiency in Latin as demonstrated by a department exam based on a set reading list is required.

Minor Requirements for Students Majoring in Other Fields—Students must complete CNES 5794 and 15 graduate credits of Latin (excluding LAT 8120).

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 28 credits in the major, 6 credits in a related field, plus 10 thesis credits. The Plan B requires 28 credits in the major plus 6 credits in a related field.

Language Requirements—Proficiency in one modern language (normally German) and master's-level proficiency in classical Hebrew, Greek, or Latin as demonstrated by a department exam based on a set reading list is required.

Final Exam—The final exams are written (ancient language reading proficiency) and oral (general).

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 (612-625-8952; 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
Ronald R Jemmerson, Microbiology, M2
Marc K. Jenkins, Microbiology, 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. Nelsestuen, Biochemistry, M2
Gundu H. R. Rao, Laboratory Medicine and Pathology, M2
Jagdev M. Sharma, Veterinary and Biomedical Sciences, M2
Amy P. Skubitz, Laboratory Medicine and Pathology, M2
Michael Y. Tsai, Laboratory Medicine and Pathology, M2
Daniel A. Vallera, Therapeutic Radiology, M2
Carol L. Wells, Laboratory Medicine and Pathology, M2
Michael J. Wilson, Laboratory Medicine and Pathology, M2

Associate Professor

Angela Panoskaltsis-Mortari, Pediatrics, M2
William R. Swaim, Laboratory Medicine and Pathology, M2

Assistant Professor

Connie J. Gebhart, Veterinary and Biomedical Sciences, M2
Timothy C. Hallstrom, Laboratory Medicine and Pathology, M2
Keli L. Hippen, Laboratory Medicine and Pathology, M2
Michael R. Verneris, Pediatrics, M2

Along with the program-specific requirements listed below, 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, medical technology, or M.D. 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.

Courses—See Clinical Laboratory Science (CLS) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—The program accepts CLSP 4xxx courses when cross-listed with CLS 5xxx courses and approved by the adviser and/or director of graduate studies, (e.g., CLSP 4102 and 4103—Diagnostics Microbiology: Lecture and Lab). However, credit will not be granted if the CLS equivalent of these CLSP 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, basic science undergraduate, or M.D. fellow 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
Donna Z. Bliss, Nursing, M2
Hanna Bloomfield, Medicine, M2
Linda J. Burns, Medicine, M2
Jay Cohn, Medicine, M2
Allan J. Collins, Medicine, M2
Daniel Duprez, Medicine, M2
Maurice Dysken, Psychiatry, M2
Kristine E. Ensrud, Medicine, M2
Michael Garwood, Radiology, M2
Richard H. Grimm, Medicine, M2
Dorothy Hatsukami, Psychiatry, M2
Bernhard J. Hering, Surgery, M2
James R. Johnson, Medicine, M2
Jeffrey Kahn, Bioethics, M2
Frank Lederle, Medicine, M2
Russell V. Luepker, Epidemiology and Community Health, M2
Robert Madoff, Surgery, M2
Philip McGlave, Medicine, M2
Jeffrey S. Miller, Medicine, M2
Antoinette Moran, Pediatrics, M2
Jim D. Neaton, Biostatistics, M2
Joseph Neglia, Pediatrics, M2
Dennis Niewoehner, Medicine, M2
Mark S. Paller, Medicine, M2
Bruce A. Peterson, Medicine, M2
Julie Ross, Pediatrics, M2
David Rothenberger, Surgery, 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
Douglas Yee, Medicine, M2

Associate Professor

K. Scott Baker, Pediatrics, M2
Paul Bohjanen, Microbiology, M2
Tracie C. Collins, Medicine, M2
Patricia Fontaine Conboy, Family Medicine and Community Health, M2
Edward W. Greeno, Medicine, M2
Pankaj Gupta, Medicine, M2
Alan T. Hirsch, Medicine, M2
Hassan N. Ibrahim, Medicine, M2
Mike T. John, Diagnostic/Biological Sciences, M2
Robert Kratzke, Medicine, M2
Anna Petryk, Pediatrics, M2
Julia Steinberger, Pediatrics, M2
Marie E. Steiner, Pediatrics, M2
John William Thomas, Biostatistics, M2
Todd Tuttle, Surgery, M2
Beth A. Virnig, Health Policy/Management, M2

Assistant Professor

Alan K. Berger, Medicine, M2
Susan J. Duval, Epidemiology and Community Health, M2
Steven S. Fu, Medicine, M2
Ajay Israni, Epidemiology and Community Health, M2
Carolyn Torkelson, Family Medicine and Community Health, M2
Timothy P. Whelan, Medicine, M2
Mark W. Yeazel, Family Medicine and Community Health, M2

Senior Research Associate

John O. Look, Developmental/Surgical Sciences, M2

Other

Jasjit Ahluwalia, Medicine, M2
MaryJo Kreitzer, Center for Spirituality and Healing, M2

Along with the program-specific requirements listed below, 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 may be better 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.N.P., D.C., 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 nonnative 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) Students who have taken the MELAB 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 from 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 major coordinator at epichstu@umn.edu 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/cr/home.html for courses pertaining to the program.

Use of 4xxx 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 38 credits, including 3 elective credits and 10 thesis credits. Coursework in clinical research, biostatistics, epidemiology, clinical trials, grant writing, and ethics are required. 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 epichstu@umn.edu.

Cognitive Science

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.

Regents Professor

Apostolos Georgopoulos, Neuroscience, SM

Professor

James Ashe, Neuroscience, ASM
Andrew Elfenbein, English, M2
Maria Gini, Computer Science and Engineering, SM
Jeanette Gundel, Linguistics, SM
Sheng He, Psychology, SM
Paul Johnson, Information and Decision Sciences, SM
Michael Kac, Philosophy, M2
Daniel J. Kersten, Psychology, SM
Gordon Legge, Psychology, SM
Michael P. Maratsos, Child Development, SM
Chad James Marsolek, Psychology, SM
Bruce Overmier, Psychology, SM
Herb Pick, Child Development, SM
Wade Savage, (emeritus), Philosophy, ASM
Maria Sera, Child Development, SM
Dave Stephens, Ecology, Evolution, and Behavior, M2
Albert Yonas, Child Development, SM

Associate Professor

Charles R. Fletcher, Psychology, SM
Jonathan Gewirtz, Psychology, SM
Yuhong Jiang, Psychology, SM
Mary Kennedy, Speech, Language, and Hearing Sciences, M2
David Redish, Neuroscience, M2
Hooi Ling Soh, Linguistics, M2

Adjunct Associate Professor

Celia Wolk Gershenson, Psychology, M2

Assistant Professor

Matthew Chafee, Neuroscience, M2
Peter Hanks, Philosophy, M2
Victoria Interrante, Computer Science and Engineering, M2
Bernard Mettler, Aerospace Engineering and Mechanics, M2
Serguei Pakhomov, Pharmaceutical and Health Care, M2
Paul Schrater, Psychology, M2
William Schuler, Computer Science and Engineering, M2

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

Curriculum—Cognitive science is broadly concerned with integrating contemporary approaches to the study of mind/brain, and with the systems and processes underlying the acquisition and use of knowledge. The coherence of the program lies in its intellectual focus on cognition. This program spans cellular, behavioral, and psychological levels of scientific analysis in the study of cognition in a single unified graduate program. It integrates the diverse content, methods, and perspectives of a number of different disciplines (e.g., anthropology, biology, artificial intelligence, linguistics, neuroscience, philosophy, and psychology) which are concerned with or in some sense inform our understanding of cognition.

Prerequisites for Admission—There are no specific prerequisites for admission. Students admitted normally have a broad undergraduate background that includes some cognitive science courses. Students may also be admitted with an M.A. in a related discipline (e.g. psychology, linguistics, philosophy, computer science), in which case some of their credits from the M.A. may count towards the cognitive science Ph.D.

Special Application Requirements—Applicants must apply through the Graduate School's Apply Now interface. They must

submit a completed Graduate School Application, scores from the GRE, and three letters of recommendation. Applicants wishing to be considered for financial support should apply no later than January 1 of the preceding academic year. Entry is usually in fall semester but may be permitted in other semesters in exceptional cases.

Courses—Refer to Cognitive Science (CGSC) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program. Due to the interdisciplinary nature of the degree, courses from various programs throughout the university are also integrated into the degree program. See www.cogsciphd.umn.edu for a list of relevant courses.

Use of 4xxx Courses—Inclusion of 4xxx courses in degree programs is subject to adviser and director of graduate studies approval.

Ph.D. Requirements

The Ph.D. program trains cognitive scientists to conduct research integrating methodologies and content knowledge from a variety of approaches. In order to ensure an interdisciplinary approach, each student has two coadvisers from the cognitive science graduate faculty, each representing a different discipline from within the cognitive sciences.

The Ph.D. program requires a minimum of 46 credits, in addition to 24 thesis credits. Students are required to take two core courses with a CGSC designator, as well as 9 credits of independent study related to research. Responsible Conduct of Research training is required and is integrated into the two core courses taken by all students.

Other course requirements are distributed among component disciplines and fields. Courses are intended to provide a foundation for the student's research program. Students are expected to conduct two research projects prior to taking their preliminary written exams. A report on the first year research project should be concluded by the first term of the second year. A report on the second year research project should be completed by the second term of the third year. The preliminary written exams will typically be (but are not necessarily) expansions of the first and second year research projects. The two Ph.D. written preliminary projects are expected to be of near publishable quality. As entry into the Ph.D. program assumes no previous graduate work, students who enter the program with an M.A. or other graduate coursework in a cognitive science-related discipline may apply credits from their previous graduate work towards the required 46 credits.

Final Exam—The final exam is oral.

Language Requirements—None

Minor Requirements for Students Majoring in Other Fields—The minor in cognitive science is available to master's (M.A. and M.S.) and doctoral students. Both master's and doctoral minors require the following courses outside the student's major department: CGSC 8001—Proseminar in Cognitive Science and a broad introduction to cognitive sciences, such as *one* of the following: IDSC—8711 Cognitive Science; CGSC—8000 Philosophy of Cognitive Science; PSY 5015—Cognition, Computation and Brain; CGSC—8040 Cognitive Neuroscience.

The master's minor requires a minimum of 8 graduate credits (including the required courses listed above) and 3 credits of additional relevant elective courses. The doctoral minor requires a minimum of 14 graduate credits (including the required courses listed above) and 9 credits of additional relevant elective courses.

Substitutions for required courses are permitted only with prior permission from the director of graduate studies for cognitive science. Elected courses must be taught by faculty in the minor program or be approved in advance by the director of graduate studies for cognitive science. Courses in the student's major department do not count toward the minor.

Communication Disorders

See Speech-Language-Hearing Sciences.

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.

Regents Professor

Elaine Tyler May, ASM

Professor

Donald R. Browne, SM
Karlyn K. Campbell, SM
W. Andrew Collins, ASM
Alan G. Gross, SM
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, SM

Associate Professor

Rosita D. Albert, SM
Richard J. Graff, Writing Studies, ASM
Ronald W. Greene, SM
Susanne M. Jones, SM
Ascan F. Koerner, SM
Laurie Ouellette, SM
Mark Pedelty, ASM
Gilbert Rodman, SM
Catherine Squires, ASM
Mary D. Vavrus, SM
Kirt H. Wilson, SM

Along with the program-specific requirements listed below, 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: interpersonal communication, rhetorical studies, and critical media studies.

Coursework in rhetoric and public discourse studies emphasizes humanistic methods and includes argumentation and persuasion, ethics, rhetorical theory and criticism, and political rhetoric. Students may also pursue special interests in rhetorical philosophies, movements and campaigns, or popular culture and critical theory. The program should be supplemented by coursework outside the department. An understanding of history, political science, sociology, or cultural studies is recommended.

Coursework in interpersonal communication has a social scientific orientation. Most students focus on a subarea such as small group, intercultural, interpersonal communication, or problems (e.g., decision making, conflict resolution). Coursework outside the department is usually concentrated in one or more of the behavioral sciences. Students are expected to develop a command of research techniques and a thorough knowledge of statistics.

Coursework in critical media studies emphasizes qualitative, historical, critical, and empirical methods and includes electronic media studies, feminist media studies, ethnic and racial minorities in media, critical media literacy, political economy of media, popular culture, and media regulation and industries. Coursework outside the department is usually in the

fields of American studies, political science, cultural studies, mass communication, or women's studies.

Prerequisites for Admission—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 or in Twin Cities Courses on the University Catalog Web site 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 3 course credits from a 5xxx or 8xxx course in one of the concentrations other than the student's own, a minimum of 6 course credits in a minor or related fields, and 10 thesis credits. Plan B requires a minimum of 21 course credits in communication studies, including 3 course credits from a 5xxx or 8xxx course in one of the concentrations other than the student's own, a minimum of 6 course credits in a minor or related field, an additional 6 credits in the field of student's choice, and a paper.

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; 6 course credits from a 5xxx or 8xxx course from each of the other concentrations other than the student's own); 24 thesis credits are required.

The program should include 12 credits in research methods relevant for completing the degree and continuing a scholarly career. Under certain circumstances, foreign language courses may be used to satisfy this requirement.

Language Requirements—None.

Comparative and Molecular Biosciences

Contact Information—Director of Graduate Studies, Comparative and Molecular Biosciences Graduate Program, College of Veterinary Medicine, 443VMC, 1365 Gortner Avenue, Saint Paul, MN 55108 (612-626-1948; fax 612-626-2825; cvmmsphd@umn.edu; www.cvm.umn.edu/cmb).

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

Professor

Alvin J. Beitz, 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
Douglas N. Foster, Animal Science, SM
Sagar Goyal, Veterinary Population Medicine, SM
Richard Isaacson, Veterinary and Biomedical Sciences, SM
Mathur S. Kannan, Veterinary and Biomedical Sciences, SM
David Largaespada, Genetics, Cell Biology and Development, SM
Alice A. Larson, Veterinary and Biomedical Sciences, SM
Samuel K. Maheswaran, Veterinary and Biomedical Sciences, SM
Louis Mansky, Diagnostic and Biological Sciences, SM
James R. Mickelson, Veterinary and Biomedical Sciences, SM
Jaime Modiano, Veterinary Clinical Sciences, SM
Thomas W. Molitor, Veterinary Population Medicine, SM
Michael P. Murtaugh, Veterinary and Biomedical Sciences, SM
Scott M. O'Grady, Animal Science, SM
Clifford Steer, Medicine, SM
Stephanie J. Valberg, Veterinary Population Medicine, SM
Robert Washabau, Veterinary Clinical Sciences, SM

Associate Professor

John Collister, Veterinary and Biomedical Sciences, SM
Kay S. Faaberg, Veterinary and Biomedical Sciences, SM
Scott Fahrenkrug, Animal Science, SM
Rueben Harris, Biochemistry, Molecular Biology and Biophysics, SM
Yinduo Ji, Veterinary and Biomedical Sciences, SM
James R. Lokensgard, Medicine, SM
Laura J. Mauro, Animal Science, SM
Elizabeth Pluhar, Veterinary Clinical Sciences, SM
Kent Reed, Veterinary and Biomedical Sciences, SM
Mark S. Rutherford, Veterinary and Biomedical Sciences, SM
Leslie Sharkey, Veterinary Population Medicine, SM
Randall Singer, Veterinary and Biomedical Sciences, 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
Timothy Johnson, Veterinary and Biomedical Scieinces, M2
Kim Mansky, Dentistry, M2
John Ohlfest, Pediatrics, M2
Pratima Pakala, Surgery, M2
Ned Patterson, Veterinary Clinical Sciences, SM
Pam Skinner, Veterinary and Biomedical Sciences, SM
Catherine St. Hill, Veterinary Clinical Sciences, M2
Troy Trumble, Veterinary Population Medicine, M2
Lucy Vulchanova, Veterinary and Biomedical Sciences, M2

Along with the program-specific requirements listed below, 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; Medical School; College of Food, Agricultural and Natural Resource Sciences; and 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. Previous laboratory experience is strongly preferred.

Special Application Requirements—Applicants must submit scores from the GRE General Test, a C.V. 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 1 is required to ensure 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 or in Twin Cities Courses on the University Catalog Web site 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 coursework and laboratory experiences as well as at least 6 course credits in a minor or related field. Students complete a minimum of 20 course credits and 10 thesis credits; the thesis is based on original laboratory research.

Language Requirements—None.

Final Exam—The final exam is written and oral.

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/supporting program courses. Considerable flexibility is available for students in selecting their minor/supporting program courses to construct a program around their own interests and research. Students typically complete 24–30 credits in the major field and 12 credits in a minor or supporting program for a recommended total of 36–42 credits. In addition, 24 thesis credits are required. All students are required to complete a teaching experience.

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.html.

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
Jane Blocker, Art History, ASM
Robert Brown, SM
Cesare Casarino, SM
Keya Ganguly, SM
Leslie Morris, German, Scandinavian, and Dutch, ASM
Thomas Pepper, SM
Simona Sawhney, Asian Languages and Literatures, AM2
Gary Thomas, SM

Assistant Professor

Hisham Bizri, SM
Shaden Tageldin, SM

Along with the program-specific requirements listed below, 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. Check the 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 or in Twin Cities Courses on the University Catalog Web site 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.

Final Exam—The final exams are written and oral.

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

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.html.

Regents Professor

Richard Leppert, SM

Professor

John Archer, SM
Timothy Brennan, SM
Ellen Messer-Davidow, ASM
John Mowitt, SM
Paula Rabinowitz, ASM
Harvey Sarlese, SM
Jochen Schulte-Sasse, German, Scandinavian, and Dutch, SM
Arlene Teraoka, German, Scandinavian, and Dutch, ASM
Jack D. Zipes, German, Scandinavian, and Dutch, ASM

Associate Professor

Jane Blocker, Art History, ASM
Robert Brown Jr., SM
Cesare Casarino, SM
Maria Damon, English, ASM
Keya Ganguly, 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
Shaden Tageldin, SM

Along with the program-specific requirements listed below, 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.

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. 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 or in Twin Cities Courses on the University Catalog 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 credits is required for a master's minor, which must include CSDS 8001 and 8002.

Ph.D. Degree Requirements

The Ph.D. requires 47 graduate credits of coursework as follows: 6 credits of basic seminar (CSDS 8001–8002), 2 credits of CSDS 8902—Methodologies Colloquium, 3 credits of CSDS 8901—Pedagogy of Cultural Studies and Comparative Literature, 24 credits in CSDS courses (with approval of the adviser and the director of graduate studies up to 3 credits of the 24-credit requirement may be taken in the field of the minor or supporting program), and 12 credits (or more, as necessary) to complete a formal minor in another Graduate School program, excluding comparative literature. If a minor is not pursued in another program, the student must complete 12 credits in coursework outside of CSDS, CSCL, or CL courses, in a coherent and complementary program to be approved by the adviser and the director of graduate studies. Overall, the degree should include 12 credits of 8xxx courses (exclusive of CSDS 8001–8002 and 8901). 24 thesis credits are also required.

Language Requirements—Reading knowledge of two foreign languages appropriate to the student's program is required. Language requirement must be completed before taking the preliminary examination.

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

Contact Information—Center for Spirituality and Healing, MMC 505, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-5166; fax 612-626-5280; www.csh.umn.edu).

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

Professor

Linda J. Brady, M
Mary Jo Kreitzer, M
Barbara Leonard, M
Ruth A. Lindquist, M
Pamela J. Schreiner, M
Marilyn Speedie, M
Mark S. Umbreit, M

Associate Professor

Linda L. Chlan, M
Laura Duckett, M
Linda Halcon, M
Craig A. Hassel, M
Cheryl Robertson, M
Carla Tabourne, M

Assistant Professor

Karen Lawson, M

Lecturer

Miriam Cameron, M
Pat Culliton, M
Carolyn Garcia, M
Rebecca Gorman, M
Annette Heiderscheit, M
Kathleen Marshall, M
Dennis J. McKenna, M
Karen Monsen, M
Deborah Ringdahl, M
Erik Storlie, M
Sue M. Towey, M

Curriculum—The graduate minor in complementary therapies and healing practices is an interdisciplinary program designed to expose students to the global range of complementary, cross-cultural, and spiritual healing practices. It enhances the preparation of graduate students in health sciences and other disciplines by developing knowledge and skills in the emerging field of complementary and alternative health care. Specifically, the minor provides students with a theoretical basis for applying complementary therapies and healing practices; prepares students to research complementary therapies and healing practices; and prepares students to work collaboratively with other health professionals and patients in a multicultural, pluralistic 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 or in Twin Cities Courses on the University Catalog Web site. 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

Masters and doctoral students take CSPH 5101 (3 cr) and 8101 (2 cr). Masters students take an additional 3 credits for a total 8 credits; doctoral students must take an additional 7 credits for a total of 12 credits. Note that students cannot use course credits to satisfy requirements for both a major and the minor.

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 the question, "What are your short- and long-term professional goals after you complete the postbaccalaureate certificate program in complementary therapies and healing practices?" Be as specific as possible. Two letters of support are required if the individual is not currently enrolled in a graduate program at the University of Minnesota, one from an academic source and one from an employer/supervisor. A current C.V. is also requested. Goal statement, letters of support, and C.V. should be mailed to: Center for Spirituality and Healing, MMC 505, 420 Delaware Street S.E., 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 Center for Spirituality and Healing (CSPH) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site. 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 is not permitted.

Certificate Requirements

A total of 12 credits are required to complete the certificate. Required courses: CSPH 5101—Introduction to Complementary Therapies and Healing Practices (3 cr) and CSPH 5102—Art of Healing: Self as Healer (1 cr). Students are encouraged to choose the remaining 8 credits from courses consistent with their academic training and professional goals. The student's faculty adviser works with the student in designing a program plan that accommodates the student's unique learning objectives. To earn a certificate, the preferred GPA for all courses is 2.80.

Health Coaching Track Under the Postbaccalaureate 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 two- to five-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.

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 students must take CSPH 5701—Fundamentals of Health Coaching I (4 cr), CSPH 5702—Fundamentals of Health Coaching II (4 cr), CSPH 5703—Advanced Health Coaching Practicum (3 cr), CSPH 5704—Business of Health Coaching (1 cr), and a professional internship in health coaching. To earn a certificate, the preferred GPA for all courses is 2.80.

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; admissions@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. Du, SM
Maria Gini, SM
Alok Gupta, Carlson School of Management, AM2
Caroline Hayes, AM2
Mats Heimdahl, SM
Wei Chung Hsu, SM
Ravi Janardan, SM
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
Vipin Kumar, SM
David J. Lilja, Electrical and Computer Engineering, ASM
Richard Maclin, Computer Science, Duluth, AM2
Gopalan Nadathur, SM
Nikolaos P. Papanikolopoulos, SM
John T. Riedl, SM
Jaijeet Roychowdhury, ASM
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
Yongdae Kim, SM
Gary Meyer, SM
Ted Pedersen, Computer Science, Duluth, AM2
Stergios Roumeliotis, SM
Loren Terveen, SM
Hudson Turner, Computer Science, Duluth, AM2
Erik Van Wyk, SM
Jon Weissman, SM

Adjunct Associate Professor

Masha Sosonkina, Computer Science, Duluth, AM2

Assistant Professor

Arindam Banerjee, SM
Abhishek Chandra, SM
Tian He, SM
Nicholas Hopper,SM
Chad L. Myers, M2
Martin O. Saar, Geology and Geophysics, AM2
Ibrahim Volkan Isler, SM
Daniel Keefe, M2
Rui Kuang, M2
Mohamed Mokbel, SM
Paul Schrater, SM
William Schuler, SM
Antonia Zhai, SM

Lecturer

John Collins, AM2

Other

Vassilios Morellas, AM2

Along with the program-specific requirements listed below, 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 fall 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 Research Laboratory Department of Defense Supercomputing Resource 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 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 or in Twin Cities Courses on the University Catalog Web site 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.

Conservation Biology

Contact Information—Director of Graduate Studies, Conservation Biology Graduate Program, University of Minnesota, 187 McNeal Hall, 1985 Buford Avenue, Saint 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.

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
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. Cuthbert, Fisheries, Wildlife, and Conservation Biology, SM
K. William Easter, Applied Economics, SM
Mohamed E. El Halawani, 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
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
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
Carlisle F. Runge, Applied Economics, SM
Abdi I. Samatar, Geography, SM
Ingrid E. Schneider, Forest Resources, SM
Ruth G. Shaw, 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, Fisheries, Wildlife, and Conservation Biology, SM
Bruce C. Vondracek, Fisheries, Wildlife, and Conservation Biology, SM

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
Tamara Giles-Vernick, History, SM
Jay T. Hatch, Postsecondary Teaching and Learning, SM
Sarah Hobbie, Ecology, Evolution, and Behavior, SM
Frances R. Homans, Applied Economics, SM
Pamela Jakes, Forest Resources, ASM
Sharon A. Jansa, Ecology, Evolution, and Behavior, SM
Susan D. Jones, Ecology, Evolution, and Behavior, SM
Mike Kilgore, Forest Resources, SM
Katerine Klink, Geography, SM
Jennifer Kuzma, Humphrey Institute of Public Affairs, SM
John P. Loegering, Agriculture and Natural Resources, Crookston, M2
Steven Manson, Geography, SM
Laura R. Musacchio, Landscape Architecture, SM
Kristen C. Nelson, Forest Resources, SM
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, SM
Daniel J. Philippon, English, SM
Rachel Schurman, Sociology, SM
Andrew M. Simons, Fisheries, Wildlife, and Conservation Biology, SM
Roderick H. Squires, Geography, SM
Steven J. Taff, Applied Economics, SM
Ronald Tilson, Fisheries, Wildlife, and Conservation Biology, ASM
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
Frederick J. Jannett, 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
Jeannnine M. Cavender-Bares, Ecology, Evolution, and Behavior, SM
Jacques Finlay, Ecology, Evolution, and Behavior, SM
Diane Larson, Ecology, Evolution, and Behavior, SM
Rebecca Anne Montgomery, Forest Resources, 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
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
Kenneth H. Kozak, Bell Museum of Natural History, SM
Clarence L. Lehman, Ecology, Evolution, and Behavior, SM

Lecturer

Thomas R Fiutak, Humphrey Institute of Public Affairs, SM

Research Associate

Dean A. Current, Forest Resources, AM2
Lee E. Frelich, Forest Resources, SM
Paul Harold Glaser, Earth Sciences Geology/Geophysics, AM2
Lorin Kent Hatch, Fisheries, Wildlife and Conservation Biology, AM2
Loren M. Miller, Fisheries, Wildlife, and Conservation Biology, M2
Ronald Moen, Natural Resources Research Institute, Duluth, SM
Naomi Zeitouni, Applied Economics, SM

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

Curriculum—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 Ecosystem Science Reserve, 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; csdy@aem.umn.edu; www.csdy.umn.edu).

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

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
Perry Y. Li, Mechanical Engineering, SM
Walter Littman, Mathematics, ASM
Richard P. McGehee, Mathematics, SM
Peter Olver, Mathematics, SM
Nikolaos P. Papanikolopoulos, Computer Science and Engineering, SM
Rajesh Rajamani, Mechanical Engineering, SM,
George R. Sell, Mathematics, ASM
Marian S. 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

Demoz Gebre Egziabher, Aerospace Engineering and Mechanics, SM

Assistant Professor

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, 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 (612-625-6366; creawrit@umn.edu; www.creativewriting.umn.edu).

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

Regents Professor

Patricia M. Hampl, M2
Madelon M. Sprengnether, M2

Professor

Michael Dennis Browne, M2
Ray Gonzalez, M2
Julie Schumacher, M2

Adjunct Professor

Charles Baxter, M2

Associate Professor

Lois B. Cucullu, M2
Maria Damon, M2
M.J. Fitzgerald, M2
Charles J. Sugnet, M2
David Treuer, M2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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 cr), three of which must be in the student's genre of choice and include one 8xxx course, and one of which must be outside the student's primary genre; language and literature courses (7 cr); related field (6 cr); 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 literary 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.html.

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
Patrick M. Lloyd, Restorative Sciences, M2

Bryan S. Michalowicz, Developmental/Surgical Sciences, M2
Jorge M. Perdigão, Restorative Sciences, M2
Nelson L. Rhodus, 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
Brett E. Larson, Developmental/Surgical Sciences, M2
Thomas D. Larson, Restorative Sciences, M2
Scott B. McClanahan, 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
Maria R. Pintado, Restorative Sciences, M2
Eric L. Schiffman, Diagnostic and Biological Sciences, M2
John K. Schulte, Restorative Sciences, M2
Stephen K. Shuman, Primary Dental Care, M2
Jill L. Stoltenberg, Primary Dental Care, M2
Omar A. Zidan, Restorative Sciences, M2

Clinical Associate Professor

John P. Beyer, Developmental/Surgical 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
Wook-Jin Seong, Restorative Sciences, M2

Senior Research Associate

John O. C. Look, Diagnostic/Surgical Sciences, M2

Along with the program-specific requirements listed below, 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 with clinical expertise for positions of leadership in education, research, and program administration in the oral health field. A multidisciplinary faculty of dental and dental 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, and prosthodontics). 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. 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 or in Twin Cities Courses on the University Catalog Web site 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

Contact Information—Director of Graduate Studies, Design, University of Minnesota, 240 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-626-1219; fax 612-624-2750; designgrad@umn.edu; http://dha.design.umn.edu/programs/grad).

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

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
Elizabeth Bye, SM
Sauman Chu, SM
Jeffrey R. Crump, SM
Sherri A. Gahring, M2
Delores A. Ginthner, (emeritus), AM2
Brad Hokanson, SM
Daniel Jasper, M2
Barbara E. Martinson, SM
Gloria M. Williams, SM
Ann Ziebarth, SM
Stephanie A. Zollinger, SM

Assistant Professor

Lucy Dunne, M2
Tasoulla Hadjiyanni, M2
Hye-Young Kim, M2
Caren S. Martin, M2
Carol C. Waldron, M2
Juanjuan Wu, M2

Other

Lou Bunker-Helmich, AM
Kathleen E. Campbell, Goldstein Museum, AM
Mary Catherine Daly, AM
Kathleen Harder, AM2
Lin Nelson-Mayson, Goldstein Museum, M

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

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

The M.A., M.S., and Ph.D. degrees include formal tracks in apparel studies (including dress, history, and culture; product development; and retail merchandising and consumer studies); graphic design (including interactive design); housing studies; and interior design (including evidence-based design). The M.F.A. is available in the graphic design track and interactive design emphasis. The track in apparel studies advances both theoretical knowledge and applications for textile and apparel products related to human behavior. Students may focus on product development; dress, history, and culture; or retail merchandising and consumer studies. The track in graphic design focuses on design theory, process, and methods related to design practice and research. Potential areas of study include graphic design history, theory, and critical narrative; visual systems research; situational and transformative design; and interactive design. 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. Students and faculty collaboratively develop designed objects and information resources that will enhance people's lives. The housing studies track advances both theoretical and applied knowledge in the housing field. Through research experiences, students are prepared to assist people and communities in addressing housing-related issues. Courses emphasize human needs and behavior, analysis of designed environments, policy and community development, and housing of specific subpopulations such as the elderly or low-income families with children. Graduate study in the interior design track emphasizes the theory, research, and specialized practice components of design as applied to people's health, safety, and welfare in the interior environment, including design education, sustainability, social/cultural issues, aspects of professional practice, and facilities research (educational, office, criminal justice, and residential). 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 evidence-based design emphasis provides students with the opportunity to explore theoretical, process, and applied aspects of this emerging innovation of design practice.

Prerequisites for Admission—Individuals must have adequate undergraduate education in the track and background in the basic disciplines of art, social science, physical science, and biological science appropriate to the track. To pursue a degree in the interior design track, 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 (DES) and Design, Housing, and Apparel (DHA) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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

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

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 is required. Courses are selected in consultation with the director of graduate studies.

M.F.A. Degree Requirements

Students are required to take 4 credits in the core, 36 credits in the major field, 8 credits in the related field or minor, and 12 credits for the creative project. The program requires a minimum number of credits

in theory and methods. Students may be required to complete additional credits upon recommendation of their committee.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements

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

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—For a doctoral minor, a minimum of 12 credits is required. Courses are selected in consultation with the director of graduate studies.

Design, Housing, and Apparel

See Design.

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 South, Minneapolis, MN 55455 (612-624-0832; fax 612-625-1879; icgc@umn.edu; www.icgc.umn.edu).

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

Regents Professor

Allen Isaacman, History, M
Eric S. Sheppard, Geography, M
Kathryn A. Sikkink, Political Science, M

Professor

Ronald R. Aminzade, Sociology, 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
Raymond D. Duvall, 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
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
Tamara 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
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, M
Joanna O'Connell, Spanish and Portuguese Studies, M
Tade Okediji, Applied Economics. M
Daniel J. Philippon, English, M
Simona Sawhney, Asian Languages and Literatures, M
Rachel Schurman, Sociology, M
Ajay Skaria, History, M
Charles J. Sugnet, English, M

Assistant Professor

Barbara Frey, Human Rights Program, M
Greta Friedemann-Sanchez, Humphrey Institute, M
Keith Mayes, African American and African Studies, M
Helene Murray, Agronomy and Plant Genetics, 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 global south, the program engages a wide range of academic disciplines, including the social sciences, humanities, and biological sciences. The minor focuses on three areas: 1) the relationships between macroscopic processes of political, economic, and social change, and the microscopic conditions of lived experience in the global south; 2) specifically interdisciplinary perspectives (encompassing the social sciences, the biological sciences, and the humanities) on this general thematic concern; and 3) preparation of doctoral students for research on the global south.

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—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 four core seminars (DSSC 8111, 8112, 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; ecpcert@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 J. Leonard, Nursing, M
Scott McConnell, Educational Psychology, M
Richard Weinberg, Child Development, M

Associate Professor

Elizabeth Davis, Applied Economics, M
Dan Kelliher, Political Science, M

Charles Oberg, Public Health, M
Susan Walker, Curriculum and Instruction, M

Lecturer

Karen Cadigan, Center for Early Education and Development, M
Amy Susman Stillman, Center for Early Education and Development, M

Curriculum—The early childhood policy postbaccalaureate certificate gives students expertise in applying research-based knowledge to public policies affecting young children and the adults who care for them. In addition to completing coursework, students in the certificate program complete two types of applied work: participation in an individualized learning experience (ILE) that integrates and applies coursework through practicum experiences or individual research and participation in local discussion groups as part of the McEvoy Lecture Series on Early Childhood Policy. These three certificate components—coursework, ILE, and discussion groups—provide a vehicle for students to gain a similar set of skills, and foster connection between the University and the community.

Admission Requirements—Applications are accepted on a rolling basis 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:** Graduate School application deadlines are fall semester—June 15, spring semester—October 15, and 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, Saint Paul, MN 55108-6097 (612-625-5700; fax 612-624-6777; ;EEBGrad@cbs.umn.edu; www.cbs.umn.edu/eeb/graduateprogram).

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 B. Cotner, SM
James W. Curtsinger, SM
Antony M. Dean, SM
Susan M. Galatowitsch, Horticultural Science, SM
Linda L. Kinkel, Plant Pathology, SM
Scott M. Lanyon, SM
L. David Mech, Fisheries, Wildlife, and Conservation Biology, SM
Raymond M. Newman, Fisheries, Wildlife, and Conservation Biology, SM
Craig Packer, SM
John Pastor, Duluth, SM
Stephen Polasky, SM
Anne E. Pusey, 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
David W. Stephens, SM
Robert W. Sterner, SM
Susan J. Weller, Entomology, SM
Robert M. Zink, SM

Adjunct Professor

Edward J. Cushing, SM
Robert Denison, SM
Claudia Neuhauser, SM

Associate Professor

David Fox, Geology and Geophysics, SM
George Heimpel, Entomology, SM
Sarah E. Hobbie, SM
Sharon Jansa, SM
Susan D. Jones, SM
Jennifer King, SM
Georgiana May, SM
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, SM
Andrew M. Simons, Fisheries, Wildlife, and Conservation Biology, SM
Peter Tiffin, Plant Biology, SM
Michael Travisano, SM
George Weiblen, Plant Biology, SM

Assistant Professor

F. Keith Barker, SM
Mark Bee, SM
Mark Borrello, SM
Jeannine Cavender-Bares, SM
Jacques Finlay, SM
Jeffrey A. Gralnick, Biotechnology Institute, SM
Kenneth H. Kozak, Fisheries, Wildlife, and Conservation Biology, SM
Rebecca Montgomery, Forest Resources, SM
Helene Muller-Landau, SM
Jennifer Powers, SM
Imke Schmitt, Plant Biology, SM
Michael L. Wilson, SM

Adjunct Assistant Professor

Diane L. Larson, SM

Research Associate

Lee E. Frelich, Forest Resources, SM
Clarence Lehman, SM

Along with the program-specific requirements listed below, 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. In addition to the online application to the Graduate School, a personal statement, scores from the general GRE test (current within the past five years), and transcripts should be sent directly to the EEB graduate program. The GRE subject test is recommended but not required.

Courses—Refer to Ecology, Evolution, and Behavior (EEB) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 in the major, and at least 12 course 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 South, Minneapolis, MN 55455 (612-625-6833; fax 612-624-0209; econdgs@econ.umn.edu; www.econ.umn.edu).

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

Professor

Beth E. Allen, SM
Patrick Bajari, SM
Varadarajan V. Chari, SM
Roger D. Feldman, Public Health, ASM
Thomas J. Holmes, SM
Larry E. Jones, SM
Patrick J. Kehoe, SM
Timothy Kehoe, SM
Narayana Kocherlakota, SM
Erzo G. J. Luttmer, SM
Christopher Phelan, SM
Marcel K. Richter, SM
Jose Victor Rios-Rull, SM
Aldo Rustichini, SM
Craig E. Swan, SM
Warren E. Weber, AM2
Jan Werner, SM

Associate Professor

Kim Sau Chung, SM
George D. Green, History, AM2
Ellen McGrattan, AM2
Fabrizio Perri, SM
Amil Petrin, SM
James A. Schmitz, AM2

Assistant Professor

Christina Arellano, M2
Alessandra Fogli, M2
Fatih Guvenen, M2
Kyoo-Il Kim, M2
Minjung Park, M2
David Rahman, M2
Itai Sher, M2

Other

Simran Sahi, M2

Along with the program-specific requirements listed below, 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 15. Students are admitted for fall semester only.

Courses—Refer to Economics (ECON) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 must include two courses in either the 4161–4164 sequence or the 4165–4168 sequence, or more advanced courses in economic theory.

The economic theory requirement may be waived if, in the judgment of the director of graduate studies, the student's previous work in economics has included courses equivalent to 4xxx economic theory courses, though the requirement to complete 6 credits would still stand.

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 preliminary exams constitute the major program. In addition, students must complete 12 credits outside the major for a supporting program, which may include economics courses not included in the major.

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—Work and Human Resource Education

See Work and Human Resource Education.

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://cehd.umn.edu/ci).

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

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
David O'Brien, SM
Thomas R. Post, SM
S. Jay Samuels, Educational Psychology, ASM
Thomas Swiss, SM
Elaine E. Tarone, Linguistics, ESL, and Slavic Languages and Literatures, AM2
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
Patricia James, Postsecondary Teaching and Learning, AM2
Murray S. Jensen, Postsecondary Teaching and Learning, AM2
Kendall King, SM
Timothy Lensmire, SM
Jane Plihal, SM
Gillian H. Roehrig, SM
Diane J. Tedick, SM
Constance L. Walker, SM
Susan K. Walker, M2

Assistant Professor

James W. Bequette, M2
Lesa Covington Clarkson, M2
Bhaskar Dahal, SM
Aaron H. Doering, SM
Lori A. Helman, M2
Benjamin M. Jacobs, M2
J. B. Mayo, M2
Charles D. Miller, M2
Tamara J. Moore, M2
Bic Ngo, M2
Mistilina Sato, M2
Ross VeLure Roholt, School of Social Work, AM2

Lecturer

Lisa Kimball, M2
Terrence Wyberg, M2

Other

Mary Bents, Associate Dean, College of Education and Human Development, AM2
David J. Ernst, Director of Academic Computing, College of Education and Human Development, AM2
Tara W. Fortune, Center for Advanced Research on Language Acquisition, AM2
Christine Greenhow, Research Associate, Curriculum and Instruction, M2
Michael Michlin, Center for Applied Research and Educational Improvement, AM
Jerome Stein, Senior Fellow, School of Social Work, AM2
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, postsecondary and research settings, educational service agencies, and 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 online distance learning, multimedia design and development, and K–12 technology integration); literacy education (including children's and adolescent literature, critical literacy and English education, and reading education); mathematics education; science education; second languages and cultures education (including ESL, foreign language education, and bilingual and immersion education); and social studies education. 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 preferred for admission to some of the tracks within the Ph.D. program, but it is not always required.

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 individuals familiar with their scholarship and research potential, a complete set of official transcripts, and a clearly written statement of career interests, goals, and objectives. 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 or in Twin Cities Courses on the University Catalog Web site 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 (MITER) Program office, Education Sciences Building, 56 East River Road, Suite 250/4101, 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.html.

Regents Professor

Apostolos P. Georgopoulos, Neuroscience, M
Matt McGue, Psychology, M

Professor

Mark L. Davison, Educational Psychology, M
Christine A. 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. Maruyama, Educational Psychology, M
Samuel L. Myers Jr., Humphrey Institute of Public Affairs, M
J. B. Overmier, Psychology, M
Anthony D. Pellegrini, Educational Psychology, M
Michael D. Resnick, Pediatrics, M
John L. Romano, Educational Psychology, M
Maria D. Sera, Child Development, M
Barbara M. Taylor, Curriculum and Instruction, M
Paul W. van den Broek, Cognitive Science, M
James E. Ysseldyke, Educational Psychology, M

Associate Professor

Ernest C. Davenport Jr., Psychology, M
Jeffrey D. Long, Educational Psychology, M
Ben Munson, Speech, Language, and Hearing Sciences, M
Michael C. Rodriguez, Educational Psychology, M
John R. Warren, Sociology, M

Assistant Professor

Eric Grodsky, Sociology, M
Nicole Landi, Educational Psychology, M
Kristen McMaster, Educational Psychology, M
Tamara Moore, Curriculum and Instruction, M

Curriculum—The education sciences minor reflects an interdisciplinary effort that combines research in education with research in the basic arts and sciences to address problems of education. The minor draws on coursework from education, educational psychology, cognitive neuroscience, child development, psychology, and public policy. Coursework includes professional socialization courses presenting a general introduction to educational research and experimental methods; two advanced courses in research methods and statistics; and two advanced courses in cognition and learning.

Prerequisites for Admission—This graduate minor is restricted to doctoral students. To have the minor formally designated on a transcript, students must be enrolled in a major in the Graduate School. Prerequisites include two graduate courses in statistical methods and one course in cognition and learning. A list of courses satisfying the prerequisites is available on the program Web site.

Courses—Refer to the program Web site for approved courses. Contact the minor program office for further information on relevant coursework pertaining to the program. With the prior approval of the Graduate Advisory Committee and the

student's adviser(s), courses not on this list may be approved as satisfying program requirements.

Use of 4xxx Courses—Use of 4xxx courses in the degree program is not permitted.

Minor Requirements

Coursework includes: a) two professional socialization courses presenting a general introduction to schools and educational research (3 cr each); b) two advanced courses in research methods and statistics (experimental research design, measurement, and statistical methods, 3 cr each), and c) two advanced courses in cognition and learning (addressing cognitive approaches to learning, 3 cr each), for a total of 18 credits. **Note:** Students may not use course credits to satisfy requirements for both a graduate major and for the education sciences minor.

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.

Professor

Melissa S. Anderson, SM
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
Richard A. Krueger, Work and Human Resource Education, ASM
Robert B. Kvavik, Political Science, ASM
Linda Cleary-Miller, English, Duluth, AM2
R. Michael Paige, SM
Arthur Reynolds, Child Psychology, AM
Rebecca Ropers-Huilman, SM
Karen Rose Seashore, SM
Robert D. Tennyson, Educational Psychology, ASM
Jennifer York-Barr, SM
James E. Ysseldyke, Educational Psychology, ASM

Associate Professor

Nicola A. Alexander, SM
David R. Arendale, AM
Heidi L. Barajas, AM2
C. Cryss Brunner, SM
Peter W. Demerath, SM
Andrew Furco, M2
Frank A. Guldbrandsen, Duluth, ASM
Arthur M. Harkins, SM
Darwin D. Hendel, SM
Mary Hermes, Duluth, ASM
Walt Jacobs, AM
Karen L. Miksch, AM
Helen Mongan-Rallis, Duluth, AM2
Byron J. Schneider, M2
Joyce Strand, Duluth, AM
Catherine A. Wambach, AM
Stuart S. Yeh, SM

Assistant Professor

Joan G. DeJaeghere, AM
Rashne R. Jehangir, AM
Frances Vavrus, SM
David J. Weerts, M2

Lecturer

Noro R. Andriamanalina, AM2
Rusty Barceló, AM
Dale A. Blyth, AM2
Beverly J. Dretzke, AM2
Garrett-Dikkers, Amy, AM2
Amy S. Hewitt, AM2
Richard D. Howard, M
Julie S. Kalnin, ASM
Gloria L. Kumagai, AM
Deanne L. Magnusson, ASM
Joseph H. Nathan, Public Affairs, AM2
Richard D. Nunneley, ASM
Robert K. Poch, AM2
Kyla L. Wahlstrom, ASM
Ann Z. Werner, AM2

Other

Debra Ingram, AM
Karen Evans Stout, AM
Joyce Ann Walker, AM2

Along with the program-specific requirements listed below, 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 preK–12 administrative licensure programs.

The department also offers various certificate programs (including program evaluation, staff development, disability policy and services, and preK–12 administration), an individualized concentration in youth leadership development, and minors in international education, social and philosophic studies of education, and program evaluation. See the department 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 (CIDE, 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 CIDE Ph.D., are reviewed twice per semester. CIDE 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 (ICI), 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 or in Twin Cities Courses on the University Catalog Web site 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, and comparative and international development education. The M.A. is offered under two plans. Plan A requires 14–18 course credits in EDPA, 6 course credits outside the department, and 10 thesis credits. Plan B requires 24–26 course credits in EDPA, 6 course credits outside the department, and a Plan B project. For details see the EDPA Web site under "Student Resources: Handbooks."

Language Requirements—None.

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

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 (pre-K–12 schools) and higher education. Cohorts include those in the metropolitan area, out state Minnesota, and international schools. The Ed.D. degree is offered only in the context of cohort programs of 20–30 students each.

All Ed.D. cohort programs include department core courses, program core courses, inquiry and research courses, supporting program or minor, and field research project credits. Within the overall 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 (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, 250 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455 (612-624-1698; fax 612-624-8241; epsy-adm@umn.edu; www.education.umn.edu/EdPsych).

For specific track materials, contact the tracks as follows:

Counseling and Student Personnel Psychology, University of Minnesota,250 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455 (612-624-6827; fax 612-624-8241; cspp-adm@umn.edu)

Psychological Foundations of Education, University of Minnesota, 250 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455 (612-624-0042; fax 612-624-8241; psyf-adm@umn.edu)

Quantitative Methods in Education, University of Minnesota, 250 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455 (612-624-0042; fax 612-624-8241; psyf-adm@umn.edu)

School Psychology, University of Minnesota, 250 Education Sciences Building, 56 East River Road,, Minneapolis, MN 55455 (612-624-4156; fax 612-624-0879; schpsych@umn.edu).

Special Education, University of Minnesota,250 Education Sciences Building, 56 East River Road, Minneapolis, MN 55455 (612-624-0367; fax 612-624-8241; sped-adm@umn.edu).

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

Professor

William M. Bart, SM
Thomas Brothen, AM2
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
Joan B. Garfield, SM
Sunny Sundal Hansen, (emeritus), ASM

Michael R. Harwell, SM
Thomas J. Hummel, SM
Susan C. Hupp, SM
Asha Jitendra, SM
David R. Johnson, Educational Policy and Administration, AM2
David W. Johnson, SM
Roger T. Johnson, Curriculum and Instruction, AM2
Jean A. King, Educational Policy and Administration, AM2
Frances P. Lawrenz, SM
Geoffrey M. Maruyama, SM
Scott R. McConnell, SM
Anthony Pellegrini, SM
Joe E. Reichle, Communication Disorders, SM
John L. Romano, SM
S. Jay Samuels, SM
Thomas M. Skovholt, SM
Robert D. Tennyson, SM
Patricia McCarthy Veach, SM
Richard A. Weinberg, Child Development, ASM
James E. Ysseldyke, SM

Associate Professor

Matthew Burns, SM
Theodore Christ, M2
Ernest C. Davenport, SM
Robert C. DelMas, M2
Michael P. Goh, SM
Jeffrey D. Long, SM
Jennifer J. McComas, SM
Michael C. Rodriguez, SM
Susan Rose, SM
Frank J. Symons, SM
Sherri L. Turner, SM
Kay Herting Wahl, SM

Assistant Professor

Pearl Barner, Psychology, AM
Tabitha Grier-Reed, Postsecondary Teaching and Learning, AM
Nicole Landi, M2
Kristen McMaster, M2
Kay A. Thomas, International Programs, AM2
Keisha Varma, M2
Sashank Varma, M2

Lecturer

Brian H. Abery, AM2
Caroline Burke, AM2
Ann M. Casey, AM
Daria P. Dona, AM
Michelle G. Everson, AM
Matthew Lau, AM2
Salina M. Renninger, University Counseling and Consulting Services, AM

Other

Matthew Hanson, AM
LeAnne Johnson, AM2
Camilla Lehr, AM2
Douglas Marston, AM
Mark Sander, AM
William S. Slattery, University Counseling and Consulting Services, AM
Martha L. Thurlow, AM
Teresa L. Wallace, AM2

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

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. Check directly with the program offices for current deadlines.

Courses—Refer to Educational Psychology (EPSY) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.

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—Quantitative Methods in Education (QME)

Graduate Study in QME prepares students for a wide variety of careers, including positions in test publishing firms, college and university teaching and research, research and evaluation centers, public school systems, state departments of instruction, and private industry. The goal of QME is to provide students with broad but rigorous methodological skills so that they may conduct research on methodologies, may help to train others in methodology, or will have the skills necessary to conduct research in related fields.

The program offers M.A. and Ph.D. degrees with emphases in measurement, evaluation, statistics, and statistics education. Students typically choose one of these areas in addition to achieving competence in all aspects of the curriculum.

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. Graduates are employed as psychologists in local schools, university clinics and hospitals, community mental health centers, and as trainers/researchers in universities. Since 1988, training has focused on the delivery of psychological services in schools and school communities to promote children's and adolescent's academic, social, and behavioral success.

The program integrates didactic and experiential components of training and applied research. Students develop specific competencies through a broad range of applied experiences, including field placements, practica assignments, and a full-year internship.

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, and social psychology) and 6 credits in a related field or minor. Plan A students must also take 10 thesis credits; Plan B students take 2 research credits (EPSY 8994).

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.

The program focuses on the attainment of core competencies and related skills, since special education professionals share many common concerns and goals. A complementary emphasis is placed on problems unique to or extremely influential in the field, including social and cultural perceptions about disabilities, and federal, state, and local legislation regarding prevention and the care, treatment, education, training, and support of persons with disabilities.

M.A. Degree Requirements

Students may emphasize consulting, college teaching, or research in one or more of the specializations.

Students must complete at least 30 credits, including credits in EPSY core courses (statistics, measurement, learning, and social psychology), 6 credits in special education foundations, and 6 credits in a related field or minor. Plan A students must take 10 thesis credits.

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 trains graduates to address problems related to the full development of individuals with disabilities and their families. Intensive course-related learning and guided experiences prepare students to assume professional leadership. Further competencies may be achieved in four areas of emphasis: research, professional preparation, administration/policy, and clinical practice/community service.

Students must complete credits in EPSY core courses (statistics, measurement, learning, social psychology, issues in educational psychology, and research methods), 12 credits in special education (EPSY 8701 and 8702 and 6 additional credits which must be from EPSY 86xx or 87xx offerings), 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 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, 3-166 Electrical Engineering/Computer Science Bldg., 200 Union Street S.E., Minneapolis, MN 55455 (612-625-3564; fax 612-626-1136; jager001@umn.edu; www.ece.umn.edu).

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

Professor

Massoud Amin, SM
Stephen A. Campbell, SM
Vladimir Cherkassky, SM
Philip I. Cohen, SM
David H. Du, Computer Science and Engineering, ASM
Emad Ebbini, SM
Tryphon T. Georgiou, SM
Georgios Giannakis, SM
Anand Gopinath, SM
Bruce E. Hammer, Radiology, ASM
Ramesh Harjani, SM
Bin He, Biomedical Engineering, ASM
Mostafa Kaveh, SM
John C. Kieffer, SM
Larry L. Kinney, SM
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
William P. Robbins, SM
P. Paul Ruden, SM
Sachin Sapatnekar, SM
Guillermo Sapiro, SM
Joseph J. Talghader, SM
Ahmed H. Tewfik, SM
J. Thomas Vaughan, Radiology, Magnetic Resonance Research, ASM
Randall H. Victora, SM
Bruce F. Wollenberg, SM
Paul R. Woodward, Astronomy, ASM
Pen-Chung Yew, Computer Science and Engineering, ASM
Ofer Zeitouni, Mathematics, ASM
Zhi-Li Zhang, Computer Science and Engineering, ASM

Adjunct Professor

Jaijeet Roychowdhury, SM

Associate Professor

Kiarash Bazargan, SM
Tianhong Cui, Mechanical Engineering, ASM
Douglas W. Ernie, SM
Rhonda R. Franklin, SM
Demoz Gebre Egziabher, Aerospace Engineering and Mechanics, AM
Ted K. Higman, SM
James E. Holte, SM
Heinrich O. Jacobs, SM
Thomas Alfred Posbergh, AM
Stergios Roumeliotis, Computer Science and Engineering, ASM

Murti Salapaka, SM
Gerald E. Sobelman, SM
Bethanie J. Stadler, SM
Jian-Ping Wang, SM

Adjunct Associate Professor

Matthew T. O'Keefe, Sistina Software, ASM
Robert A. Sainati, 3M, ASM
Euisik Yoon, ASM

Assistant Professor

Taner Akkin, Biomedical Engineering, ASM
Lucy Elizabeth Dunne, Design, Housing, and Apparel, AM
Nihar Jindal, SM
Mihailo Jovanovic, SM
Chris Hyung-il Kim, SM
Chad Leighton Myers, Computer Science and Engineering, ASM
Sang-Hyun Oh, SM
Marc Riedel, SM
Antonia B. Zhai, Computer Science and Engineering, ASM

Other

Gregory T. Cibuzar, Microtechnology Laboratory, AM
Mostafa Fatemi, Mayo Clinic, AM
Paul Jay Imbertson, AM

Along with the program-specific requirements listed below, 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 read detailed information on requirements for applying to the electrical engineering graduate program at www.ece.umn.edu/admissions/graduate/Department Application Information.shtml.

Courses—Refer to Electrical and Computer Engineering (EE) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—The electrical engineering graduate program allows all EE 4XXX Regular/Special Topics Regular or Lab Courses (excluding Senior Design/Coop/Independent Study) for graduate credit. Graduate credit for EE 4XXX classes is limited to 6 credits total. If by the end of fall semester 2007 students have completed 6 credits of 4xxx courses, any additional 4xxx courses will not be counted in their programs. Students who completed more than 6 credits of 4xxx courses by end of fall semester 2007 will be allowed to keep them in your program. 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.

Note: *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 (6 credits of 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 M.S.E.E. Plan A 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 registrations (excluding colloquiums 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.cla.umn.edu/grad).

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

Regents Professor

Thomas S. Clayton, SM
Patricia M. Hampl, SM
Madelon Sprengnether,SM

Professor

Timothy Brennan, Cultural Studies and Comparative Literature, SM
Michael Dennis Browne, SM
Maria Damon, SM
Andrew Elfenbein, SM
Genevieve J. Escure, SM
Shirley N. Garner, SM
Ray Gonzalez, SM
Edward M. Griffin, SM
Laura J. Gurak, Writing Studies, AM2
David B. Haley, SM
Michael Hancher, SM
Gordon D. Hirsch, SM
Karen A. Hoyle, Children's Literature Research Collections, AM2
Nabil I. Matar, SM
Ellen Messer-Davidow, SM
John W. Mowitt, Cultural Studies and Comparative Literature, ASM
Paula Rabinowitz, SM
Donald J. Ross Jr., Writing Studies, ASM
JulieSchumacher,SM
Geoffrey Sirc, 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
Lianna H. Farber, SM
Maria J. Fitzgerald, SM
Brian B. Goldberg, SM
Qadri Ismail, SM
Rebecca L. Krug, SM
Josephine D. Lee, SM
Evelyn Nien-Ming Ch'ien, SM
Daniel J. Philippon,SM
Janette Scandura, SM
Andrew Scheil, SM
Katherine W. Scheil, SM
Charles J. Sugnet, SM
David R. Treuer, SM
Michelle M. Wright, SM

Assistant Professor

Tony C. Brown, M2
Siobhan Craig, M2
Kirsten Jamsen, Director, Writing Center, M2
David B. Luke, M2
Natasha Tinsley, M2

Along with the program-specific requirements listed below, 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 manifestoes. 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 or in Twin Cities Courses on the University Catalog Web site 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 cr); four English courses distributed among broad areas (minimum of 12 cr); four additional English courses in a focused area of emphasis (minimum of 12 cr); 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; iles@umn.edu; www.iles.umn.edu/esl).

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

Professor

Andrew D. Cohen, M2
Carol Klee, AM
Elaine E. Tarone, M2

Associate Professor

Martha Bigelow, AM
Kathryn Kohnert, AM
Anne Lazaraton, M2

Assistant Professor

Douglas Margolis, M2

Other

Michael Anderson, AM
Jenise Rowekamp, AM

Along with the program-specific requirements listed below, 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 offers a course of study leading to an M.A. Degree holders are qualified to teach ESL to adults at the college or university level. The program emphasizes research and practice in language analysis, 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 teaching 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 7). Students may begin the program fall semester or first summer session. Applications for both admission dates are due on February 1.

Courses—Refer to English as a Second Language (ESL) and Teaching English as a Second Language (TESL) in the course section of this catalog or in Twin Cities Courses on on the University Catalog Web site 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. program in ESL normally takes 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 graduate minor in ESL, students must take ESL 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., Saint Paul, MN 55108 (612-624-3636; fax 612-625-5299; entodept@umn.edu; www.entomology.umn.edu).

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

Professor

David A. Andow, SM
Mark E. Ascerno, Jr., (emeritus), M2
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
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. Weiblen, 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
Steffen Pauls, M2

Along with the program-specific requirements listed below, 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, letters of recommendation, and the statement of interest from the applicant.

Special Application Requirements—Applicants must submit a complete set of official transcripts and a clearly written statement of career interests, goals, and objectives. Three letters of recommendation are required from persons well acquainted with the student's academic record, and 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 the 70th percentile or above 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 for full consideration for graduate fellowships and traineeships. Students may apply and be accepted at other times of year. Applications are reviewed individually by an admissions committee but only after all materials are complete.

Courses—Refer to Entomology (ENT) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.html.

Professor

Timothy R. Church, SM
Susan G. Gerberich, SM
Sagar M. Goyal, Veterinary Population Medicine, ASM
Craig W. Hedberg, SM
Jordan L. Holtzman, Medicine, ASM
Julie A. Jacko, SM
Patricia M. McGovern, SM
Debra K. Olson, SM
Michael T. Osterholm, SM
Lisa A. Peterson, SM
Gurumurthy Ramachandran, SM
Deborah L. Swackhamer, SM
William Toscano, SM

Adjunct Professor

Debora Boyle, Veterinary Population Medicine, ASM
John M. Shutke, ASM

Associate Professor

John L. Adgate, SM
Bruce Alexander, SM
Lisa M. Brosseau, SM
Colin Campbell, Pharmacology, ASM
Ian A. Greaves, SM
George Maldonado, SM
Jeffrey H. Mandel, AM2
Heather H. Nelson, Epidemiology, ASM
Carol Ann O'Boyle, Nursing, ASM
Matthew Simcik, SM
Randall Singer, SM
Elizabeth V. Wattenberg, SM

Adjunct Associate Professor

Alan P. Bender, Epidemiology, AM2
Rita B. Messing, Pharmacology, AM2

Assistant Professor

Nancy Nachreiner, SM
Peter Raynor, SM

Adjunct Assistant Professor

Beth A. Baker, Medicine, ASM
Hillary M. Carpenter, AM2
L. Ronald French, Epidemiology, AM2
Julian Marshall, Civil Engineering, ASM
Nicole V. McCullough, AM2
John R. Mulhausen, ASM
Robert R. Roy, Veterinary Population Medicine, AM2
Allan N. Williams, ASM

Instructor

Kirk E. Smith, Veterinary Population Medicine, AM2

Other

Jeff B. Bender, ASM

Along with the program-specific requirements listed below, 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.

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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program and 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.html.

Professor

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
Laël C. Gatewood, Laboratory Medicine and Pathology, M2
Richard H. Grimm, Medicine, SM
Myron D. Gross, Laboratory Medicine and Pathology, M2
Bernard L. Harlow, M2
Craig W. Hedberg, 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. Luepker, SM
Leslie L. Lytle, SM
A. Marshall McBean, M2
Joseph P. Neglia, Pediatrics, M2
Dianne Neumark-Sztainer, M2
Michael T. Osterholm, SM
Julie A. Ross, Pediatrics, SM
B. R. Rosser, 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
Ellen W. Demerath, M2
Lisa J. Harnack, M2
Wendy L. Hellerstedt, SM
Deborah J. Hennrikus, M2
Rhonda J. Jones-Webb, M2
DeAnn Lazovich, M2
George Maldonado, M2
Heather H. Nelson, M2
J. Michael Oakes, M2
Charles N. Oberg, M2
James S. Pankow, SM
Mark A. Pereira, M2
Randall Singer, Veterinary and Biomedical Sciences, M2
Lyn M. Steffen, M2
Traci L. Toomey, M2
Michelle van Ryn, Family Medicine and Community Health, M2
Beth A. Virnig, M2
Jian-Min Yuan, M2

Adjunct Associate Professor

Alan P. Bender, M2

Assistant Professor

Alvaro Alonso, M2
Sonya S. Brady, M2
Susan J. Duval, M2
Marla E. Eisenberg, Pediatrics, M2
Darin J. Erickson, M2
Andrew P. Flood, M2
Eileen M. Harwood, M2
Keith J. Horvath, M2
Jennifer A. Linde, M2
Claudia A. Munoz-Zanzi, M2
Melissa Nelson, M2
Toben F. Nelson, M2
Ruby Nguyen, M2
Kimberly Robien, M2
John R. Sirad, M2
Logan G. Spector, Pediatrics,M2

Adjunct Assistant Professor

Sally A. Bushhouse, M2
Richard N. Danila, M2
Anne M. Jurek, M2
Catherine A. Lexau, M2
John W. Oswald, M2

Senior Research Fellow

Peter J. Hannan, M2

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

Curriculum—The epidemiology Ph.D. program is designed for students interested in research and teaching careers in the health sciences. Students select one of two formal tracks: clinical/biological epidemiology (CBE) or social/behavioral epidemiology (SBE). The two tracks, each with a minimum of 63 credits, emphasize advanced epidemiologic design, methodology and analytic skills. The social/

behavioral epidemiology track focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment. The clinical/biological epidemiology track focuses on the etiology of diseases, particularly cardiovascular, cancer, and infectious diseases. A detailed description of the details related to each track may be obtained online or by contacting the major coordinator at epichstu@umn.edu.

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—Because of the program's strong emphasis on methodology, quantitative aptitude is very important. This can be demonstrated by scoring at or above the 70th percentile on the quantitative section of the GRE along with satisfactory grades in college-level quantitative courses. At least three recommendations (form and separate letter) from faculty or work supervisors with knowledge of the applicant's scholastic and professional capabilities and potential and a statement of goals and objectives (letter of intent) for seeking a career in epidemiology are also required.

In addition to the above materials, applicants for the Ph.D. program must submit a separate essay (statement of research interests) beyond what is required for the SOPHAS application process that provides evidence of their potential to conduct original research in a specific epidemiologic area and, if possible, indicating interest in particular methodologies or study designs. Serious doctoral applicants are encouraged to contact the major coordinator at epichstu@umn.edu before applying. Students begin their studies in the fall semester. Applications must be completed by December 15 of the year prior to beginning 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.edu/students/application/home.html.

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.

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, visit 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 at least 8 credits.

Ph.D. Degree Requirements

Students may select one of two formal tracks; both have an applied perspective that emphasizes study design, measurement, quantitative analysis, and data interpretation. Social/behavioral epidemiology focuses on origins and development of human behavior patterns and how they are influenced and formed by personality, family, culture, and environment. Clinical/biological epidemiology focuses on the biological causes of diseases, especially determinants of cardiovascular disease, cancer, infectious diseases, and genetic epidemiology.

The Ph.D. program includes a minimum curriculum of 63 credits. Students must pass written and oral preliminary exams, write and defend a dissertation, and prepare a first-authored manuscript for publication.

Coursework includes 17 credits in epidemiology, biostatistics, ethics, and teaching core courses common to both tracks; 6 credits in advanced methodology/statistics that focus on track-specific courses; 4 credits of content area courses; and 12 credits of supporting program or minor coursework. In addition, the Graduate School requires 24 thesis credits as part of the doctoral requirements that can be taken once the preliminary qualifying exams are completed.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—The minor requires 12 credits: 10 credits in epidemiology and biostatistics, and 2 credits in epidemiology elective courses. The director of graduate studies must approve the student's selection of elective credits. Contact the major coordinator in epidemiology for information at epichstu@umn.edu.

Ergonomics

See Human Factors/Ergonomics.

Experimental Surgery

See Surgery.

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, Saint Paul, MN 55108 (612-625-3116; fax 612-625-4227; http://cehd.umn.edu/fsos/Graduate/famPolMinor.asp).

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, 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. Hull, 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

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 www.cehd.umn.edu/fsos/Graduate.

Courses—Contact the minor program office or www.cehd.umn.edu/fsos/Graduate 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.

Family Social Science

Contact Information—Department of Family Social Science, University of Minnesota, 290 McNeal Hall, 1985 Buford Avenue, Saint Paul, MN 55108 (612-625-3116 or 612-625-1900; fax 612-625-4227; fsosgrad@umn.edu; http://cehd.umn.edu/fsos/Graduate.

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

Professor

Jean W. Bauer, SM
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
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

Jodi B. Dworkin, SM
Joan M. Patterson, Psychiatry, ASM
Beatrice E. Robinson, Family Medicine and Community Health, AM2
Martha A. Rueter, SM
Catherine A. Solheim, SM
Elizabeth Wieling, SM
Blong Xiong, M2
Virginia S. Zuiker, SM

Assistant Professor

Shonda M. Craft, M2
Abigail Gewirtz, M2
Tai J. Mendenhall, Family Medicine and Community Health, AM2

Lecturer

William J. Goodman, M2
Cynthia J. Meyer, M2

Research Associate

Gretchen E. Wrobel, AM2

Other

Sara Axtell, Community-Campus Health Outreach Liaison, M2
Patricia Olson, Minnesota Extension Director, M2

Along with the program-specific requirements listed below, 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 Commission on Accreditation for Marriage and Family Therapy Education. 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 Admissions and Orientation Web page or the director of graduate studies. The Graduate Program Handbook and application requirements and procedures may be found at http://cehd.umn.edu/fsos/Graduate/admissionOrient.asp.

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 or in Twin Cities Courses on the University Catalog Web site 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—Master's students 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.

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; gwss@umn.edu; www.gwss.umn.edu).

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

Regents Professor

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
Raymond Duvall, 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. Joeres, 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. Kohlstedt, Geology and Geophysics, AM2
Regina Kunzel,, Gender, Women, and Sexuality Studies,SM
Helga Leitner, Geography, AM2
Mary J. Maynes, History, AM2
Richard W. McCormick, German, Scandinavian, and Dutch, AM2
Ellen Messer-Davidow, English, ASM
Richa Nagar, Gender, Women, and Sexuality Studies, SM
Riv-Ellen Prell, American Studies, AM2
Paula Rabinowitz, English, ASM
Gloria Goodwin Raheja, Anthropology, AM2
Rebecca Ropers-Huilman, Educational Policy and Administrattion, AM2
Naomi B. Scheman, Philosophy, SM
Edward Schiappa, Communication Studies, AM2
Mary Lay Schuster, Writing Studies, AM2
Amy L. Sheldon, Communication Studies, AM2
Billie J. Wahlstrom, Writing Studies, AM2
Ann B. Waltner, History, AM2
Barbara Y. Welke, 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, Gender, Women, and Sexuality 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
Kevin Murphy, History, AM2
Lisa A. Norling, History, AM2
Joanna O'Connell, Spanish and Portuguese Studies, AM2
Jennifer L. Pierce, American Studies, AM2
Eileen B. Sivert, French and Italian, AM2
Dara Strolovitch, Political Science, AM2
Karen Taussig, Anthropology, AM2
Gary Thomas, Cultural Studies and Comparative Literature, AM2
Karen E. Till, Geography, AM2
Edén Torres, Gender, Women, and Sexuality Studies, SM
Mary Vavrus, Communication Studies, AM2
Michelle M. Wright, English, ASM
Monika Zagar, German, Scandinavian, and Dutch, AM2
Jacquelyn N. Zita, Gender, Women, and Sexuality Studies, SM

Assistant Professor

Bianet Castellanos, American Studies,MA
Omise'eke Natasha Tinsley, English, AM
Diane Willow, Art, AM

Other

Karen Brown-Thompson, AM2

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

Curriculum—The M.A. 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. It is similar to the Ph.D. but with no dissertation.

The Ph.D. program is an interdisciplinary, multicultural, and international study of women and gender in which students develop competence in interdisciplinary and disciplinary feminist theories, research methods, and pedagogy. The program pays attention to all aspects of women's diversity, nationally and globally. Students may select a disciplinary focus from among feminist theory, critical sexuality studies, literary studies, historical studies, social sciences and public policy, and gender in a global

perspective, or may, with the advice and consent of the director of graduate studies, design their own area of concentration.

Prerequisites for Admission—The graduate minor program is available only to students who have prior admission to a master's or doctoral degree-granting program within the Graduate School.

Special Application Requirements—Applicants for the Ph.D. program must submit scores from the General (Aptitude) Test of the GRE, three letters of recommendation sent directly to the department, a writing sample, a current curriculum vitae, and a clearly written statement of career interests, goals, and objectives. Graduate study in the program begins in the fall semester. The application deadline is Friday of the first week in December; all applications are evaluated once each year in December.

Students interested in the graduate minor program should 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 or in Twin Cities Courses on the University Catalog Web site 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 considered only 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 written and oral and is effectively identical to the Ph. D. preliminary written and oral exams.

Ph.D. Degree Requirement

The course and credit requirements for the Ph.D. fall into roughly two categories: interdisciplinary courses satisfying core requirements, and courses constituting or enhancing a concentration. Students take 28 credits in required courses, including two elective courses that satisfy core requirements in cultural diversity and two courses that satisfy core requirements in research tools and methods. The remaining coursework includes 12 credits in an area of concentration and 12 credits in the minor field or supporting program (related to the concentration). Students are also expected to register for 1 credit of GWSS 8996 for each of 4 semesters and to participate in the department colloquium series of faculty, student, and guest lecturer presentations. In addition, students are expected to register for 24 thesis credits while writing the dissertation.

Because some courses may fall into more than one category (e.g., courses in the concentration may also satisfy core course requirements), students are permitted to "double count" credits in the major program in consultation with the director of graduate studies. This means that a student can graduate with fewer than 55 credits when double counting is approved. Students entering the Ph.D. program with a master's degree may transfer credits from that degree and apply them to the Ph.D. requirements in consultation with the director of graduate studies. All students, however, must take GWSS 8108 and 8109.

Language Requirements—None, but a second language is strongly encouraged.

Preliminary Exams—Ph.D. students are expected to take a three-paper preliminary written exam, a preliminary oral exam on those papers, and an informal oral exam on their dissertation proposal.

Final Exam—The final Ph.D. exam on the dissertation 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, and 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 cr), including at least one 5xxx or 8xxx course in gender, women, and sexuality studies and at most one feminist studies-approved graduate course from their 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; mfmgrad@umn.edu; www.math.umn.edu/finmath).

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

Professor

Scot Robert Adams, M2
John Robert Baxter, M2
Bernardo Cockburn, M2
Lawrence F. Gray, M2

Assistant Professor

Carlos Tolmasky, AM2

Along with the program-specific requirements listed below, 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 focusing on C# and MATLAB. 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—Recent college graduates 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 are admitted for fall semester only.

Courses—Refer to Financial Mathematics (FM) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.

Food Science

Contact Information—Graduate Program in Food Science, Department of Food Science and Nutrition, University of Minnesota, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint Paul, MN 55108 (612-624-1290; fax 612-625-5272; fsgrad@umn.edu; http://fscn.cfans.umn.edu/education/foodsciencegraduate/index.htm).

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

Professor

Mrinal Bhattacharya, SM
Linda J. Brady, SM
A. Saari Csallany, SM
Theodore P. Labuza, SM
Allen S. Levine, SM
Daniel J. O'Sullivan, SM
Gary A. Reineccius, SM
Roger R. Ruan, SM
Joanne L. Slavin, AM2
David E. Smith, SM
Zata M. Vickers, SM

Adjunct Professor

Bernhard van Lengerich, AM2

Associate Professor

Mirko Bunzel,SM
Francisco Diez-Gonzalez, SM
Joellen M. Feirtag, SM
Craig A. Hassel, AM2
Leonard F. Marquart, SM
Lloyd Metzger, SM

Adjunct Associate Professor

Katherine M. Swanson, AM2

Assistant Professor

Baraem Ismail, SM

Adjunct Assistant Professor

Mary K. Schmidl, AM

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

Curriculum—Food science applies scientific principles to the manufacture, distribution, marketing, and consumer aspects of food. Food scientists apply the basic principles and techniques of many disciplines, including chemistry, physics, microbiology, and nutrition, to food processing and preservation, new product development, and food marketing. Food scientists are concerned with the theoretical and practical aspects of the food chain, from the production of raw materials to the use of food products by consumers. Students may emphasize the chemistry, engineering, microbiology, nutrition, or technology of food products.

Prerequisites for Admission—Applicants with an undergraduate major in any physical or biological science usually have completed the necessary prerequisites. The minimum requirements are general chemistry with laboratory, organic chemistry with laboratory, physics with laboratory, biology with laboratory, and calculus. If preparation appears inadequate, certain additional courses may be required after admission.

Special Application Requirements—GRE scores and three letters of reference are required.

Courses—Refer to Food Science and Nutrition (FSCN) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx food science courses on the Degree Program Form is permitted with adviser and director of graduate studies approval.

M.S. Degree Requirements

The M.S. offers both Plan A (with thesis) and Plan B (without thesis) options. Both options require at least 14 course credits in the major and 6 course credits in the minor or related field. Plan A also requires at least 10 thesis credits. Plan B also requires at least an additional 10 graduate credits in approved courses and a Plan B paper. The minor may be chosen from fields such as biochemistry, chemistry, chemical engineering, microbiology, nutrition, and statistics. All students also are expected to participate as teaching assistants during their graduate careers.

Language Requirements—None.

Final Exam—The final exam is oral.

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.

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.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—For a Ph.D. minor, students must take FSCN 4111 and 4121, and BAE 4744, plus one additional food science graduate level course totally 12 credits. The minor must be approved by the food science director of graduate studies.

Forestry

See Natural Resources Science and Management.

French

Contact Information—A department 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.html.

Professor

F. R. P. Akehurst, SM
Daniel Brewer, SM
Susan Noakes, SM, Italian, M

Associate Professor

Mária M. Brewer, SM
Bruno Chaouat, M2
Juliette Cherbuliez, M2
Susanna Ferlito, SM, Italian, M
Betsy Kerr, SM
Judith Preckshot, SM
Peter H. Robinson, SM
Eileen B. Sivert, SM

Assistant Professor

Hakim Abderrezak, M2
Mary F. Brown, M2
Christophe M. Wall-Romana, M2

Along with the program-specific requirements listed below, 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 interests, expertise, and research in areas that are shaping the discipline of French studies. The program, which fosters interdisciplinary research, has particular strengths in literary and cultural studies, critical theory, feminist studies, medieval studies, and francophone studies.

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. The program offers funding packages of five years for those admitted at the M.A. level. Submission of all application materials by December 15 ensures consideration for Graduate School Fellowships; submission by 1 January ensures consideration for other fellowships and graduate instructorships for the next academic year. New teaching assistants and fellowship recipients are only admitted for fall semester; others may be admitted in mid-year.

Affiliated Research Centers—Students 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 or in Twin Cities Courses on the University Catalog Web site.

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 cr). 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 Students Majoring 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 cr). 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 Students Majoring 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.html.

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 Abderrezak, 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 cr) selected according to the following formula: one course (3 cr) in French linguistics, one course (3 cr) in French or francophone literature or culture, and three elective courses (9 cr) in French/francophone language, linguistics, literature, or culture. One of the three electives may be taken in a related area outside French studies, subject to approval by the student's adviser. At least 60 percent of credits must be taken at the 5xxx and 8xxx levels and no more than two courses (6 cr) 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
Robert B. McMaster, M2
Shashi Shekhar, Computer Science, M2

Associate Professor

Francis Harvey, M2
Steven Manson, M2
Roger Miller, M2
Roderick H. Squires, M2

Assistant Professor

Robert Edsall, 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, 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 (M.G.I.S.), administered by the Department of Geography, provides graduate-level work in the theory, applications, and technology of geographic information science (GIS). Courses for the program are divided into three broad categories. Core courses provide the conceptual and theoretical underpinnings for a comprehensive, well-rounded knowledge of GIS, including an introductory seminar for entering students (GIS 8501). A set of technology courses 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 M.G.I.S. 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 or in Twin Cities Courses on the University Catalog Web site 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 under 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 courses (12 credits of core courses and 6 credits of technology courses). All students are required to take GEOG 5561, GEOG 5563, GIS 5571, GIS 5572, an approved 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 courses (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 M.G.I.S. director of graduate studies about selecting an adviser. The minor requires at least 9 credits (three 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.

Regents Professor

Eric S. Sheppard, SM

Professor

Philip J. Gersmehl, SM
John Fraser Hart, SM
Lawrence M. Knopp Jr., Geography, Duluth, AM2
Helga Leitner, SM
Ann R. Markusen, Public Affairs, AM2
Judith A. Martin, SM
Robert B. McMaster, SM
Richa Nagar, Gender, Women, and Sexuality Studies, AM2
Abdi I. Samatar, 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, AM
Scott Freundshuh, Geography, Duluth, AM
Vinay K. Gidwani, SM
Timothy J. Griffis, Soil, Water, and Climate, AM2
Francis J. Harvey, SM
George L. Henderson, SM
Katherine Klink, SM
Steven M. Manson, SM
Roger P. Miller, SM
Roderick H. Squires, SM
Karen E. Till, SM
Connie H. Weil, SM

Assistant Professor

Rob Edsall, M2
Brenda Kayzar, M2
Kurt F. Kipfmueller, M2
Arun Saldanha, M2
Susy S. Ziegler, M2

Other

William J. Craig, Associate Director, Center for Urban and Regional Affairs, AM2
Mark B. Lindberg, Director, University of Minnesota Cartography Lab, M2

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

Curriculum—The geography graduate program at Minnesota reflects the intellectual breadth of the discipline by maintaining strengths in the broad areas of human geography, physical geography, nature-society relationships, and geographic information science. Faculty and students are engaged in teaching and research both within and across these broad areas as evidenced by prominent research themes within the program: culture, place, and flow; environmental change; geographies of the information society; geovisualization; globalization and uneven development; governance, citizenship, and justice; metropolis and world; and nature and society. To support students in gaining both depth and breadth within the discipline, the program is highly individualized with a limited number of requirements. Students work with their advisers to design individual programs suited to their educational and professional goals.

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/or regional geography. Students who were not undergraduate geography majors are encouraged to apply but may be required to make up deficiencies.

Special Application Requirements—Applicants must provide three letters of recommendation from persons familiar with their scholarship and research potential. 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—No more than two 4xxx courses may be included on 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, 8002, and 8405, plus two additional GEOG 81xx and/or GEOG 82xx courses. GEOG 8970 and 8980 may be used for GEOG 81xx or 82xx coursework with permission of the adviser. The M.A. program usually is completed within two years. Further details on degree requirements may be found on the department Web page.

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 Majoring in Other Fields—A master's minor must be developed in consultation with a faculty adviser. Consult the director of graduate studies about selecting an adviser. The minor requires at least 6 credits (two courses).

Ph.D. Degree Requirements

Each student is required to take GEOG 8001, 8002, and 8405, 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 12 or more graduate credits outside of the department. Course credits from the M.A. program may be transferred to the Ph.D. program. Further details on degree requirements may be found on the department Web page.

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 Majoring in Other Fields—A doctoral minor program must be developed in consultation with an appropriate faculty adviser. Consult the director of graduate studies about selecting an adviser. The minor requires at least 9 credits (three courses).

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; civesgs@umn.edu; www.ce.umn.edu).

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

Professor

Roberto Ballarini, SM
Steven L. Crouch, SM
Peter A. Cundall, ASM
Gary A. Davis, M2
Emmanuel M. Detournay, SM
Andrew Drescher, SM
Efi Foufoula-Georgiou, SM
Catherine E. French, SM
Bojan B. Guzina, SM
Miki Hondzo, M2
Joseph F. Labuz, SM
Arturo E. Schultz, M
Carol K. Shield, SM
Henryk K. Stolarski, SM
Otto D. L. Strack, SM
Vaughan R. Voller, SM

Associate Professor

William A. Arnold, M2
Randal J. Barnes, 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

Adjunct Professor

Marc Bonnet, AM2

Senior Research Associate

Sofia G. Mogilevskaya, AM2
Eugene Skok, M2

Along with the program-specific requirements listed below, 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 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx department 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 cannot 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 cr); 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 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 three plans. Plan A emphasizes research and preparation of a thesis; Plan B emphasizes coursework and project; Plan C is coursework only. The thesis is written on a research project carried out in consultation with a faculty adviser. Under Plan B, students complete one to three Plan B papers as determined by the faculty adviser. Plan B papers can include computer programs, annotated bibliographies, field investigations, and analysis/design of special engineering problems. Plan A requires at least 20 course credits and 10 thesis credits. Plan B requires at least 27 course credits and Plan C requires 30 course credits. At least 6 credits of coursework must be from outside the department for all plans.

Language Requirements—None.

Final Exam—The final exam is oral except for plan C.

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.geo.umn.edu).

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

Regents Professor

Thomas C. Johnson, Geological Sciences, Duluth, ASM
Herbert E. Wright Jr., (emeritus), ASM

Professor

E. Calvin Alexander Jr., SM
Subir K. Banerjee, M2
Erik Brown, Geological Sciences, Duluth, ASM
Steve Colman, Geological Sciences, Duluth, ASM
R. Lawrence Edwards, SM
Jonathan Foley, Institute on the Environment, ASM
John W. Goodge, Geological Sciences, Duluth, ASM
Vicki L. Hansen, Geological Sciences, Duluth, ASM
Marc Hirschmann, SM
Peter J. Hudleston, SM
Emi Ito, SM
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
Lee Penn, Chemistry, ASM
Bryan Shuman, Geography, AM2
John Swenson, Geological Sciences, Duluth, ASM
Nigel J. Wattrus, Geological Sciences, Duluth, ASM
Josef P. Werne, Chemistry and Biochemistry, Duluth, ASM

Assistant Professor

James Almendinger, Fisheries, Wildlife, and Conservation Biology, AM2
Annia K. Fayon, AM2
Joshua M. Feinberg, SM
Karen B. Gran, Geological Sciences, Duluth, AM2
Kent C. Kirkby, AM
Katsumi Matsumoto, SM
James D. Miller, Geological Sciences, Duluth, AM2
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

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, 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, biogeochemistry, 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—A department application, 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 8 to ensure consideration. Studies may begin in any semester or summer session, although fall semester is preferable. IMPORTANT: Refer to the Graduate Programs section of the department Web site for a listing of all required applications materials and preferred method of submission (www.geo.umn.edu.dept/programs/gradprosp.html).

Interdisciplinary Collaborations—In addition to the department's long history of collaboration with the engineering, physical science, and math departments in the Institute of Technology, there are many organizations within and without the University with which the faculty collaborate in order to promote a wide range of interdisciplinary studies: Antarctic Geospatial Information Center; Bell Museum of Natural History; Department of Ecology, Evolution, and Behavior; Department of Geological Sciences, Duluth campus; History of Science and Technology; Institute for Rock Magnetism; Institute on the Environment; Institute of Technology Characterization Facility; Large Lakes Observatory, Duluth; Limnological Research Center; Macalester College; Minnesota Geological Survey, Minnesota Supercomputing Institute; National Center for Earth-surface Dynamics; Postsecondary Teaching and Learning; Quaternary Paleoecology Minor Program; Red Lake Peatland Observatory; Science Museum of Minnesota; St. Croix Watershed Research Station; Water Resource Science Program. Check the department's Web site for a current listing of research facilities within the department of geology and geophysics.

Courses—Refer to Geology and Geophysics (GEO) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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. 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 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 a 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.

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.geo.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

Joshua M. Feinberg, SM
Katsumi Matsumoto, 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, 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—A department application, 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 8 to ensure consideration. Studies may begin in any semester or summer session, although fall semester is preferable. IMPORTANT: Refer to the Graduate Programs section of the department Web site for a listing of all required applications materials and preferred method of submission (www.geo.umn.edu.dept/programs/gradprosp.html).

Interdisciplinary Collaborations—In addition to the department's long history of collaboration with the engineering, physical science, and math departments in the Institute of Technology, there are many organizations both within and without the University with which our faculty members collaborate in order to promote a wide range of interdisciplinary studies: Antarctic Geospatial Information Center; Bell Museum of Natural History; Department of Ecology, Evolution and Behavior; Department of Geological Sciences, Duluth Campus; History of Science and Technology; Institute for Rock Magnetism; Institute on the Environment; Institute of Technology Characterization Facility; Large Lakes Observatory, Duluth; Limnological Research Center; Macalester College; Minnesota Geological Survey; Minnesota Supercomputing Institute; National Center for Earth-surface Dynamics; Post Secondary Teaching and Learning; Quaternary Paleoecology Minor Program; Red Lake Peatland Observatory; Science Museum of Minnesota; St. Croix Watershed Research Station; Water Resource Science Program. Check the department's Web site for a current listing of research facilities within the department of geology and geophysics.

Courses—Refer to Geology and Geophysics (Geo) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 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 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 Street S.E., Minneapolis, MN 55455 (612-625-2080; fax 612-624-8297; gradgsd@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 K. N. Stockenstrom, Scandinavian, SM
Arlene A. Teraoka, German, SM

Associate Professor

Kaaren E. Grimstad, Scandinavian, Germanic Medieval, SM
Rembert Hueser, German, SM
Charlotte A. Melin, German, SM
Leslie Morris, German, SM
Ray M. Wakefield, German, Germanic Medieval, SM
Monika Zagar, Scandinavian, SM

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

Curriculum—The Germanic studies graduate program includes five tracks: 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 may be submitted through the online application or be sent directly to the department: the department's Supplemental Application Information form; a copy of one or more papers representative of the applicant's level of scholarly development; and three letters of recommendation. A complete set of transcripts (in addition to transcripts sent to the Graduate School) must be sent to the department. 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 December 15.

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 GSD 8001, Approaches to Textual Analysis and two other courses, for at least 9 credits. Ph.D. minors who have not completed GSD 8001 at the M.A. level must fulfill this requirement at the Ph.D. level. In addition, Ph.D. minors must complete at least four other courses for a total of at least 15 credits (usually five courses).

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 four core courses in literature and theory; a Germanic medieval studies course; three electives 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 the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.

German Track 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 30 credits, including four courses in German literature/culture beyond the M.A.; a course in Germanic medieval studies; a dissertation seminar; and four courses outside the German track. A pedagogy course and three core courses are also required if they have not been taken for the Germanic Studies M.A., A minimum of 24 thesis credits are required.

Courses—Refer to German (GER); German, Scandinavian, and Dutch (GSD); and Dutch (DTCH) 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. 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 or in Twin Cities Courses on the University Catalog Web site 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 literature and culture courses; two or more courses in language teaching, curriculum and instruction or teaching English as a second language or linguistics; one elective; 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 or in Twin Cities Courses on the University Catalog Web site 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); Dutch (DTCH); German (GER); German, Scandinavian, and Dutch (GSD); and Scandinavian (SCAN) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.

Germanic Medieval Studies Track 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 33 credits, including four courses in Germanic Medieval studies; two courses in a third medieval Germanic language (supplementing the two languages for the M.A.); a dissertation seminar, and four courses in a designated minor or supporting field. A pedagogy course and GSD 8001—Approaches to Textual Analysis are also required if they have not been taken for the M.A.), A minimum of 24 thesis credits are required.

Courses—Refer to English (ENGL); Dutch (DTCH); German (GER); German, Scandinavian, and Dutch (GSD); and Scandinavian (SCAN) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to this track.

Language Requirements—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 36 credits. Students choose to emphasize either German or Scandinavian. The German emphasis requires at least four GER 8xxx literature or theory courses and three Scandinavian courses: one Old Norse course, one 19th-century Scandinavian literature course and one 20th-century Scandinavian literature course. The Scandinavian emphasis requires one Old Norse course, one 19th-century Scandinavian literature course and one

20th-century Scandinavian literature course plus an additional Scandinavian course and three GER 8xxx literature or theory courses. Students in both emphases are required to take a dissertation seminar and 4 courses in a designated minor or supporting program. Also required if not already taken for the M.A.: a pedagogy course and GSD 8001—Approaches to Textual Analysis. A minimum of 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 or in Twin Cities Courses on the University Catalog Web site 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 / MAGEC, University of Minnesota, MMC 197, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-1185; coa@umn.edu; www.hpm.umn.edu/coa/ed_opp/gerontologyminorattheumn.html).

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

Regents Professor

Matt McGue, Psychology, M

Professor

Donna Z. Bliss, Nursing, M
David O. Born, Primary Dental Care-Health Ecology, M
James C. Cloyd, Pharmacy Practice, M
Jim Curtsinger, Ecology, Evolution, and Behavior, M
Daniel F. Detzner, 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
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 and Biomedical Sciences, M
Tom A. Larson, Pharmacy Practice, M
Chap Le, Biostatistics, 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
LaDora V. Thompson, Physical Medicine and Rehabilitation, 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
Joseph E. Gaugler, Nursing, M
Priscilla 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 and Human Resource Education, M
James R. Reinardy, Social Work, M
Robert C. Serfass, Kinesiology, M
Stephen K. Shuman, Preventive Sciences, M
Carla E. S. Tabourne, Kinesiology, M

Assistant Professor

Michael K Davern, Public Health, M
Jeremy L. Holtzman, Medicine, M
Hee Lee, Social Work, M
Dawn Annette Lowe, Biochemistry, M
David B. Luke, English, M
Teresa C. McCarthy, Family Medicine and Community Health, M
David M Radosevich, Surgery, M
Huber R. Warner, Biological Science, M

Research Associate

Lois Cutler, Public Health, M
Celia W. Gershenson, Psychology, M

Other

Ursala Bea Krinke, Epidemiology, 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, Institute for Health Informatics MMC 912, 330 Diehl Hall, 505 Essex Street S.E., Minneapolis, MN 55455 (612-625-8440; fax 612-625-7166; www.ihi.umn.edu)

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

Professor

Donald P. Connelly, SM
Shawn Curley, 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
Julie Jacko, Nursing, Public Health, SM
Paul E. Johnson, Information and Decision Sciences, SM
George G. Klee, Mayo Clinic, M2
Stuart M. Speedie, SM

Douglas R. Wholey, Health Services Research and Policy, SM

Adjunct Professor

Christopher G. Chute, SM

Associate Professor

George Karypis, Computer Science and Engineering, M2
Stephen T. Parente, Health Care Management, M2
Sandra J. Potthoff, Health Care Management, SM
Edward Ratner, Medicine, M2

Assistant Professor

Terrence Adam, Pharmacy, M2
Genevieve Melton-Meaux, Surgery, M2
Serguei Pakhomov, Pharmacy, M2
Bonnie Westra, Nursing, M2

Adjunct Assistant Professor

John Faughnan, M2
Marcelline Harris, M2
Jeffrey Hertzberg, M2
Martin LaVenture, M2
George Vasmatizis, M2

Other

Linda A. Watson, Health Sciences Library, AM2
Brian J. Westrich, M2

Along with the program-specific requirements listed below, 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 listed for 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. Check the Web site at www.ihi.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 or in Twin Cities Courses on the University Catalog Web site 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 sub area (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 70 credits, including 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 Requirements—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 and Communication

Contact Information—Health Journalism and Communication 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 612-625-9525; hjournal@umn.edu; www.healthjournalism.umn.edu).

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

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. Schwitzer, M2
Brian G. Southwell, M2

Assistant Professor

Marco Yzer, M2

Along with the program-specific requirements listed below, 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 and communication promotes improved public communication about health matters by combining knowledge, skills, and experience from both disciplines. The program is designed for journalists and health professionals, who earn a master's degree in health journalism. Journalists and communications professionals learn the fundamentals of medical research and public health. Health professionals learn basic journalistic principles and ethics, and how to develop meaningful health stories. Those pursuing other master's degrees, (e.g., master's in public health), earn the M.A. in health journalism and communication in addition to the other degree.

Prerequisites for Admission—The minimum requirement for admission is a B.A. or equivalent. The program is designed for journalists and communications professionals with at least two years of professional experience. It is also designed for health professionals with at least two years of public health or other professional health experience.

Special Application Requirements—Applicants must submit an application to the University of Minnesota Graduate School and a department application to the School of Journalism and Mass Communication. The department application includes a clearly written statement of career interests, goals, and objectives; three letters of recommendation; a complete set of transcripts; professional work samples; IELTS or TOEFL scores (for every applicant whose previous degree was obtained from a non-English speaking country and whose native language is not English); and scores from the GRE. The director of graduate studies may waive the GRE requirement for students who have at least five years of professional experience and a strong academic record or have recently completed another graduate degree program. This program uses a rolling admission process: the sooner a complete application is received (this includes both the completed Graduate School and department applications), the sooner the applicant receives a decision. Applications received by January 15 receive first consideration. For fall enrollment, the final deadline for applications is May 15.

Courses—Refer to Journalism and Mass Communications (JOUR) and Public Health (PUBH) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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: health journalism or health communication. All coursework must be taken A-F.

Language Requirements—Foreign language study is recommended for students who plan to work internationally.

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; sph-ssc@umn.edu; www.sph.umn.edu).

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

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
Judith M. Garrard, Public Health, SM
Diwaker Gupta, IT Mechanical Engineering Administration, ASM
Robert L. Kane, Public Health, SM
Rosalie A. Kane, Public Health, SM
John E. Kralewski, (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
Francois Sainfort, Public Health, SM
Vernon E. Weckwerth, Public Health, SM
Douglas R. Wholey, Public Health, SM

Associate Professor

Lynn A. Blewett, Public Health, SM
Kathleen T. Call, Public Health, SM
Leslie A. Grant, Public Health, SM
Donna D. McAlpine, Public Health, M2
Gordon M. Mosser, Public Health, M
Stephen T. Parente, Health Care Management, M2
Sandra J. Potthoff, Public Health, SM
William J. Riley, Public Health, M2
Todd H. Rockwood, Public Health, SM
Robert J. Town, Public Health, SM
Beth A. Virnig, Public Health, SM

Adjunct Associate Professor

Robert A. Connor, Health Care Management, SM
Michael D. Finch, Public Health, SM

Assistant Professor

Jean M. Abraham, Public Health, M2
Michael E. Davern, Public Health, AM
Pinar Karaca-Mandic, M
Jeffrey McCullough, M2

Adjunct Assistant Professor

Jeremy L. Holtzman, Medicine, M
Yvonne Jonk, Public Health, M2
David M. Radosevich, Surgery, M

Other

Kirk C. Allison, M2
Pamela Jo Johnson, AM

Along with the program-specific requirements listed below, 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 decision sciences, economics, political science, sociology, business, engineering 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 is recommended. The Ph.D. program requires calculus and statistics. Applicants who have not completed the prerequisites, but are otherwise qualified for admission, are required to take relevant courses at the University or another accredited institution before beginning the program.

Special Application Requirements—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), or the IELTS exam with a preferred score of 7.0. The TOEFL or IELTS 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 C.V. Students are admitted fall semester only. The programs are full time.

For an online application and information about application requirements, see the School of Public Health Web site at www.sph.umn.edu/students/application/home.html.

Courses—Refer to Public Health (PUBH), particularly numbers 65xx, 67xx, 68xx, and 88xx, in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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. The Plan B MS degree also includes a part-time, three year option.

Plan A requires 49–52 credits, including 33–36 core credits, 6 elective credits in one or more related fields outside the major, and 10 thesis credits. Plan B requires 46 credits, including 37 core credits and 9 elective credits in one of the structured Areas of Interest or other related fields outside the major.

Ph.D. Degree Requirements

The Ph.D. requires at least 74 credits, including 30-31 core credits in the major, and 21-26 credits in a chosen area of emphasis, and 24 thesis credits. The structured areas of emphasis include: multidisciplinary social sciences, sociology of health and illness, health decision science, health organizations and management science, clinical outcomes research, Health policy analysis, and health economics.

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 (612-625-5858; fax 612-625-3549; spptgrad@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
Amy K. Kaminsky, Gender, Women, and Sexuality Studies, ASM
Carol A. Klee, SM
Nicholas Spadaccini, SM

Associate Professor

Fernando Arenas, SM
Timothy Face, SM
Ofelia Ferrán, SM
Ana Forcinito, SM
Francisco A. Ocampo, SM
Joanna O'Connell, SM
Luis Ramos-García, SM

Assistant Professor

Jaime Hanneken, M2
Raul Marrero-Fente, M2

Along with the program-specific requirements listed below, 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 Luso-Brazilian 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 sociohistorical perspectives on literatures and cultures. The 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; African 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—Check the department Web site for application information: http://spanport.umn.edu/grad/apply.php. The deadline for application for admission is January 5th. Applicants are considered for admission for fall semester only.

For an online application or for more information about Graduate School admissions, see the General Information section in this catalog, or visit the Graduate School Web site.

Courses—Refer to Portuguese (PORT), Spanish (SPAN), and Spanish-Portuguese (SPPT) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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—Department of Spanish and Portuguese Studies, University of Minnesota, 51 Folwell Hall, 9 Pleasant Street S.E., Minneapolis, MN 55455 (612-625-5858; fax 612-625-3549; spptgrad@umn.edu; www.spanport.umn.edu).

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

Professor

Ana Paula Ferreira, 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
Ofelia Ferrán, M2
Ana Forcinito, M2
Francisco A. Ocampo, M2
Joanna O'Connell, M2
Luis Ramos-García, M2

Assistant Professor

Jaime Hanneken, M2
Raul Marrero-Fente, M2

Along with the program-specific requirements listed below, 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 Luso-Brazilian Literature 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 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—Check the department Web site for application information: http://spanport.umn.edu/grad/apply.php. The deadline for application for admission is January 5th. Applicants are considered for admission for fall semester only.

For an online application or for more information about Graduate School admissions, see the General Information section in this catalog, or visit the Graduate School Web site.

Courses—Refer to Portuguese (PORT), Spanish (SPAN), and Spanish-Portuguese (SPPT) in the course section of this catalog

or in Twin Cities Courses on the University Catalog Web site 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, 1110 Heller Hall, 271 19th Ave South, 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

Allen F. Isaacman, SM
Elaine Tyler May, American Studies, SM
Steve Ruggles, SM

Professor

Catherine Asher, Art History, AM2
Frederich Asher, Art History, AM2
Bernard S. Bachrach, SM
Iraj Bashiri, SM
Anna K. Clark, SM
Gary Cohen, SM
Gail Dubrow, Landscape Architecture, SM
John K. Evans, SM
John M. Eyler, History of Medicine, ASM
Edward L. Farmer, SM
Donna Gabaccia, SM
David F. Good, SM
Ruth M. Karras, SM
Sally G. Kohlstedt, History of Science and Technology, ASM
Regina Kunzel, SM
Nabil Matar, English, ASM
Lary May, American Studies, SM
Mary Jo Maynes, SM
Robert E. McCaa, SM
Russell R. Menard, SM
John K. Munholland, 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
Daniel Schroeter, SM
Theofanis G. Stavrou, SM
James D. Tracy, SM
Ann B. Waltner, SM
Eric D. Weitz, SM
Barbara Y. Welke, SM

Associate Professor

Jennifer Alexander, History of Science and Technology, AM2
Keletso E. Atkins, African American and African Studies, AM2
Susannah Blumenthal, AM
Sarah C. Chambers, SM
Brenda Child, American Studies, AM2
Kirsten Fischer, SM
Tamara L. Giles-Vernick, SM
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
Kevin P. Murphy, SM
Lisa A. Norling, SM
Jean M. O'Brien-Kehoe, SM
J. B. Shank, SM
Ajay Skaria, SM
Eva Von Dassow, Classical and Near Eastern Studies, AM2
Liping Wang, SM
Thomas C. Wolfe, SM

Assistant Professor

Giancarlos Casale, M2
David Chang, M2
Victoria B. Coifman, African American and African Studies, AM2
Tracey Deutsch, M2
Andrea Gallia, M2
Carol Hakim, M2
Mai Na Lee, M2
Malinda Lindquist, M2
Sarah-Jane Mathieu, M2
Hiromi Mizuno, M2
Kevin Murphy, M2
Helena Pohlandt-McCormick, M2

Lecturer

Marguerite Ragnow, AM

Along with the program-specific requirements listed below, 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 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, 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 or Twin Cities Courses on the University Catalog Web site 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 defendable 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 ten history courses (including HIST 8015) (roughly 30 cr), four non-history courses (roughly 12 cr), 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, 108 Pillsbury Hall, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-7069; fax 612-625-3819; HSTM@physics.umn.edu; www.hstm.umn.edu).

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

Professor

John M. Eyler, History of Medicine, SM
Sally Gregory Kohlstedt, Geology and Geophysics, SM
Thomas J. Misa, History of Science and Technology, SM
Robert W. Seidel, Chemical Engineering, SM
Alan E. Shapiro, Physics, SM
Roger H. Stuewer, (emeritus), Physics, ASM
C. Kenneth Waters, Philosophy, AM2

Associate Professor

Jennifer Karns Alexander, Mechanical Engineering, SM
Tamara L. Giles-Vernick, History, AM2
Jennifer Gunn, History of Medicine, SM
Michel Janssen, Physics, SM
Susan D. Jones, Ecology, Evolution, and Behavior, SM

Assistant Professor

Megan K. Barnhart, History of Science and Technology, M
Mark E. Borrello, Ecology, Evolution, and Behavior, SM

Adjunct Assistant Professor

Jon Harkness, History, AM2
David Rhees, Surgery, AM2
Jole Richard Shakelford, Medicine, SM

Along with the program-specific requirements listed below, 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 application form.

Courses—Refer to History of Science and Technology (HSCI) and the History of Medicine (HMED) course lists in this catalog or in Twin Cities Courses on the University Catalog Web site 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 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 cr) 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 competence, including teaching and research. Following the guidelines in the *Graduate Student Handbook* for the program (www.hstm.umn.edu), Ph.D. students 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) and a minor or supporting program consisting of four courses (12 cr). 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, 20 Classroom Office Building, 1994 Buford Avenue, St Paul, MN 55108 (612-624-4000; cceinfo@umn.edu; www.cce.umn.edu/certificates/hhs/housing). Housing Studies direct contact: 612-626-1219.

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

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. An undergraduate GPA of 3.00 is preferred. (Students who do not have a 3.00 GPA should describe relevant nonacademic 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 www.onestop.umn.edu/onestop/registration.html 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 Graduate School 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 (612-626-8391; www.humanfactors.umn.edu).

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

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 Shekhar, Computer Science, AM
John Shutske, Biosystems and Agricultural Engineering, M
Thomas Stoffregen, Kinesiology, M
Donald Vesley, M
Michael Wade, Kinesiology, M

Adjunct Professor

Victor Koscheyev, Kinesiology, M

Associate Professor

Lee Ann Breuch, Rhetoric, M
Elizabeth Bye, Design, Housing, and Apparel, M
Jonathan Chaplin, Biosystems and Agricultural Engineering, M
Victoria Interrante, Computer Science, M
Loren Terveen, Computer Science, 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 or in Twin Cities Courses on the University Catalog Web site 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, master's students must also take a course in statistical analysis methods. The statistic course may be at the graduate or undergraduate level, and must be approved by the director of graduate studies. A doctoral minor requires 13 credits, including 12 credits from the approved list of courses, and 1 seminar credit approved by the director of graduate studies. In addition to these 13 credits, doctoral students must also take courses in statistical analysis methods and design of experiments. The statistics courses may be at the undergraduate or graduate level, and must be approved by the director of graduate studies.

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 S.E., Minneapolis, MN 55455 (612-626-3267; fax 612-626-7031; www.med.umn.edu/ihg).

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

Regents Professor

Matt McGue, Psychology, M

Professor

Susan Berry, Pediatrics, M
John West Day, Neurology, M
Perry B. Hackett, Genetics, Cell Biology, Developmental Biology, M
Richard A. King, Medicine, M
David Andrew Largaespada, Cancer Center, M
R. Scott McIvor, Genetics, Cell Biology, Developmental Biology, M
Harry T. Orr, Lab Medicine and 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 and Pathology, M
Michael D. Koob, Laboratory Medicine and Pathology, M
Bonnie S. LeRoy, Genetics, Cell Biology, Developmental Biology, M
James Scott Pankow, Epidemiology, M
Nikunj V. Somia, Genetics, Cell Biology, Developmental Biology, M
Karen-Sue Taussig, Medicine, M

Assistant Professor

Na Li, Biostatistics, M
Michael B. Miller, Epidemiology, 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 3011—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 MCDBG 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—Center for Human Resources and Labor Studies, University of Minnesota, 3-300 Carlson School of Management, 321 19th Avenue South, Minneapolis, MN 55455 (612-624-5810; fax 612-624-8360; hrirgrad@umn.edu; www.csom.umn.edu/Page5888.aspx).

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, ASM
John A. Fossum, (emeritus), ASM
Jo-Ida C. Hansen, Psychology, ASM
Morris M. Kleiner, Public Affairs, ASM
Jeylan T. Mortimer, Sociology, ASM
Deniz S. Ones, Psychology, ASM
John Remington, SM
Paul R. Sackett, Psychology, ASM
James G. Scoville, (emeritus), ASM
Jason Shaw, SM
Connie R. Wanberg, SM
Yijiang Wang, SM
Mahmood A. Zaidi, (emeritus), ASM

Associate Professor

Ross E. Azevedo, SM
Joyce E. Bono, SM
Michelle K. Duffy, SM
Theresa M. Glomb, SM
Maria J. Hanratty, Public Affairs, ASM

Assistant Professor

Lisa M. Leslie, M2
Colleen F. Manchester, M2

Along with the program-specific requirements listed below, 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 all materials and statements required by the graduate school. 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 or in Twin Cities Courses on the University Catalog Web site 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—Students majoring in business administration, education, hospital and health care administration, or the social and behavioral sciences may select a doctoral minor or supporting program. 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 612-626-2242; 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
Sally J. Kenney, Humphrey Institute of Public Affairs, M
Helga Leitner, Geography, M
Dario Menanteau, Social Work, M
Eric Weitz, History, M

Associate Professor

Elizabeth Heger Boyle, Sociology, Law, M

Assistant Professor

Barbara A. Frey, Institute for Global Studies, M

Other

Karen Brown, Institute for Global Studies, M
John R. Vreyens, Agricultural, Food, and Environmental Sciences, M
Mahmood A. Zaidi, Human Resources and Industrial Relations, 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 3 credits (LAW 6886—International Human Rights Law, POL 8660—Theoretical Approaches to Human Rights, POL 5485—Human Rights and Democracy in the World, and GLOS 5900/LAW 6058—Topics in Global Studies), and one 200-hour internship. M.A. and M.S. students must complete one additional elective course (3 cr) while doctoral and law students select at least two additional electives (totaling 6 cr) outside their major field from a designated course list. Other courses may be taken with the approval of the program director. Qualifying courses taken prior to approval of the minor will be applied retroactively.

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
Francois Sainfort, Health Policy/Mgmt, ASM
Patrick J. Starr, SM
Thomas Stoffregen, Kinesiology, AM

Associate Professor

William L. Cooper, SM
Karen L. Donohue, Operations and Management Sciences, ASM

Assistant Professor

Bharath Rangarajan, SM

Along with the program-specific requirements listed below, 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.—Industrial Engineering (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.—Systems Engineering (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 or in Twin Cities Courses on the University Catalog Web site 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 has two options: Plan A (thesis) option and Plan B (non-thesis) option. The IE track requires at least 12 course credits in the major if Plan A is chosen, and 16 course credits in the major if Plan B is chosen. At least 6 course credits in a minor or related field and at least 1 credit of graduate seminar must be included in the 30 credits. Additional program requirements for each plan in the IE track are as follows.

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; degrees@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
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, 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 or in Twin Cities Courses on the University Catalog Web site 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

Contact Information—Rosemarie J. Park, Director of Graduate Studies, International Education Minor, Work and Human Resource Education, College of Education and Human Development, University of Minnesota, 325L VoTech Education Building, 1954 Buford Avenue, Saint Paul, MN 55108 (612-625-6267; parkx002@umn.edu).

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

Professor

Patricia G. Avery, Curriculum and Instruction, M
William M. Bart, Educational Psychology, M
David Chapman, Educational Policy and Administration, M
Gerald W. Fry, Educational Policy and Administration, M
R. Michael Paige, Educational Policy and Administration, M

Associate Professor

Peter W. Demerath, Educational Policy and Administration, M
Fred Finley, Curriculum and Instruction, M
Rosemarie J. Park, Work and Human Resource Education, M

Assistant Professor

Joan DeJaeghere, Educational Policy and Administration, M
Frances Vavrus, Educational Policy and Administration, M

Adjunct Assistant Professor

Kay A. Thomas, Educational Psychology, M

Lecturer

Deanne L. Magnusson, Educational Policy and Administration, AM

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 the Departments of Curriculum and Instruction; Educational Policy and Administration; Educational Psychology; Human Resource Education; School of Kinesiology; and the Institute of Child Development.

Prerequisites for Admission—Admission to the international education minor is contingent upon prior admission to the Graduate School and to an M.A., M.S., M.S.W., S.C., Ph.D., or Ed.D. program at the University of Minnesota. For an application form visit the international education minor Web site at: http://education.umn.edu/EdPA/CIDE/minor.html or consult with the director of graduate studies for more information.

Courses—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: AFEE 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, S354 Elliott Hall, 75 East River Road, Minneapolis, MN 55455-0344 (612-626-0025; simps108@umn.edu).

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

Regents Professor

Ellen S. Berscheid, Psychology, M

Professor

W. Andrew Collins, Child Development, M
Nicki R. Crick, Child Development, M
Byron Egeland, Child Development, M
Patricia A. Frazier, Psychology, M
Dean E. Hewes, Communication Studies, M
Anthony D. Pellegrini, Educational Psychology, M
Jeffry A. Simpson, Psychology, M
Mark Snyder, Psychology, M
L. Alan Sroufe, Child Development, M
Ruth G. Thomas, Work and Human Resource Education, M

Associate Professor

Susanne Jones, Communication Studies, M
Ascan F. Koerner, Communication Studies, M
Richard M. Lee, Psychology, M
Martha A. Rueter, Family Social Science, M
Kathleen Vohs, Management, M

Assistant Professor

Vlad Griskevicius, Management, M
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 or in Twin Cities Courses on the University Catalog Web site 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).

Italian Studies

Minor Only

Contact the program for additional details about this minor.

Contact Information—Department of French and Italian, University of Minnesota, 9 Pleasant Street S.E., 260 Folwell Hall, Minneapolis, MN 55455 (612-624-4308; fax 612-624-6021).

Professor

John K. Evans, History, M
Rick McCormick, German, Scandinavian, and Dutch, M
Susan Noakes, French and Italian, M
Leon Satkowski, Architecture, M
Nicholas Spadaccini, Spanish and Portuguese
John Watkins, English, M
Eric Weitz, History, M

Associate Professor

Susanna Ferlito, French and Italian, M
Maria Fitzgerald, English, M
Michael Gaudio, Art History, M
Kelley Harness, School of Music, M
Peter Mercer-Taylor, School of Music, M
J.B. Shank, History, M

Assistant Professor

Giancarlo Casale, History, M
Siobhan Craig, English, M

Curriculum—A minor in Italian studies is available for Graduate School students enrolled in master's and doctoral programs in such relevant fields as art history, architecture, French, comparative literature, history, English, and music. The graduate minor in Italian studies is under the general direction of the graduate faculty in Italian studies, all of whom hold membership in other fields of study within the University of Minnesota Graduate School. The minor program is shaped to suit the particular research needs and interests of the student. Courses are selected in consultation with the director of graduate studies from a list of existing courses at the 4xxx, 5xxx, as well as appropriate 8xxx courses. Students may also elect to do a directed readings course with faculty affiliated with Italian studies to satisfy minor program requirements.

Prerequisites for Admission—Admission to the Italian studies graduate minor is contingent on enrollment in good standing in a relevant master's or doctoral degree granting program within the Graduate School. Interested students should consult with the director of graduate studies. A minimum GPA of 2.80 is required.

Use of 4xxx Courses—One course bearing a 4xxx designator may be accepted for the minor upon the approval of the director of graduate studies.

Courses—Contact the director of graduate studies for the most current information on relevant coursework pertaining to this program.

Minor Requirements—M.A. students must complete at least 6 graduate credits in approved courses or directed readings. Ph.D. students must complete at least 12 graduate credits in approved courses or directed readings. One of these may be a 4xxx course with the approval of the director of graduate studies; one may be a directed readings course. Coursework from the major field may not be applied to satisfy minor field requirements.

Language Requirements—Certification of proficiency in Italian language is required. Proficiency can be demonstrated in one of the following ways: by successfully completing an undergraduate literature/culture course in Italian, by having an undergraduate major or minor in Italian, or through a translation examination devised, administered, and assessed by the director of graduate studies. The proficiency requirement will be monitored by the director of graduate studies.

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://cehd.umn.edu/kin).

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

Professor

James R. Carey, Physical Medicine and Rehabilitation, AM2
Richard P. Di Fabio, Physical Medicine and Rehabilitation, AM2
Arthur G. Erdman, Mechanical Engineering, AM2
Mary Jo Kane, SM
Jürgen Konczak, SM
Victor S. Koscheyev, Integrative Biology and Physiology, SM
Arthur S. Leon, SM
Herbert L. Pick Jr., Child Development, AM2
Thomas Stoffregen, SM
Michael G. Wade, SM
Maureen Weiss, SM
Albert Yonas, Child Development, AM2

Associate Professor

Donald Dengel, SM
Paula M. Ludewig, Physical Medicine and Rehabilitation, AM2
Virgil G. Mathiowetz, Allied-Occupational Therapy, AM2
Trish Painter, School of Nursing, AM2
Moira A. Petit, SM
Robert C. Serfass, SM
Diane M. Wiese-Bjornstal, SM

Adjunct Research Professor

Catherine M. Kotz, Food Science and Nutrition, AM2

Assistant Professor

Daheia Barr-Anderson, M2
Yingjie Chen, Medicine, AM2
Aaron Scott Kelly, Pediatrics, AM2
Lisa A. Kihl, M2
Beth Lewis, M2
Dawn A. Lowe, Physical Medicine and Rehabilitation, AM2
Stephen D. Ross, SM
Steven D. Stovitz, Family Medicine, AM2

Lecturer

Rayla Allison, M2
Jo Ann Buysse, M2
Stacy Ingraham, M2
Christopher Kaufman, AM2
Nicole LaVoi, M2
Richard Rodgerson, M2
Aynsley M. Smith, AM2
Thomas J. Smith, M2

Research Associate

George Biltz, AM2
Ulf Bronas, School of Nursing, AM2
Carol A. Leitschuh, M2

Other

Anthony Brown, Recreational Sports, AM2
James C. Turman, Recreational Sports, AM2

Along with the program-specific requirements listed below, 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 biomechanics/neural control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport and exercise 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 adviser 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. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students can be admitted any term.

Research Facilities—Research facilities for graduate students in kinesiology include the Affordance Perception-Action Laboratory; Human Sensorimotor Control Laboratory; Gait and Posture Laboratory; Laboratory of Physiological Hygiene and Exercise Science; Laboratory for Musculoskeletal Health; Laboratory of Integrative Human Physiology; Human Performance and Teaching Laboratory; Sports Business Institute; and Tucker Center for Research on Girls and Women in Sport.

Courses—Refer to Kinesiology (KIN) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 biomechanics/neural control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport and exercise 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) or 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 and exercise psychology, or sport sociology.

The Ph.D. requires at least 48 course credits and 24 thesis credits, for a total of 72 credits. Course credits include 24 credits in kinesiology, 9 credits in statistical methods, 12 credits in a supporting program or minor (statistical methods courses may be included), and an additional 3 credits in any of these areas. Kinesiology course credits must include 5171 and 5981 (achieving a grade of A or B in each), 2 to 6 credits of 8980, and at least 12 credits of 8xxx. Statistical methods courses must include EPSY 8261 or equivalent and EPSY 8262 or equivalent (achieving a grade of A or B in

each). A GPA of at least 3.00 is required to maintain good standing and to graduate.

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 8980 (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 (612-625-6860; fax 612-625-0710; gsland@umn.edu; http://landarch.design.umn.edu/index.php).

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

Professor

Gail Dubrow, M2
Lance M. Neckar, M2
Peter J. Olin, (emeritus), Horticultural Science, M2
David G. Pitt, M2

Associate Professor

Clinton Hewitt, M2
John A. Koepke, M2
Rebecca J. Krinke, M2
Kristine F. Miller, M2
Laura R. Musacchio, M2
Robert D. Sykes, M2

Adjunct Assistant Professor

Vince deBritto, AM
Joseph R. Favour, AM
Robert Gunderson, AM
Richard T. Murphy, AM
Patrick Nunnally, AM2
Nikki Schlepp, AM
Daniel B. Shaw, AM
Carissa S. Slotterback, AM
Andrea Wedul, AM

Senior Research Fellow

Stephan J. Roos, AM2

Research Fellow

Carlos J. Fernandez, AM2

Lecturer

Dean F. Abbott, M2
Brad Agee
L. Peter Macdonagh, AM
Fred J. Rozumalski, AM2

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

Curriculum—Students develop professional design skills through a curriculum of carefully integrated courses that address the increasingly complex relationships between art, ecology, and community that influence and inform design on the land. Design inquiry in a studio setting defines the integrative core of this curriculum. Courses emphasize three principal areas of study: 1) landscape architecture as a means to add to the aesthetic richness of our culture and environment—helping us to better understand ourselves and our place in the world; 2) integration of biological, geophysical, and ecological processes into lasting, meaningful, and systemically rigorous landscape architecture that sustains and protects the health of people and the ecosystems on which they depend; and 3) design for urban and suburban places and people, with emphasis on gaining knowledge and experience through direct engagement with clients and the public in order to address the problems and opportunities of the metropolitan core of cities. The department offers an accredited professional degree, the master of landscape architecture (M.L.A.), and an academic degree, the master of science (M.S.) in landscape architecture. The department also offers a dual master's degree program with urban and regional planning (M.L.A./M.U.R.P.) in cooperation with the Humphrey Institute of Public Affairs.

Prerequisites 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 baccalaureate degree in a related discipline.

Special Application Requirements—M.L.A. program applicants must apply by January 15 for entry the following fall in order to receive first consideration for admission, fellowships, and assistantships. In addition to completing the Graduate School application requirements, applicants must submit all of the following: three recommendations, responses in English to the two questions pertaining to landscape architecture, and a résumé. All of these additional items should be submitted by uploading them to the Graduate School's electronic application system. International students must submit scores from the TOEFL, IELTS, or the MELAB. The department may waive specific required professional degree courses when an applicant has taken a course elsewhere and provides evidence that enables it to be judged equivalent to those offered by the department. An 8.5″ x 11″ portfolio containing examples of creative work is preferred for all M.L.A. applications, and is required to obtain advanced standing in design. Portfolios should be sent directly to the department. Applicants with degrees in related design professions such as architecture, environmental design, or planning should clearly indicate their interest in being evaluated for admission with advanced standing with a direct letter to the director of graduate studies or by e-mail to gsland@umn.edu. 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. In addition to completing the Graduate School application requirements, applicants must submit all of the following: three recommendations, responses in English to the two questions pertaining to landscape architecture, and a résumé. All of these additional items should be submitted by uploading them to the Graduate School's electronic application system. International students must submit scores from the TOEFL, IELTS or the MELAB. The department also requires M.S. applicants to submit GRE scores. An 8.5″ x 11″ portfolio containing examples of creative work is strongly recommended for all M.S. applications. Portfolios should be sent directly to the department. Applicants for the M.S. must also have an agreement from a specific member of the graduate faculty in landscape architecture to act as principal adviser in the student's area of study. Prospective students are encouraged to contact the director of graduate studies to discuss areas of focus and potential advisers. Students may be admitted to the M.S. program for any academic term.

More detailed information about the above departmental application requirements and procedures, including a downloadable checklist in PDF format, may be found at the department Web site, http://landarch.cdes.umn.edu/prog/admissions.php.

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 designed for students who wish to become registered professional landscape architects. Areas of required coursework within the program include design, technology and ecology, graphic and written communication, landscape history, and research methods. To develop a special focus or to explore areas in more depth, students are encouraged to select from among the graduate seminars offered to fulfill elective requirements. To meet LAAB standards, 88 graduate credits are required for students without previous design experience. Because coursework is organized in a sequential framework of six design studios, commitment to the program for three successive years is 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 A 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 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. 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—Brett McDonnell, Associate Dean, Law School, University of Minnesota, 424 Law Building, 229 19th Avenue South, Minneapolis, MN 55455 (612-625-1373; fax 612-626-2011; bhm@umn.edu; www.law.umn.edu).

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

Regents Professor

David Weissbrodt, M

Professor

Edward S. Adams, M
Stephen F. Befort, M
Brian H. Bix, M
Ann Burkhart, M
Dale Carpenter, M
Carol Chomsky, M
Laura Cooper, M
Thomas Cotter, M
Barry C. Feld, M
Richard S. Frase, M
Thomas P. Gallanis, M
Daniel J. Gifford, M
Michele B. Goodwin, M
Oren Gross, M
Jill Hasday, M
Claire Hill, M
Joan S. Howland, M
Brad Karkkainen, M
John H. Matheson, M
Brett McDonnell, M
Fred L. Morrison, M
Fionnuala Ni Aolain, M
Ruth L. Okediji, M
Richard W. Painter, M
Francesco Parisi, M
Kevin Reitz, M
Gregory Shaffer, M
Robert Stein, M
E. Thomas Sullivan, M
Michael Tonry, M
Barbara Y. Welke, M
David Wippman, M
Susan Wolf, M
Judith T. Younger, M

Associate Professor

Susanna L. Blumenthal, AM
Allan Erbsen, AM
Kristin E. Hickman, AM
Heidi Kitrosser, AM
Alexandra Klass, AM
William McGeveran AM
Myron W. Orfield, AM
Daniel Schwarcz, AM
David Stras, AM

Clinical Professor

Mary Alton, AM
Brad Clary, AM
Nancy Cook, AM
Prentiss Cox, AM
Stephen Meili, AM
Perry Moriearty, AM
Jean Sanderson, AM
Kathryn J. Sedo, AM
Stephen M. Simon, AM
Lisa Stratton, 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—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 Wesbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-8724; fax 612-626-0077; mls@cce.umn.edu).

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

Professor

Fred Amram, General College, M2
Rose Brewer, Studies in Africa and the African Diaspora, M2
Daniel Detzner, Postsecondary Teaching and Learning, M2
Judith A. Martin, Geography, M2
Randy Moore, Postsecondary Teaching and Learning, M2
David Schuelke, (emeritus), Writing Studies, 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
John Logie, Writing Studies, M2
Bernadette Longo, Writing Studies, M2
Carol A. Miller, American Studies, M2
Roger Miller, Geography, M2
Lisa Norling, History, M2
Gail Peterson, M2
Jacquelyn N. Zita, Feminist Studies, M2

Other

Gerald Allan, M2
Michael M. Andregg, M2
Donna Bennett, M2
Kathleen Bernard, M2
Kurt Burch, M2
Jennifer Caruso, M2
Patricia Casello, M2
Stephen L. Daniel, M2
Steven L. Derfler, M2
Sarah Dennison, M2
Margot Galt, M2
Anita Gonzalez, M2
DonnaMae J. Gustafson, M2
Janet Hagberg, M2
John Hasselberg, M2
Janet Hively, M2
David Husom, M2
Jeremy F. Iggers, M2
Jack Johnson, M2
Judith Katz, M2
Teresa Ann Kupin Escobar, M2
Roseann Lloyd, M2
John Moravec, M2
Kathleen O'Donovan, M2
Nicholas Pease, M2
Pary Pezechkian-Weinberg, M2
David A. Shupe, M2
Bonnie Schock, M2
John Tomsyck, M2
Roslye Ultan, M2
Howard Vogel, M2
Sherry Wagner-Henry, M2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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, online 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; ILES@umn.edu; www.linguistics.umn.edu/grad/index.htm).

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

Professor

Genevieve J. Escure, English, AM2
Jeanette K. Gundel, SM
Michael B. Kac, Philosophy, SM
Carol A. Klee, Spanish and Portuguese Studies, AM2
Michael P. Maratsos, 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, (emeritus), SM
Timothy Face, AM
Charles R. Fletcher, Psychology, AM2
Betsy K. Kerr, French and Italian, AM2
Benjamin Munson, AM
Hooi Ling Soh, SM

Assistant Professor

Jean-Phillipe Marcotte, AM2
Marianne Milligan, AM2
Serguei V. Pakhomov, AM

Lecturer

Daniel Karvonen, AM2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses in degree programs 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

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 cr), and an individualized plan of study (including at least three 8xxx courses) to be determined in consultation with the student's committee. Upon completion of required coursework, students must pass a preliminary written exam in phonology, syntax, and their primary and secondary areas of concentration. Two research papers judged to be of near publishable quality by the student's committee can be substituted for exam questions in any of these areas. The preliminary oral exam is a presentation and defense of a research-paper-length dissertation prospectus, which introduces and motivates the student's dissertation topic and provides a detailed plan for completion of the dissertation.

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 no prior coursework in linguistics must take six courses approved by the director of graduate studies, including the three courses required for the M.A. minor: LING 5001, 4002, and either 5201 or 5302. Students who have taken 5001 or its equivalent as undergraduates do not have to substitute another course.

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.htm).

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
Karlyn K. Campbell, Communication Studies, M
Andrew D. Cohen, English as a Second Language, M
Hazel Dicken-Garcia, Journalism and Mass Communication, M
Edward M. Griffin, English, M
Alan G. Gross, Communication Studies, M
Laura J. Gurak, Writing Studies, M
Michael Hancher, English, M
Cynthia Lewis, Curriculum and Instruction, M
Donald Ross Jr., Writing Studies, M
Edward Schiappa, Communication Studies, M
Amy L. Sheldon, Communication Studies, M
Geoffrey Sirc, English, M
Thom Swiss, Curriculum and Instruction, M
Elaine E. Tarone, English as a Second Language, M
Arthur E. Walzer, Communication Studies, M

Associate Professor

Lee-Ann K. Breuch, Writing Studies, M
Patrick Bruch, Writing Studies, M
Richard J. Graff, Writing Studies, M
Amy M. Lee, Postsecondary Teaching and Learning, M
John Logie, Writing Studies, M
Rosemarie J. Park, Work and Human Resource Education, M
Thomas J. Reynolds, Writing Studies, M
Diane J. Tedick, Curriculum and Instruction, M
Kirt H. Wilson, Communication Studies, 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, 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/admission.htm), 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 South 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

Massoud Amin, Electrical and Computer Engineering, M2
Norman L. Chervany, Information and Decision Sciences, M2
William K. Durfee, Mechanical Engineering, M2
Arthur V. Hill, Operations and Management Science, M2
George John, Marketing and Logistics Management, M2
Edward J. Joyce, Accounting and Business Law, M2
Kenneth H. Keller, Public Affairs, M2
Francis A. Kulacki, Mechanical Engineering, M2
Ian H. Maitland, Strategic Management and Organization, M2
Alfred Marcus, Strategic Management and Organization, M2
Mary Nichols, Strategic Management and Organization, AM2
Dennis L. Polla, Electrical Engineering, M2
Kenneth J. Roering, Marketing and Logistics Management, M2
Kanti Kingshuk Sinha, Operations and Management Science, M2
Karl A. Smith, Civil Engineering, M2

Associate Professor

Douglas Ernie, Electrical and Computer Engineering, M2
Kevin W. Linderman, Operations and Management Science, M2

Assistant Professor

Frederick J. Riggins, Information and Decision Sciences, M2

Other

Lockwood Carlson, Management of Technology, M2
Dileep R. Rao, Strategic Management and Organization, M2
Frederick J. Riggins, Center for Development of Technological Leadership, M2
Tarun Soni, Center for Development of Technological Leadership, M2

Along with the program-specific requirements listed below, 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; sjmcgrad@tc.umn.edu; www.sjmc.umn.edu).

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

Professor

Tsan-Kuo Chang, 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, SM
Dona B. Schwartz, SM
Gary Schwitzer, M2
Brian Southwell, SM
Catherine Squires, SM
Albert R. Tims Jr., SM
Thomas Wolfe, History, AM2

Assistant Professor

Kathryn R. Forde, M2
Jisu Huh, SM
Amy Sanders, M2
Shayla Thiel-Stern, M2
Marco Yzer, SM

Along with the program-specific requirements listed below, 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 department application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; 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 30.

The mass communication M.A. and Ph.D. programs offer a joint degree with the Law School. Applicants to either joint degree—either the M.A./J.D. or the Ph.D./J.D.—are reviewed separately by the Law School and the mass communication programs for admission, but are asked to identify themselves as seeking the joint degree option in their statement of intent for the mass communication application. For more information, contact sjmcgrad@umn.edu.

Special 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 Sevareid Library), and the SJMC Research Division.

Courses—Refer to Mass Communication (JOUR) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 8xxx.

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; gradprog@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
Greg William Anderson, SM
Douglas Norman Arnold, SM
John Robert Baxter, SM
Sergey Germanovich Bobkov, SM
Maury Daniel Bramson, SM
Carme Calderer, SM
Bernardo Cockburn, SM
Mark F. Feshbach, SM
Bert E. Fristedt, SM
Paul B. Garrett, SM
Lawrence F. Gray, SM
Robert D. Gulliver, SM
Dennis A. Hejhal, SM
Naresh C. Jain, SM
Dihua Jiang, SM
Donald William Kahn, SM
Markus Keel, SM
Harvey Bayard Keynes, SM
Nicolai Vladimir Krylov, SM
Tian-Jun Li, SM
Walter Littman, SM
Mitchell B. Luskin, SM
Gennady Lyubeznik, SM
Albert Marden, SM
Richard P. McGehee, SM
William Messing, SM
Norman G. Meyers, SM
Willard Miller, SM
Richard B. Moeckel, 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. Prikry, SM
Victor Schorr Reiner, SM
Fernando Leiva Reitich, SM
Peter A. Rejto, 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
Jiaping Wang, SM
Peter Joseph Webb, SM
Dennis E. White, SM
Ofer Zeitouni, SM

Associate Professor

Ionut Ciocan-Fontanine, SM
Jack Frederi Conn, SM
David L. Frank, SM
Ezra Miller, SM
Chester L. Miracle, SM
Wayne H. Richter, SM

Assistant Professor

Adrian Diaconu, SM
Tayler Lawson, SM
Gilad Lerman, SM
Marta Lewicka, SM
Yoichiro Mori, SM
Duane Q. Nykamp, SM
Daniel Spirn, SM
Panos Stinis, SM
Carlos Tolmasky, ASM

Along with the program-specific requirements listed below, 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, mathematical biology, and dynamical systems. The M.S. Plan A includes an emphasis in applied and industrial mathematics. The M.S. Plan B includes an emphasis in mathematics education and an emphasis in actuarial science industrial mathematics.

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).

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 fall semester only.

Courses—Refer to Mathematics (MATH) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 or with emphasis in mathematics education. 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 are expected 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 are expected pass by the end of their fourth year. If a supporting program is chosen, it may consist partly or entirely of mathematics courses.

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.umnx.edu; www.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
Victor H. Barocas, Biomedical 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
Perry Y. Li, SM
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
Terrence W. Simon, SM
Fotis Sotiropoulos, ASM
Ephraim M. Sparrow, SM
Patrick J. Starr, SM
Kim A. Stelson, SM
Paul J. Strykowski, 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
Joan Bechtold, Orthopaedic Surgery, ASM
Tianhong Cui, SM
Sean C. Garrick, SM
Allison Hubel, SM
Heinrich O. Jacobs, Electrical and Computer Engineering, ASM

Assistant Professor

Alptekin Aksan, SM
Traian Dumitrica, SM
Julian Marshall, ASM
Zongxuan Sun, SM

Associate Program Director

Craig R. Shankwitz, AM

Research Associate

Michael Manser, AM

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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 is 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; www.pharmacy.umn.edu/medchem).

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,A 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, AM
Robert Vince, SM
Carston R. Wagner, SM

Associate Professor

Courtney Aldrich, ASM
Mark D. Distefano, Chemistry, ASM
Robert A. Fecik, SM
Natalia Y. Tretyakova, SM

Assistant Professor

Elizabeth A. Amin, SM
Shana J. Sturla, SM
Chengguo Xing, SM

Along with the program-specific requirements listed below, 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 (Aptitude) Test of the GRE, three letters of recommendation from college-level faculty, a complete set of official transcripts, and a statement of immediate and long range career objectives are required. All application materials should be submitted by 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 or in Twin Cities Courses on the University Catalog Web site 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 cr) and medicinal chemistry (10 cr), 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 cr), biochemistry (8 cr), and medicinal chemistry (12 cr). 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 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; www.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
Mary Louise Fellows, Law, M
Evelyn S. Firchow, German, Scandinavian, and Dutch, M
Thomas Gallanis, Law, M
Ruth Mazo Karras, History, M
Michal A. Kobialka, Theatre Arts, M
Anatoly Liberman, German, Scandinavian, and Dutch, M
Nabil I. Matar, English, 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
Barbara Weissberger, (emeritus), Spanish, M
Peter Wells, Anthropology, M

Associate Professor

Janet Ericksen, English, Morris, M
Lianna 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
Andrew Scheil, English, M
Rosemary Stanfield-Johnson, History, Duluth, M
John W. Steyaert, Art History, M
Krista Twu, English, Duluth, M
Ray M. Wakefield, German, Scandinavian, and Dutch, M

Assistant Professor

Mary F. Brown, French and Italian, M
Jennifer Deane, History, Morris, M
Gabriela Ilnitchi Currie, Music, M
James Schryver, Art History, Morris, M
Jole R. Shackelford, History of Medicine, 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 collegial interaction and scholarly collaboration among faculty and students in all areas of medieval studies. CMS seeks to provide an opportunity for scholars of all disciplines and at all levels to focus intensively on historical, literary, anthropological, social, economic, religious, artistic, cultural, and methodological inquiries into the medieval period, which may fall within the chronology of roughly 300 to 1,500 A.D. The program emphasizes an interdisciplinary and cross-cultural approach to medieval culture including the study of medieval texts in original languages. Departments associated with the minor include: history; art history; theatre arts; music; English; French and Italian; German, Scandinavian, and Dutch; Spanish and Portuguese studies; Classical and Near Eastern studies; Asian languages and literatures; and others.

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 or in Twin Cities Courses on the University Catalog Web site 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 course which demonstrates command of Latin texts, normally LATN 51xx or higher or other Latin course by permission of the DGS, and one additional course in MEST or on a medieval topic.

The doctoral minor requires 12 graduate credits: four courses in medieval studies outside the student's major department, including a course which demonstrates command of Latin texts, normally LATN 51xx or higher or other Latin course by permission of the DGS; a second Latin course 51xx or above, or a course 5xxx or above in Arabic, Greek, Hebrew, Classical Chinese, or a medieval vernacular; and two additional courses in MEST or on medieval topics.

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 Gaviarum. Other opportunities for research collaboration exist through 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, Saint Paul, MN 55108 (612-624-2706; micecol@umn.edu; or sadowsky@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
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 between 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.

Special Application Requirements—Consult the director of graduate studies. Students are admitted each semester.

Courses—Contact the director of graduate studies for information on relevant coursework.

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, Saint Paul, MN 55108 (612-624-6774; fax 612-625-5780; mice@umn.edu; www.bti.umn.edu/MicE).

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

Professor

Robert J. Brooker, Genetics and Cell Biology, M2
Paul P. Cleary, Microbiology, M2
Lynda B. Ellis, Laboratory Medicine and Pathology, 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

Associate Professor

Mark D. Distefano, Chemistry, M2
Kaznessis, Yiannis: Chemical Engineering and Materials Science, M2
Daniel J. O'Sullivan, Food Science and Nutrition, M2
Claudia Schmidt-Dannert, Biochemistry, M2
Michael Travisano, Ecology, Evolution, and Behavior, M2
Ping Wang, Bioproducts and Biosystems Engineering, M2

Assistant Professor

Daniel R. Bond, Microbiology, M2
Jeffrey A. Gralnick, BioTechnology Institute, M2
Christine Salomon, Medicinal Chemistry, M2
Burckhard Seelig, Biochemistry, Molecular Biology and Biophysics, M2
Xianzheng Zhou, Pediatrics, M2

Other

Kenneth Valentas, BioTechnology Institute, M2

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

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

Prerequisites for Admission—Typically, applicants with a bachelor's degree in biological sciences, biochemistry, chemistry, or chemical engineering apply. Recommended academic preparation includes one year each of calculus, organic chemistry, physics, microbiology, and a background in a field such as basic chemical engineering, biology, physical chemistry, or genetics. Background deficiencies can be made up during the first year of graduate work. Most students enter the program with a GPA of 3.00 or higher.

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

Courses—Refer to Microbial Engineering (MICE) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—A limited number of 4xxx courses are permitted toward degree requirements based on director of graduate studies approval.

M.S. Degree Requirements

The M.S. requires 32 credits. Plan A students carry out a research project (10 cr) resulting in a M.S. thesis presented to the graduate faculty. Plan B students complete a summer (about 2 ½ months) preceptorship (4 cr) in a private company research laboratory or at a research institute in the University and prepare a Plan B project paper based on this research.

The two-year program comprises coursework in a specialized program of microbiology, molecular biology, immunology, and chemical engineering. The major program courses are the chemical engineering and microbiology courses. All students must take MICE 5001 Material and Energy Balances , and MICE 5355—Advanced Ferment/Biocatalysis Laboratory. In addition, students must attend research seminars during the first-year spring semester and the following year present a research seminar in a biotechnology seminar series.

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

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

Language Requirements—Students must demonstrate competence in a computer programming language.

Final Exam—An oral examination is required for both Plan A and Plan B students. The thesis or Plan B project paper will be presented to the examining committee for approval two weeks prior to the oral examination.

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

Bruce R. Blazar, Pediatric Hematology/Oncology/Bone Marrow Transplantation, SM
Ashley T. Haase, Microbiology, SM

Professor

Khalil I. Ahmed, 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
Paul P. Cleary, Microbiology, SM
Denis R. Clohisy, Orthopaedic 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
David A. Largaespada, Genetics, Cell Biology and Development, SM
Tucker W. LeBien, Laboratory Medicine and Pathology, SM
Walter C. Low, Neurosurgery, SM

Louis M. Mansky, Diagnostic and Biological Sciences, SM
James B. McCarthy, Laboratory Medicine and Pathology, SM
R. Scott McIvor, Laboratory Medicine and Pathology, SM
Matthew F. Mescher, Laboratory Medicine and Pathology, SM
Jeffrey S. Miller, Medicine, SM
Jaime Modiano, Veterinary Clinical Sciences, SM
Daniel L. Mueller, Medicine, SM
Vitaly Polunovsky, Medicine, SM
Sundaram Ramakrishnan, Pharmacology, SM
Michael J. Sadowsky, Soil, Water, and Climate, SM
Ashok Saluja, Surgery, 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
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
Wade A. Bresnahan, Microbiology, SM
Kathleen F. Conklin, Genetics, Cell Biology and Development, SM
Dana Davis, Microbiology, SM
Michael A. Farrar, Laboratory Medicine and Pathology, SM
Reuben S. Harris, Biochemistry, Molecular Biology, and Biophysics, SM
Yinduo Ji, Veterinary 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
Stephen J. McSorley, Medicine, SM
Christopher A. Pennell, Laboratory Medicine and Pathology, SM
David A. Potter, Medicine, SM
Stephen A. Rice, Microbiology, SM
Peter Southern, Microbiology, SM
Bruce K. Walcheck, Veterinary and Biomedical Sciences, SM

Assistant Professor

Bryce Binstadt, Pediatrics, SM
Daniel R. Bond, BioTechnology Institute, SM
Mark Cannon, Medicine, SM
Brian Fife, Medicine, SM
Emily Gillespie, Medicine, SM
Jeffrey A. Gralnick, BioTechnology Institute, SM
Timothy Hallstrom, Pediatrics, SM
Haojie Huang, Laboratory Medicine and Pathology, SM
Koho Iizuka, Medicine Hematology, SM
Dan Kaplan, Dermatology, SM
Ameeta Kelekar, Laboratory Medicine and Pathology, SM
Nobuaki Kikyo, Medicine, SM
Kim C. Mansky, Developmental and Surgical Sciences, SM
David Masopust, Microbiology, SM
Christian D. Mohr, Microbiology, SM
Kirsten Nielsen, Microbiology, SM
John Ohlfest, Pediatrics, SM
Erik J. Peterson, Medicine, SM
Nicola Philpott, Medicine, SM
Kathryn Schwertfeger, Laboratory Medicine and Pathology, SM
Naoko Shima, Genetics, Cell Biology and Development, SM
Pamela J. Skinner, Veterinary Biosciences, SM
Catherine St. Hill, Veterinary Clinical Sciences, SM
Sing Sing Way, Pediatrics, SM
Xianzheng Zhou, Pediatrics, SM

Along with the program-specific requirements listed below, 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 MICaB 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 or in Twin Cities Courses on the University Catalog Web site 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 Street S.E., Minneapolis, MN 55455 (612-624-7470; fax 612-626-6140; mcdbg@umn.edu; http://mcdbg.umn.edu).

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

Bruce R. Blazar, Pediatric Hematology/Oncology/Bone Marrow Transplantation, SM
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
Robert P. Elde, Neuroscience, SM
Stuart F. Goldstein, SM
David Greenstein, SM
Perry B. Hackett, SM
Thomas S. Hays, SM
Kristin A. Hogquist, Laboratory Medicine and Pathology, SM
Stephen C. Jameson, Laboratory Medicine and Pathology, SM
Ryoko Kuriyama, SM
David A. Largaespada, 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
Louis M. Mansky, Dentistry, 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
David J. Odde, 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
Yoji Shimizu, Laboratory Medicine and Pathology, SM
Carolyn D. Silflow, Plant Biology, SM
Michael J. Simmons, SM
Jeffrey A. Simon, SM
Amy P. Skubitz, Laboratory Medicine and Pathology, SM
Jonathan M. Slack, 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
Daniel F. Voytas, SM
Chester B. Whitley, Pediatrics, SM
Susan M. Wick, Plant Biology, SM
Robin L. Wright, SM
David A. Zarkower, SM

Associate Professor

Vivian J. Bardwell, SM
Lihsia Chen, SM
Duncan Clarke, SM
Kathleen F. Conklin, SM
Dana Davis, Microbiology, M2
Michael A. Farrar, Laboratory Medicine and Pathology, SM
Cheryl A. Gale, M2
William M. Gray, Plant Biology, M2
Reuben Harris, SM
Betsy A. Hirsch, Laboratory Medicine and Pathology, SM
Victoria Iwanij, SM
Dan S. Kaufman, M2
David T. Kirkpatrick, SM
Deanna Koepp, SM
Michael D. Koob, Medicine, M2
Bonnie S. LeRoy, SM
York H. Marahrens, SM
Hiroshi Nakato, M2
Thomas P. Neufeld, SM
Anna Petryk, M2
Lisa A. Schimmenti, Pediatrics, SM
Joceyln E. Shaw, SM
Nikunj Somia, SM

Assistant Professor

Anindya Bagchi, M2
Sean D. Conner, M2
Laura S. Gammill, M2
Nobuaki J. Kikyo, Medicine, M2
Lorene M. Lanier, Neuroscience, M2
Nancy J. Mendelsohn, AM
Yasushi Nakagawa, M2
Sue V. Petzel, Obstetrics/Gynecology, AM
Naoko Shima, M2

Other

Mary J. Ahrens, AM
Janice Baker, AM
Shari R. Baldinger, AM
Matt Bower, AM
Maryann V. Fox, AM
Katherine A. Nelson Fuhrman, AM
Judy Garza, AM
Joy Gustin, AM
Beth A. Hall, AM
Bonnie A. Hatten, AM
Jennifer A. Roggenbuck, AM
Karol R. Rubin, AM
Cheri Schoonveld, AM
Alysia B. Spear, AM

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

Curriculum—This program provides scientific training in the basic life sciences, with emphasis on the molecular basis of genetics, development, and cell biology. Areas of specialization include membranes, receptors, and membrane transport; cell interactions; macromolecular structure; extracellular matrix; cytoskeleton and cell motility; regulation of gene expression; neuroscience; developmental mechanisms; human genetics; plant cell and molecular biology; genetic mechanisms; and genomics.

The program is interdisciplinary and involves faculty from several departments in the College of Biological Sciences; the Medical School; and the College of Food, Agricultural and Natural Resource Sciences. Special institutes in human genetics, plant molecular genetics, biological process technology, and a center for developmental biology provide opportunities for graduate study. The program administers a specialty in genetic counseling. 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 of this catalog or in Twin Cities Courses on the University Catalog Web site 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 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 a Plan B paper. Students take a core curriculum, which is multidisciplinary and contributes to both the major and minor or related field requirements. Students may choose a concentration or specialization within the program such as cell biology, developmental biology, genetics, or human genetics. 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.

Molecular Veterinary Biosciences

See Comparative and Molecular Biosciences.

Museum Studies

Minor Only

Contact Information—Museum Studies Graduate Minor; 300 Bell Museum, 10 Church Street S.E., University of Minnesota, Minneapolis, MN 55455 (612-624-6380; fax 612-626-7704; murdo001@umn.edu).

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

Regents Professor

Joanne B. Eicher, Design, Housing, and Apparel, M

Professor

Robert J. Poor, Art History, AM
Peter S. Wells, Anthropology, AM

Associate Professor

Lyndel I. King, Art History, M

Adjunct Assistant Professor

David J. Rhees, The Bakken Museum, AM

Lecturer

Anita F. Cholewa, Bell Museum of Natural History, AM

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 or in Twin Cities Courses on the University Catalog Web site 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 cr), the museum practices course (MST 5012, 3 cr), and at least one credit of internship (MST 5020). Additional credits for the doctoral minor may be internship or directed study (MST 8993).

Music

Contact Information—School of Music, University of Minnesota, 100A Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (612-624-2847; fax 612-624-8001; MNmusic@umn.edu).

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

Professor

John E. Anderson, SM
Lydia Artymiw, SM
Thomas J. Ashworth, SM
David B. Baldwin, SM
Alexander Braginsky, SM
Michael Cherlin, SM
James Dillon, SM
David A. Grayson, SM
Craig J. Kirchhoff, SM
Korey B. Konkol, SM
Alex J. Lubet, SM
Glenda Maurice, SM
Guerino Mazzola, M2
David Myers, SM
Sally O'Reilly, SM
Tanya Remenikova, SM
Rebecca P. Shockley, SM

Associate Professor

Akosua Addo, SM
Dean W. Billmeyer, SM
Mark P. Bjork, SM
Matthew Bribitzer-Stull, SM
David A. Damschroder, SM
Immanuel Davis, SM
John De Haan, SM
Jean Del Santo, SM
Keitha Lucas Hamann, SM
Kelley A. Harness, SM
Noriko Kawai, M
Young Nam Kim, SM
Scott D. Lipscomb, SM
Timothy Lovelace, SM
Jerry Luckhardt, SM
Peter Mercer-Taylor, SM
Fernando A. Meza, SM
Karen Painter, M2
Kathy S. Romey, SM
Paul M. A. Shaw, SM
Dean Sorenson, AM
David Walsh, M2
Wendy Zaro-Mullins, AM

Assistant Professor

Gabriela Currie, SM
Sumanth Gopinath, M2
Matthew Mehaffey, M2
Anna Schultz, M2
Michael Silverman, M2

Instructor

John W. Miller Jr., AM

Lecturer

James L. Clute, AM
Scott Currie, M
Kathy Kienzle, AM
Basil Reeve, AM
Eugene Rousseau, SM
Mark Russell Smith, SM
John Snow, AM2
Charles Ullery, AM
Jeffrey W. Van, AM

Other

Julia Bogorad, AM
Gary A. Bordner, AM
Christopher Brown, AM
Steven C. Campbell, AM
Timothy Diem, AM
James F. Flegel, AM
Michael C. Gast, AM
Burt Hara, AM
Barbara G. Kierig, AM
Thomas Turner, AM

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

Curriculum—The School of Music offers the degrees of master of arts (M.A.), master of music (M.M.), doctor of musical arts (D.M.A.), and doctor of philosophy (Ph.D.). Specific degree plans and emphases are listed in each degree's requirements below.

Prerequisites for Admission—Applicants interested in any master's level program must hold a bachelor's degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy. Those applying to the M.A. in music education also generally hold an appropriate teaching license. Applicants interested in doctoral level study must hold a master's degree in an appropriate field of study.

Special Application Requirements—Applicants to the musicology/ethnomusicology, theory, composition, or music education/therapy programs must submit GRE General Test scores; applicants to other programs are encouraged to submit GRE scores in order to be eligible for certain University fellowships. Applicants whose primary language is not English must score a minimum of 6.5 on the IELTS test or obtain a passing score on the TOEFL exam: 550 (paper), 213 (computer), or 79 (Internet, with a minimum of 21 on writing and 19 on reading).

The various degree programs also require additional application materials. For the M.M. and D.M.A. programs in performance, taped auditions may be accepted for applicants who live more than 200 miles from the Twin Cities. However, applicants are encouraged to perform a live audition if at all possible. For the M.M. and D.M.A. in conducting, a preliminary tape screening is required in video format (DVD).

Although students may be admitted any semester, only students starting in fall semester will be considered for financial assistance. To receive Graduate School fellowship consideration, all materials must be received by December 15. Check with the School of Music for scholarship and assistantship application deadlines.

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 20th-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 or in Twin Cities Courses on the University Catalog Web site 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 theory/composition course to be approved there must also be a 5xxx or 8xxx 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 cr) 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 piano, organ, voice, violin, viola, cello, flute, oboe, clarinet, saxophone, bassoon, trumpet, trombone, percussion, guitar, collaborative piano/coaching, conducting, and woodwind performance. Credit requirements are as follows: 89 credits for

piano and voice; 85 credits for instrumental performance, guitar, and conducting; 87 credits for organ and woodwinds; and 91 credits for collaborative piano/coaching.

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, the division representing the secondary area, and 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 8xxx 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.: 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, or choral conducting—or on an interrelated body of courses—e.g., technology and music 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 the 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.

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.

Minor Requirements for Students Majoring in Other Fields—The minor in music studies consists of 12 credits as follows: four 3-credit-minimum 8xxx courses in musicology/ethnomusicology or theory, with the possible substitution of one or more 5xxx course(s) only with the approval of the student's adviser and the director of graduate studies (DGS) in the School of Music. In the case of 5xxx substitutions, the professor(s) of the course(s) in question, the graduate student, the graduate student's adviser, and the School of Music DGS should communicate in advance of course registration, so as to ensure that the course will in fact count towards the minor. Graduate students seeking to enroll in a 5xxx or 8xxx School of Music course requiring prior coursework or its equivalent in background knowledge will need to have completed all course prerequisites or secured instructor approval in order to register for that course.

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.

Regents Professor

Donald G. Truhlar, Chemistry, M

Professor

Eray Aydil, Chemical Engineering and Materials Science
Subir Banerjee, Geology and Geophysics, M
Stephen A. Campbell, Electrical and Computer Engineering, M
Paul Crowell, Physics
C. Daniel Frisbie, Chemical Engineering and Materials Science, M
William Gerberich, Chemical Engineering and Materials Science, M
Steven L. Girshick, Mechanical Engineering, M
Wayne L. Gladfelter, Chemistry, M
Joachim Heberlein, Mechanical Engineering, M
James Kakalios, Physics, M
David Kittelson, Mechanical Engineering, M
Uwe Kortshagen, Mechanical Engineering, M
Alon McCormick, Chemical Engineering and Materials Science, M
Peter H. McMurry, Mechanical Engineering, M
David J. Norris, Chemical Engineering and Materials Science, M
David Y. H. Pui, Mechanical Engineering, M
Jeff Roberts, Chemistry, M
Michael Tsapatsis, Chemical Engineering and Materials Science, M
Randall Victora, Electrical and Computer Engineering, M
Xiaoyang Zhu, Chemistry

Associate Professor

Sean Garrick, Mechanical Engineering, M
Allison Hubel, Mechanical Engineering
Heiko O. Jacobs, Electrical and Computer Engineering, M
R. Lee Penn, Chemistry, M
Bethanie Stadler, Electrical and Computer Engineering

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 between 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 MATS 8212—Solid State Reaction Kinetics.

Natural Resources Science and Management

Contact Information—College of Food, Agricultural and Natural Resource Sciences, University of Minnesota, 105 Green Hall, 1530 Cleveland Ave N., Saint Paul, MN 55108 (612-624-7683; fax 612-625-5212; nrsm@umn.edu; www.nrsm.umn.edu).

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

Regents Professor

Peter B. Reich, Forest Resources, SM

Professor

Dorothy H. Anderson, (emeritus), Forest Resources, AM
David Andow, Entomology, ASM
Marvin E. Bauer, Forest Resources, SM
Melvin J. Baughman, Forest Resources, SM
Robert A. Blanchette, Plant Pathology, ASM
Charles R. Blinn, Forest Resources SM
Paul V. Bolstad, Forest Resources, SM
Kenneth N. Brooks, Forest Resources, SM
Thomas E. Burk, Forest Resources, SM
Stephan P. Carlson, Extension Services, M2
John J. Cogan, Educational Policy and Administration, AM
Yosef Cohen, Fisheries, Wildlife, and Conservation Biology, SM
Francesca J. Cuthbert, Fisheries, Wildlife, and Conservation Biology, SM
Alan R. Ek, Forest Resources, SM
Fred N. Finley, Curriculum and Instruction, AM
Bill Gartner, Applied Economics, ASM
Ralph J. Gutierrez, Fisheries, Wildlife, and Conservation Biology, SM
Howard M. Hoganson, North Central Research and Outreach Center, SM
Gary R. Johnson, Forest Resources, M2
Joseph G. Massey, (emeritus), Agriculture, Crookston, ASM
L. David Mech, Fisheries, Wildlife, and Conservation Biology, SM
John L. Nieber, Biosystems and Agricultural Engineering, SM
James A. Perry, Fisheries, Wildlife, and Conservation Biology, SM
Alan Stephen Polasky, Ecology, Evolution, and Behavior, SM
Shri Ramaswamy, Bioproducts and Biosystems Engineering, SM
R. Roger Ruan, Bioproducts and Biosystems Engineering, SM
C. Ford Runge, Applied Economics, ASM
Simo Sarkanen, Bioproducts and Biosystems Engineering, SM
Elmer L. Schmidt, (emeritus), Bioproducts and Biosystems Engineering, SM
Ingrid E. Schneider, Forest Resources, SM
Donald B. Siniff, (emeritus), Ecology, Evolution, and Behavior, SM
J. L. David Smith, Fisheries, Wildlife, and Conservation Biology, SM
Susan G. Stafford, Forest Resources, SM
Alfred D. Sullivan, Office of the President, M2
Jerrold E. Winandy, Bioproducts and Biosystems Engineering, AM

Adjunct Professor

David E. Andersen, Fisheries, Wildlife, and Conservation Biology, SM
Mark E. Ascerno Jr., Entomology, ASM
Edward J. Cushing, Forest Resources, ASM
Daniel L. Erkkila, North Central Research and Outreach Center, M2
Robert G. Haight, Forest Resources, AM
Gjalt Huppes, Bioproducts and Biosystems Engineering, ASM
Douglas H. Johnson, Fisheries, Wildlife, and Conservation Biology, ASM
Ronald E. McRoberts, Forest Resources, AM
W. Keith Moser, Forest Resources, AM2
John H. 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, SM
Robert Blair, Fisheries, Wildlife, and Conservation Biology, SM
Mary M. Blickenderfer, Extension Services, AM
Andrew J. David, Forest Resources, SM
Glenn D. Del Giudice, Fisheries, Wildlife, and Conservation Biology, SM
David T. Grimsrud, (emeritus), Bioproducts and Biosystems Engineering, ASM
Sarah E. Hobbie, Ecology, Evolution, and Behavior, AM
Patrick H. Huelman, Bioproducts and Biosystems Engineering, M2
Michael A. Kilgore, Forest Resources, SM
Richard O. Kimmel, Fisheries, Wildlife, and Conservation Biology, M
John P. Loegering, UMC, Natural Resources, M2
Kristine F. Miller, Landscape Architecture, AM
Kristen C. Nelson, Forest Resources, SM
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, ASM
Rachel Schurman, Sociology, AM2
Steven J. Severtson, Bioproducts and Biosystems Engineering, SM
Randall Singer, Veterinary Biosciences, M
Timothy M. Smith, Bioproducts and Biosystems Engineering, SM
Steven J. Taff, Applied Economics, AM2
Karen-Sue Taussig, Anthropology, AM2
Ulrike W. Tschirner, Bioproducts and Biosystems Engineering, SM
Ping Wang, Bioproducts and Biosystems Engineering, SM

Adjunct Associate Professor

Stephen M. Bratkovich, Bioproducts and Biosystems Engineering, ASM
David C. Fulton, Fisheries, Wildlife, and Conservation Biology, SM
Pamela J. Jakes, Forest Resources, AM2
Joseph G. O'Brien, Forest Resources, AM
Michael E. Ostry, Forest Resources, AM
Brian J. Palik, Forest Resources, AM2
Brian K. Reilly, Fisheries, Wildlife, and Conservation Biology, SM
Don E. Riemenschneider, Forest Resources, AM
Thomas L. Schmidt, Forest Resources, ASM

Assistant Professor

Dennis R. Becker, Forest Resources, SM
Anthony W. D'Amato, Forest Resources, M2
Joe Knight, Forest Resources, M2
Rebecca A. Montgomery, Forest Resources, SM
Harlan D. Petersen, Bioproducts and Biosystems Engineering, M
Jonathan S. Schilling, Bioproducts and Biosystems Engineering, M2
Sangwon Suh, Bioproducts and Biosystems Engineering, SM
William T. Tze, Bioproducts and Biosystems Engineering, SM
Diomides S. Zamora, Extension Services, M2

Adjunct Assistant Professor

David N. Bengston, Forest Resources, ASM
Brian N. Brogdon, Bioproducts and Biosystems Engineering, M2
Meredith W. Cornett, Forest Resources, ASM
Karlyn Eckman, Forest Resources, AM2
Alan Franklin, Fisheries, Wildlife, and Conservation Biology, M2
David L. Garshelis, Fisheries, Wildlife, and Conservation Biology, SM
Mark H. Hansen, Forest Resources, AM2
Randall K. Kolka, Soil, Water, and Climate, ASM
Michael A. Larson, Fisheries, Wildlife, and Conservation Biology, AM2
C. Hobart Perry, North Central Research Station, AM2
Michael R. Reichenbach, Cloquet Forestry Center, M
Scott W. Rosencrance, Bioproducts and Biosystems Engineering, AM2
Stephanie Snyder, Forest Resources, AM2
Jerrilyn L. Thompson, Forest Resources, M2
Christopher Woodall, Forest Resources, AM2

Research Associate

Dean A. Current, Forest Resources, M2
Lee E. Frelich, Forest Resources, SM
Jacek Oleksyn, Forest Resources, AM
Robert T. Seavey, Bioproducts and Biosystems Engineering, M2
Robert A. Stine, M2

Teaching Specialist

Joe Magner, Fisheries, Wildlife, and Conservation Biology, AM2

Committee Member

Jeffrey S. Lawrence, Fisheries, Wildlife, and Conservation Biology, ASM

Along with the program-specific requirements listed below, 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 December 15 (for fall admission) is required. General GRE scores are required. Master's student applicants are required to submit three letters of recommendation. Applicants for the doctoral program should provide three recommendations from people who can provide evaluations of 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 their 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 Street 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.html.

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. Ebner, SM
Robert P. Elde, Biological Sciences, SM
Esam E. El-Fakahany, Psychiatry, SM
William Elmquist, Pharmaceutics Research, SM
William C. Engeland, SM
S. Hossein Fatemi, Psychiatry, SM
Martha Flanders, SM
William H. Frey, Pharmacy, SM
Michael K. Georgieff, Pediatrics, SM
Glenn J. Giesler Jr., SM
Boyd K. Hartman, Psychiatry, SM
Bin He, Biomedical Engineering, SM
Sheng He, Psychology, SM
Christopher N. Honda, Neuroscience, SM
William G. Iacono, Psychology, SM
Paul A. Iaizzo, Anesthesiology, SM
William R. Kennedy, Neurology, SM
Daniel J. Kersten, Psychology, SM
Alice A. Larson, Veterinary Medicine, SM
Gordon E. Legge, Psychology, SM
Paul C. Letourneau, SM
Allen S. Levine, Psychiatry, SM
Kelvin O. Lim, Psychiatry, SM
Walter C. Low, Neurosurgery, SM
Linda K. McLoon, Ophthalmology, SM
Steven C. McLoon, SM
Robert Meisel, SM
Karen A. Mesce, Entomology, SM
Robert F. Miller, SM
Eric A. Newman, SM
Michael B. O'Connor, Genetics, Cell Biology and Development, SM
Harry T. Orr, Laboratory Medicine and Pathology, SM
John W. Osborn, Physiology, SM
J. Bruce Overmier, Psychology, SM
Jose V. Pardo, Psychiatry, SM
Philip S. Portoghese, Pharmacy, SM
Laura P. Ranum, Genetics, Cell Biology and Development, SM
Steve Rothman, Pediatrics, SM
Peter A. Santi, Otolaryngology, SM
Ronald J. Sawchuk, Pharmaceutics, SM

Scott Selleck, Pediatrics, Genetics, Cell Biology and Development, SM
Virginia S. Seybold, SM
Donald A. Simone, Oral Sciences, SM
Jonathan Slack, Genetics, Cell Biology and Development, M2
John F. Soechting, SM
Peter W. Sorensen, Fisheries and Wildlife, SM
Thomas Stoffregen, Kinesiology, SM
Stanley A. Thayer, Pharmacology, SM
David D. Thomas, Biochemistry, SM
Kamil Ugurbil, Radiology, SM
Govind T. Vatassery, Psychiatry, SM
Catherine Verfaillie, Medicine, SM
Neal F. Viemeister, Psychology, SM
George L. Wilcox, Pharmacology, SM
W. Gibson Wood, Pharmacology, SM

Associate Professor

John H. Anderson, Otolaryngology, SM
W. Dale Branton, M2
Stephen A. Engel, Psychology, SM
Carolyn Fairbanks, Pharmaceutics, Pharmacology, Neuroscience, SM
Patricia L. Faris, Psychiatry, SM
Janet L. Fitzakerley, Pharmacology, Duluth, SM
Jurgen F. Fohlmeister, Physiology, SM
Jonathan Gewirtz, Psychology, SM
Pankaj Gupta, Medicine, M2
Paulo Kofuji, SM
Catherine M. Kotz, Food Science and Nutrition, SM
Dezhi Liao, SM
Paul G. Mermelstein, SM
Giuseppe Pellizzer, SM
A. David Redish, SM
Martin W. Wessendorf, SM
Kevin D. Wickman, Pharmacology, SM

Adjunct Associate Professor

Frank H. Burton, Physiology, M2
Juergen Konczak, Kinesiology, SM

Assistant Professor

Bagrat Amirikian, M2
Mathew V. Chafee, SM
Lihsia Chen, Genetics, Cell Biology and Development, M2
Laura Gammill, Genetics, Cell Biology and Development, 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
Kirill Martemyanov, Pharmacology, SM
Mark Masino, SM
Yasushi Nakagawa, SM
Theoden Netoff, Biomedical Engineering, SM
Teresa Nick, SM
Duane Q. Nykamp, Mathematics, SM
John R. Ohlfest, Neurosurgery, SM
Cheryl Olman, Psychology, 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, 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, physiology, and psychology. 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, 5661, and 8211. While taking these courses, students explore research opportunities in the faculty's laboratories (NSC 8334) and thereby select a thesis adviser. Elective courses and at least 12 credits in a minor or supporting program are selected in consultation with the adviser (typical minors include cell biology, physiology, statistics, psychology, and medicine; medicine is primarily for students in the M.D./Ph.D. program). Students with sufficient background and previous course experience may apply for a waiver of specific requirements.

Students are also expected to participate in teaching neuroscience and to attend the weekly colloquium as well as neuroscience seminars and sessions devoted to professional development. Students are strongly encouraged to attend seminars in other areas and departments that may interest them.

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 psychology. 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 or in Twin Cities Courses on the University Catalog Web site 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).

Ph.D. Degree Requirements

The course requirements for a Ph.D. degree are described under Curriculum above. More detailed information may be found in the *Neuroscience Student Handbook* at www.neuroscience.umn.edu/CurStu/HandbookIntro.html.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor program is developed in consultation with the director of graduate studies for neuroscience. Students are required to take one of the following core courses: Function/Structure: NSC 5561—Systems Neuroscience (4 cr) or Cellular/Molecular: NSC 5461—Cellular and Molecular Neuroscience (4 cr).

In addition, students are required to take elective neuroscience courses for a total minimum of 12 credits (including the core courses).

Nonprofit Management

Postbaccalaureate Certificate

Contact Information—Nonprofit Management Certificate, College of Continuing Education, Student Support Services, 150 Wesbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4000; adv@ccc.umn.edu; www.cce.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. Admissions information is available at www.cce.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; www.nursing.umn.edu).

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

Professor

Lyn Bearinger, Integrative, Global and Public Health, SM
Donna Bliss, Adult and Gerontological Health, SM
Connie Delaney, Leadership, Systems, Informatics and Policy, SM
Sandra Edwardson, Leadership, Systems, Informatics and Policy, SM
Ann Garwick, Child and Family Health, SM
Cynthia Gross, SM
Susan Henly, Leadership, Systems, Informatics and Policy, SM
Julie Jacko, Leadership, Systems, Informatics and Policy, SM
Mary Jo Kreitzer, Integrative, Global and Public Health, SM
Barbara Leonard, Child and Family Health, SM
Joan Liaschenko, Leadership, Systems, Informatics and Policy, SM
Ruth Lindquist, Adult and Gerontological Health, SM
Patricia Tomlinson, ASM
Jean Wyman, Adult and Gerontological Health, SM

Clinical Professor

Thomas Clancy, Leadership, Systems, Informatics and Policy. M
Joanne Disch, Leadership, Systems, Informatics and Policy, SM
Mary Rowan, Leadership, Systems, Informatics and Policy, M2

Associate Professor

Melissa Avery, Child and Family Health, SM
Linda Chlan, Adult and Gerontological Health, SM
Laura Duckett, Integrative, Global and Public Health, SM
Jayne Fulkerson, Integrative, Global and Public Health, M2
Joseph Gaugler, Adult and Gerontological Health, SM
Linda Halcon, Integrative, Global and Public Health, SM
Helen Hansen, Integrative, Global and Public Health, SM
Merrie Kaas, Integrative, Global and Public Health, SM
Madeleine Kerr, Integrative, Global and Public Health, SM
Kathie Krichbaum, Leadership, Systems, Informatics and Policy, SM
Martha Kubik, Integrative, Global and Public Health, SM
Linda Lindeke, Child and Family Health. SM
Margaret Moss, Leadership, Systems, Informatics and Policy, SM
Christine Mueller, Adult and Gerontological Health, SM
Carol O'Boyle, Integrative, Global and Public Health, M2
Patricia Painter, Adult and Gerontological Health, M2
Cynthia J. Peden-McAlpine, Leadership, Systems, Informatics and Policy, SM
Cheryl Robertson, Integrative, Global and Public Health, SM
Renee Sieving, Integrative, Global and Public Health, SM
Diane Treat-Jacobson, Adult and Gerontological Health, SM

Clinical Associate Professor

Ulf Bronas,, Adult and Gerontological Health, M2
Elaine Darst, Integrative, Global and Public Health, M2
Kathleen Fagerlund, Adult and Gerontological Health, M2
Linda Herrick, Leadership, Systems, Informatics and Policy, M2
Catherine Juve, Child and Family Health, M2
Leonard Lichtblau, Adult and Gerontological Health, M
Linda Olson Keller, Integrative, Global and Public Health, M

Assistant Professor

Carolyn Garcia, Integrative, Global and Public Health, M2
Niloufar Hadidi, Adult and Gerontological Health, M2
Tondi Harrison, Child and Family Health, M2
Wendy Looman, Child and Family Health, M2
Karen Monson, Integrative, Global and Public Health, M2
Susan O'Connor-Von, Child and Family Health, M2
Bonnie Westra, Leadership, Systems, Informatics and Policy, M2
Fang Yu, Adult and Gerontological Health, M2

Adjunct Assistant Professor

Sharon Tucker, AM

Clinical Assistant Professor

Mary Chesney, Child and Family Health, M2
Mary Findorff, Integrative, Global and Public Health, M
Georgia Nygaard, Child and Family Health, M
Christine Poe, Child and Family Health, M
Laurie Pung, Adult and Gerontological Health, M
Diane Schadewald, Child and Family Health, M
Kristine Talley, Adult and Gerontological Health, M2
Mary Zaccagnini, Adult and Gerontological Health, M

Lecturer

Lisa Carney Anderson, Leadership, Systems, Informatics and Policy, M2

Senior Research Fellow

Kay Savik, Nursing Research and Scholarship, M

Other

Karen Alaniz, Child and Family Health, M
Bradley Cohen, AM
Barbara McMorris, Integrative, Global and Public Health, AM

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

Curriculum—Graduate programs in the School of Nursing include the Ph.D. and the Post-Masters (M.S.) Certificate.

Ph.D. Program

The Ph.D. program in nursing prepares scholars as scientists, leaders, clinical innovators, and teachers in health care who:

- Discover new knowledge for nursing science and health care practice through ethical, innovative, theory-based research;
- Integrate knowledge to influence health policy and decision-making through collaborative, interdisciplinary action at organizational, local, regional, national, and global levels;
- Create and evaluate evidence-based applications designed to improve the health and wellbeing of individuals, families, communities, and population; and
- Disseminate knowledge to those in nursing, other health sciences, policy makers, and the public through scholarly publication, formal teaching and other creative venues.

Post-Master's (M.S.) Certificate

The Post-Master's (M.S.) Certificate program in Nursing offers students with M.S. degrees in nursing the opportunity to complete an additional area of study. The following areas of study include:

- 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 Healthcare 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
- Women's Health Care Nurse Practitioner

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 non-English-speaking applicants must have a TOEFL score of 586 (paper), 240 (computer), or 94 (Internet).

Admission to the Ph.D. program requires either a master's degree with a strong background in graduate level physical and/or behavioral sciences or a bachelor's degree from an accredited institution and an exceptionally strong background in a major field of study such as nursing or the physical or behavioral sciences.

Admission to the Post-M.S. Certificate program requires an M.S. degree in nursing from an accredited institution including a current registered nurse license.

Special Application Requirements—For the Ph.D. degree, GRE General Test scores, two letters of reference, and a profile essay are required. The application deadline for the Ph.D. program is December 15 for the following fall semester.

For the Post-M.S. Certificate, two letters of reference and a goal statement are required. The application deadline for the Post-M.S. Certificate is November 1. A complete application includes a School of Nursing application and a Graduate School application.

Special Criteria for Select Areas of Study include the following: GNP requires one year of work experience with elders. FNP, PNP, PCNS, WHCNP, and PCNS require at least one year of clinical experience, preferably with the population in the anticipated area of practice. NMW strongly recommends one year of clinical experience, preferably in labor and delivery. CSHCN prefers applicants to have one year of experience working with children and families, and to have demonstrated leadership potential. PMHCNS does not require experience, but strongly encourages applicants to have current psychiatric nursing experience.

School of Nursing Mission—The mission of the School of Nursing at the University of Minnesota is to generate and disseminate knowledge necessary for promoting health by developing and improving the nursing care of individuals, families, communities and populations that reflect diversity in society. This mission contributes to the achievement of the three-part mission of the University of Minnesota.

School of Nursing Centers

- Center for Adolescent Nursing
- Center for Child and Family Health Promotion Research
- Center for Children with Special Health Care Needs
- Center for Gerontological Nursing
- Katharine J. Densford International Center for Nursing Leadership
- Center for Health Trajectory Research
- Center for Nursing Minimum Data Set Knowledge Discovery
- Center for Spirituality and Healing
- Minnesota Hartford Center of Geriatric Nursing Excellence

Courses—Refer to Nursing (NURS) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses are not routinely accepted on Degree Program Forms.

Ph.D. Degree Requirements

Students are required to take a minimum of 36 credits in required nursing courses in three areas: scholarly processes, nursing science, and area of concentration. The Ph.D. also requires a minimum of 12 credits in a minor or supporting field and 24 thesis credits. Students who do not have an M.S. in nursing will be required to take additional credits.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires 12 credits in nursing with at least 8 credits of 8xxx courses.

Post-M.S. Certificate Requirements

The Post-M.S. Certificate program prepares students for advanced practice roles that address complex health and illness issues. Individual areas of study vary in the number of credits required. See individual area of study information at www.nursing.umn.edu for specific course and credit requirements.

Language Requirements—None.

Final Exam—None.

Nutrition

Contact Information—Nutrition Graduate Program, Department of Food Science and Nutrition, University of Minnesota, 225 Food Science and Nutrition Building, 1334 Eckles Avenue, Saint 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

Charles J. Billington, Medicine, ASM
Linda J. Brady, Food Science and Nutrition, SM
Frank B. Cerra, Surgery, ASM
Margot P. Cleary, Hormel Institute, ASM
Scott J. Crow, Psychiatry, ASM

A. Saari Csallany, Food Science and Nutrition, SM
Daniel D. Gallaher, Food Science and Nutrition, SM
Myron D. Gross, Laboratory Medicine and Pathology, SM
John H. Himes, Epidemiology, SM
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
Junxuan Lu, Hormel Institute, ASM
Mark Lyte, Surgery, ASM
Diane R. Neumark-Sztainer, Epidemiology, SM
Daniel J. O'Sullivan, Food Science and Nutrition, 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

Julie M. Jones, Food Science and Nutrition, AM

Associate Professor

Donald R. Dengel, Kinesiology, SM
Mary C. Gannon, Medicine, SM
Lisa J. Harnack, Epidemiology, SM
Craig A. Hassel, Food Science and Nutrition, SM
Leonard F. Marquart, Food Science and Nutrition, SM
Mark A. Pereira, Epidemiology, M2
Susan K. Raatz, Medical School, SM
Cheryl F. Smith, Food Science and Nutrition, SM
Lyn M. Steffen, Epidemiology, SM
Jian-Min Yuan, Epidemiology, SM

Adjunct Associate Professor

Daune Cranksaw, Food Science and Nutrition, AM2
Catherine M. Kotz, Food Science and Nutrition, SM
Patricia L. Splett, Food Science and Nutrition, AM2

Assistant Professor

Tiffany R. Beckman, Medicine Endocrine Office, AM
Chi Chen, Food Science and Nutrition, AM
Xiaoli Chen, Food Science and Nutrition, M2
Carrie P. Earthman, Food Science and Nutrition, SM
Andrew P. Flood, Epidemiology, M2
Doug G. Mashek, Food Science and Nutrition, M2
Susie Nanney, Family Medicine and Community Health, M2
Melissa Nelson, Epidemiology, M2
Sabrina Peterson, Food Science and Nutrition, M2
Kim Robien, Epidemiology and Community Health, M2
Shalamar Sibley, Medical School, M2
Jamie S. Stang, Epidemiology, AM

Adjunct Assistant Professor

Jillian K. Croll, Food Science and Nutrition, M2
Mary K. Schmidl, Food Science and Nutrition, AM2
Alice C. Shapiro, Epidemiology, M2
Chuanfeng Wang, Food Science and Nutrition, AM2

Instructor

U. B. Krinke, Epidemiology, AM2

Along with the program-specific requirements listed below, 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 nonessential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (College of Food, Agricultural and Natural Resource Sciences); Division of Epidemiology (School of Public Health); Departments of Medicine, Surgery, Psychiatry, Lab Medicine and Pathology, and Family Medicine and Community Health (Medical School); Department of Kinesiology and Leisure Studies (College of Education and Human Development); Department of Biochemistry and Molecular Biology (University of Minnesota Duluth); University of Minnesota Extension; Hormel Institute (Austin, 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 or in Twin Cities Courses on the University Catalog Web site 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, 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 program directly using the contact information below. Applications for admission 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 612-625-7192; otprog@umn.edu; www.ot.umn.edu). Program office is in 271 Children's Rehabilitation Center, 426 Church Street S.E., Minneapolis MN, 55455.

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

Professor

Charles (Chuck) Harvey Christiansen, M2

Associate Professor

Virgil G. Mathiowetz, M2
Erica B. Stern, M2

Assistant Professor

Cheryl A. Meyers, M2
Patricia Schaber, M2

Assistant Clinical Specialist

Elin Schold Davis, AM
Kathleen M. Matuska, AM
Margaret VanEeckhout, AM

Along with the program-specific requirements listed below, 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 (P.O. 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 admitted pending successful 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 see 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 or in Twin Cities Courses on the University Catalog Web site 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. 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 (612-626-4483; oralbio@umn.edu; www.oralbiology.umn.edu.

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

Regents Professor

Apostolos P. Georgopoulos, Neuroscience, SM

Professor

Alvin J. Beitz, Veterinary and Biomedical Sciences, SM
David A. Bereiter, Diagnostic and Biological Sciences, SM
Edward C. Combe, Diagnostic and Biological Sciences, SM
Ralph DeLong, Restorative Sciences, SM
Gary M. Dunny, Microbiology, SM
Sven U. Gorr, SM, Diagnostic and Biological 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
Joel D. Rudney, 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
Conrado Aparicio, Restorative Sciences, SM
Massimo Costalonga, Developmental/Surgical Sciences, SM
Arkadiusz Z. Dudek, Medicine, SM
Alex Fok, Restorative Sciences, SM
Rajaram Gopalakrishnan, Diagnostic and Biological Sciences, SM
Darryl T. Hamamoto, Diagnostic and Biological Sciences, SM
Anna Petryk, Pediatrics, SM
Kylie J. Walters, Biochemistry, Molecular Biology and Biophysics, SM

Assistant Professor

David L. Basi, Developmental/Surgical Sciences, SM
Shelley N. Grimes, Diagnostic and Biological Sciences, SM
Paul J. Jardine, Diagnostic and Biological Sciences, SM

Kim Mansky, Developmental/Surgical Sciences, SM
Wook-Jin Seong, Restorative Science, M2
Antheunis Versluis, Restorative Sciences, SM
Daranee Versluis, Restorative Sciences, SM

Research Assistant Professor

Wei Zhang, Diagnostic and Biological Sciences, SM

Research Associate

Karen F. Ross, Diagnostic and Biological Sciences, SM
Yongshu Zhang, Diagnostic and Biological Sciences, SM

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

Curriculum—These interdisciplinary programs are offered by the School of Dentistry with cooperating faculty in the Medical School, College of Pharmacy, and Veterinary Medicine. They give students research skills and a broad understanding of the development, structure, function, and pathology of the orofacial region. Students are encouraged to focus in one of five areas of emphasis: biomaterials and biomechanics, epithelial biology and carcinogenesis, microbiology and immunology, sensory neuroscience, and bone biology, craniofacial development, and tissue engineering. An exceptional student can create his/her own area of emphasis or specialize in topics not listed here; students should discuss their interests with the director of graduate studies before applying. Curricula are designed to allow considerable flexibility in planning individual programs to accommodate specific areas of interest; courses from other disciplines may be included as part of the major.

Prerequisites for Admission—Applicants should have graduated with high standing from dental or medical schools and have a desire to undertake advanced studies in oral biology. Exceptional individuals with a bachelor's or master's degree who can demonstrate appropriate background and interest in oral biology are also considered. In some cases, persons without a D.D.S./D.M.D. or M.D. degree, who have demonstrated exceptional potential for graduate study, may be admitted for a combined D.D.S./Ph.D. program. A separate application and admission to the University of Minnesota D.D.S. program is a prerequisite for admission to the D.D.S./Ph.D. program. Demonstration of an appropriate background and an interest in oral biology also is required.

Special Application Requirements—Applicants must submit 1) scores from the General Test of the GRE, 2) three letters of recommendation from persons who can comment authoritatively about the applicant's potential for a research and academic career, 3) a clearly written personal statement (one to two pages) describing career goals, 4) an essay describing research aspirations (one to two pages), and 5) a résumé highlighting research experience and accomplishments, For D.D.S./Ph.D. applicants who are U.S. citizens, resident aliens or Canadian citizens, U.S. or Canadian Dental Admission Test (DAT) scores at or above the national average will be accepted in lieu of the GRE. Applicants who have graduated from U.S. or Canadian dental or medical schools within three years of their application to the Ph.D. program may request that previous U.S. or Canadian DAT or MCAT scores be considered in lieu of the GRE.

Students may apply at any time. All students are strongly encouraged, however, to apply at least four months before the anticipated entry date. Students may enter the program in any semester, but summer or fall semester is recommended.

Courses—Refer to Oral Biology (OBIO) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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 yearsand requires a total of 30 credits. Students must complete the Plan A (with thesis) program, which requires a minimum of 14 credits in the major, including 4 credits of oral biology topics courses (8021–8028). Courses in the major may be taken from other disciplines with the approval of the adviser and the director of graduate studies. Registration and participation in the oral biology student seminar series (8030) is required each semester. Students must also complete a minor or related field program in a related nonclinical discipline (minimum 6 cr) and 10 thesis credits. Students must conform to the Graduate School's GPA requirements for master's degree students.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master's minor in oral biology consists of 6 credits, at least two advanced courses in oral biology, and other coursework determined in consultation with the director of graduate studies.

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 cr) in a nonclinical discipline and 24 thesis credits are also required. A cumulative GPA of at least 3.00 in both the major and minor is required. Only grades of A or B are acceptable in the core courses.

D.D.S./Ph.D. students typically complete all requirements for the Ph.D. program, except for the thesis defense, before entering the D.D.S. program. The Ph.D. and D.D.S. degrees 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

Khalil Ahmed, ASM
Kathleen A. Daly, M2
Peter A. Hilger, M2
Steven K. Juhn, SM
Frank M. Lassman, ASM
Samuel C. Levine, M2
Robert H. Maisel, SM
Robert H. Margolis, SM
David A. Nelson, SM
Peter A. Santi, SM
Bevan Yueh, M2

Adjunct Professor

Michael M. Paparella, ASM

Associate Professor

John H. Anderson, SM
Markus Gapany, M2
George S. Goding Jr., M2
Jizhen Lin, M2
Rick M. Odland, M2
Frank G. Ondrey, SM
Frank L. Rimell, M2
James D. Sidman, AM2

Adjunct Associate Professor

Katherine A. Kendall, M2
Stephen L. Liston, AM

Assistant Professor

Holly C. Boyer, M2
Harley S. Dresner, M2
David D. Hamlar Jr., M2
Tina C. Huang, M2
Seth C. Janus, M2
Samir S. Khariwala, M2
Timothy A. Lander, M2
Amy Anne Lassig, M2
Deirdre D. Michael, M2
Derek J. Schmidt, M2
William E. Walsh, M2

Along with the program-specific requirements listed below, 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.Otol. degrees require a publishable thesis. Rotations at University of Minnesota Medical Center-Fairview, Minneapolis Veterans Administration Medical Center, Regions Hospital, Minneapolis Children's Hospital, and Hennepin County Medical Center provide a wide range of opportunity for clinical education and surgical experience. Opportunities for independent research are provided in the laboratories of audiology, auditory electrophysiology, auditory neurophysiology, biochemistry, cancer biology, cell biology and genetics, electron microscopy, electrophysiology, histochemistry, morphometry, psychoacoustics, temporal bone pathology, tumor immunology, skin-flap physiology, laryngeal physiology, mandibular bone physiology, microvascular tissue transfer, and vestibular physiology. 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 or in Twin Cities Courses on the University Catalog Web site 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

The M.S. (Plan A only) requires a minimum of 30 credits: 20 course credits (14 in the major and 6 in the minor or related fields) and 10 thesis credits. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies. Students are expected to complete and publish a research paper in a peer-reviewed journal or a presentation/poster at a national scientific meeting.

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 a 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.

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; pceuts@umn.edu; www.pharmacy.umn.edu/pharmaceutics).

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

Professor

Richard C. Brundage, ASM
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

Carolyn A. Fairbanks, SM

Adjunct Associate Professor

Walid M. Awni, ASM
Zheng Jane Li, ASM
Evgenyi Y. Shalaev, ASM

Assistant Professor

Belinda Cheung, ASM
Jayanth Panyam, SM
Gregory Rutkowski, AM2
Chanquan Calvin Sun, SM
Chun Wang, ASM

Adjunct Assistant Professor

Laura S. Stone, ASM

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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, 6-120 Jackson Hall, 321 Church Street, S.E., Minneapolis, MN 55455 (612-625-0458; fax 612-625-8408; phclgrad@umn.edu; www.pharmacology.med.umn.edu).

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

Professor

Peter B. Bitterman, SM
Bianca M. Conti-Fine, SM
Richard M. Eisenberg, Duluth, SM
Robert P. Elde, SM
Esam E. El-Fakahany, SM
Patrick E. Hanna, SM
Stephen S. Hecht, SM
Jordan L. Holtzman, SM
Carol A. Lange, SM
Ping-Yee Law, SM
Horace H. Loh, SM
Louis M. Mansky, ASM
Paul R. Pentel, SM

Philip S. Portoghese, SM
Sundaram Ramakrishnan, SM
Jean F. Regal, Duluth, SM
Sabita Roy, SM
Ashok K. Saluja, ASM
Virginia S. Seybold, SM
Alan R. Sinaiko, M2
Norman E. Sladek, SM
Stanley A. Thayer, SM
George J. Trachte, Duluth, SM
Kendall B. Wallace, Duluth, SM
Timothy F. Walseth, SM
Li-Na Wei, SM
George L. Wilcox, SM
Wellington G. Wood III, SM
Douglas Yee, SM

Associate Professor

Colin R. Campbell, SM
Gregory J. Connell, SM
Earl W. Dunham, SM
Haim Einat, Duluth, SM
Carolyn Ann Fairbanks, SM
Janet Lyn Fitzakerley, SM
Jonathan C. Gewirtz, SM
Hiroshi Hiasa, SM
Edward T. Knych Jr., Duluth, M2
Paulo Kofuji, SM
Jonathan S. Marchant, SM
Duanqing Pei, SM
Lincoln Potter, ASM
Daniel P. Romero, SM
Elizabeth V. Wattenberg, AM
Kevin D. Wickman, SM

Adjunct Associate Professor

Rita B. Messing, M2
Ronald John Shebuski, SM

Assistant Professor

Fang Li, SM
Kirill Martemyanov, SM
LiLian Yuan, ASM
Yan Zeng, SM
Lance Zirpel, ASM

Adjunct Assistant Professor

Frank H. Burton, SM

Along with the program-specific requirements listed below, 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, but typically start in fall semester.

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 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, physiology and/or other related area) and 10 thesis credits. Plan B requires a minimum of 30 course credits (14 in pharmacology, and 16 in biochemistry, physiology, and/or other related areas) and a Plan B project.

Students are expected to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.

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 19 course credits in the major (excluding the required 24 thesis credits).

Students are expected to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.

For more detailed information, contact the director of graduate studies in pharmacology.

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; umphil@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
Brian Bix, Law, SM
Norman E. Bowie, Strategic Management and Organization, ASM
B. Carl Elliott, Public Health, ASM
Eugene Garver, Philosophy, St. John's University, ASM
Jeanette K. Gundel, Linguistics, ESL, and Slavic Languages and Literatures, AM2
William H. Hanson, SM
Geoffrey Hellman, SM
Jasper S. Hopkins, SM
Michael B. Kac, SM
Jeffrey P. Kahn, Public Health, ASM
Douglas E. Lewis, SM
Joseph I. Owens, SM
Sandra L. Peterson, SM
Naomi B. Scheman, SM
John R. Wallace, SM
C. Kenneth Waters, SM

Associate Professor

Sarah W. Holtman, SM
Michelle Mason, M2
Michael D. Root, (emeritus), SM
Valerie Tiberius, SM

Assistant Professor

Roy T. Cook, M2
Debra DeBruin, Public Health, AM2
Peter Hanks, M2
Alan Love, M2

Along with the program-specific requirements listed below, 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.

Courses—Refer to Philosophy (PHIL) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 Therapy

Contact Information—Physical Therapy Program Office, University of Minnesota, MMC 388, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-2662; fax 612-625-4274; ptquest@umn.edu; www.physther.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
LaDora V. Thompson, SM

Associate Professor

Paula M. Ludewig, SM

Assistant Professor

Kathleen Anderson, SM
Lisa L. Dorsey, SM
Teresa J. Kimberley, SM
Dawn A. Lowe, SM
David J. Nuckley, SM
Becky J Olson-Kellogg, SM
LeAnn Snow, SM

Along with the program-specific requirements listed below, 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 1 of the year of application (no preferred major); an operational standard GPA of 3.00 for overall coursework and a 3.00 GPA 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses towards degree requirements is subject to adviser 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; grad@physics.umn.edu; www.physics.umn.edu).

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

Regents Professor

Allen M. Goldman, SM

Professor

Benjamin F. Bayman, (emeritus), ASM
John H. Broadhurst, SM
Charles E. Campbell, SM
Cynthia A. Cattell, SM
Hans W. Courant, (emeritus), ASM
Paul A. Crowell, SM
Priscilla B. Cushman, SM
E. Dan Dahlberg, SM
Kris Davidson, Astronomy, SM
Michael Garwood, ASM
Robert D. Gehrz, Astronomy, SM
Clayton F. Giese, (emeritus), ASM
Anand Gopinath, Electrical and Computer Engineering, ASM
J. Woods Halley, SM
Shaul Hanany, SM
Kenneth Heller, SM
Cheng-Cher Huang, SM
Roberta Humphreys, Astronomy, ASM
Terry J. Jones, Astronomy, ASM
Thomas W. Jones, Astronomy, SM
James Kakalios, SM
Alex Kamenev, SM
Joseph I. Kapusta, SM
Paul Kellogg, (emeritus), ASM
Uwe R. Kortshagen, Mechanical Engineering, ASM
Yuichi Kubota, SM
Robert L. Lysak, SM
Marvin Marshak, SM
Keith A. Olive, SM
Robert O. Pepin, SM
Earl A. Peterson, (emeritus), ASM
Ronald A. Poling, SM
Yong-Zhong Qian, SM
Serge Rudaz, SM
Keith Ruddick, (emeritus), ASM
Roger W. Rusack, SM
Mikhail Shifman, SM
Boris Shklovskii, SM
David Thomas, Biochemistry, Molecular Biology and Biophysics, ASM
Arkady Vainshtein, SM
Oriol T. Valls, SM
Randall H. Victora, Electrical and Computer Engineering, ASM
Mikhail Voloshin, SM
Thomas F. Walsh, SM
Renata M. Wentzcovitch, Chemical Engineering and Materials Science, ASM
John R. Wygant, SM
William Zimmermann Jr., (emeritus), ASM

Associate Professor

Eric Ganz, SM
Alex Habig, ASM
Alexander Heger, SM
Chris Leighton, Chemical Engineering and Materials Science, ASM
David Morse, Chemical Engineering and Materials Science, ASM
Joachim Mueller, SM
Marco Peloso, SM
Jianping Wang, Electrical and Computer Engineering, ASM
Liliya L. Williams, Astronomy, SM

Assistant Professor

Dan Cronin-Hennessy, SM
Richard Gran, Physics Duluth, ASM
Vuk Mandic, SM
Jeremiah Mans, SM
Vincent Noireaux, SM
Michael Zudov, SM

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

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 admittance 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 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 orientation sessions, which are required if a student's financial support comes from TA assignments.

Requirement for International Students—International students who want to teach as a TA must take a workshop on American teaching culture and language skills prior to the department orientation described above and also pass an English test, which is given in late July and August. If students do not pass, they must take a training course until they pass the test. The course is given during the academic year.

Use of 4xxx Courses—Use of 4xxx physics courses is permitted for either major or minor degree requirements with prior permission of the director of graduate studies.

M.S. Degree Requirements

The M.S. requires a minimum of 20 course credits (Plan A) or 30 course credits (Plan B), including classical physics (PHYS 5011–5012) or quantum mechanics (PHYS 5001–5002) and a minimum of 6 credits in a minor or related field; Plan A also requires 10 thesis credits. The minor requirement may be satisfied by completion of courses in one or two areas outside the specialization with an approval of the director of graduate studies in the minor field. Any course may be used to satisfy the related field requirement.

Language Requirements—There is no language requirement.

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 in the minor field. Any course will satisfy the supporting program requirement.

Language Requirements—There is no language 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).

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, Saint Paul, MN 55108 (612-625-4222; fax 612-625-1738; pbiogp@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
Florence K. Gleason, Plant Biology, SM
Robert J. Jones, Agronomy and Plant Genetics, SM
Paul A. Lefebvre, 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
Kate VandenBosch, Plant Biology, SM
Daniel F. Voytas, Genetics, Cell Biology and Developmental 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 O. Anderson, Horticulture, SM
James A. Bradeen, Plant Pathology, SM
Julie Etterson, Biology, Duluth, SM
J. Stephen Gantt, Plant Biology, SM
Susan I. Gibson, Plant Biology, SM
Jane Glazebrook, Plant Biology, SM
William Gray, Plant Biology, SM
Fumiaki Katagiri, 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
Peter Tiffin, Plant Biology, 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

Clay Carter, Biology, Duluth, SM
Jeannine Cavender-Bares, Ecology, Evolution, and Behavior, SM
Adrian Hegeman, Horticultural Science, SM
Rebecca Montgomery, Forest Resources, SM
Jennifer S. Powers, Soil, Water, and Climate, SM
Imke Schmitt, Plant Biology, SM
Nathan Springer, Plant Biology, SM
Robert Stupar, Agronomy and Plant Genetics, SM

Adjunct Assistant Professor

David Garvin, Agronomy and Plant Genetics, SM
Rodney Venterea, Soil, Water, and Climate, SM

Other

Kevin Silverstein, Plant Biology, M2

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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 a 1-credit current topics course taken during their first year.

Students participate in a teacher-training program and then serve as teaching assistants 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, Saint 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
James E. Kurle, SM
Benham E. L. Lockhart, SM
David H. MacDonald, SM
James A. Percich, SM
Brian J. Steffenson, SM
Carol E. Windels, SM
Nevin D. Young, SM

Adjunct Professor

Martin Carson, SM
H. Corby Kistler, SM
James Kolmer, SM
Deborah A. Samac, SM

Associate Professor

James M. Bradeen, SM
Jane Glazebrook, SM
Charla Hollingsworth, SM
Ruth Dill-Macky, SM

Adjunct Associate Professor

Yue Jin, SM
Jennifer Juzwik, SM
Les J. Szabo, SM

Assistant Professor

Dean K. Malvick, SM

Adjunct Assistant Professor

Jonathan S Schilling, SM

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

Curriculum—Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research spanning the biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements of the area of concentration and interests of the student. Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to investigate plant disease, increase basic knowledge, and develop new strategies for disease control.

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 the 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.agri.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 8 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.cfans.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.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A minimum of 6 credits in PLPA 5xxx or 8xxx courses is required for a master's 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), completion of 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.agri.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.

Policy Issues on Work and Pay

Postbaccalaureate Certificate

Contact Information—Policy Issues on Work and Pay, 101 Wesbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4000; adv@cce.umn.edu; www.cce.umn.edu/certificates/mgmt/piwp).

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

Professor

Stephen F. Befort, Law School, M
John Budd, Human Resources and Industrial Relations, M
Morris Kleiner, Public Affairs, M

Associate Professor

Maria Hanratty, Public Affairs, M
Joseph Ritter, Applied Economics, M

Assistant Professor

Colleen Manchester, Human Resources and Industrial Relations, M

Other

James G. Scoville, Human Resources and Industrial Relations, M

Curriculum—The certificate provides an understanding of, and the ability to evaluate and develop, federal, state, and local policies that affect the employment relationship. Students learn about the role of government in the employment relationship, including statutes and how employers, unions, and the government interpret and utilize policies. Core courses are drawn from the Humphrey Institute of Public Affairs as well as the Center for Human Resources and Labor Studies in the Carlson School of Management, with auxiliary courses in law, history, sociology, and applied economics.

Prerequisites for Admission—Students must have a bachelor's degree from an accredited U.S. university or its foreign equivalent. Applicants should have successfully completed 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 cr): 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), APEC 5511 (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 Center for Human Resources and Labor Studies in the Carlson School of Management, with additional courses from the College of Liberal Arts, 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 South, Minneapolis, MN 55455; (612-624-0864; fax 612-625-2078; ppcenter@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
Ronald J. Faber, Journalism and Mass Communication, M
Dean Hewes, Communication Studies, M
Lawrence Jacobs, Humphrey Institute of Public Affairs, M
David W. Johnson, Educational Psychology, M
Paul E. Johnson, Information and Decision Sciences, M
Sally J. Kenney, Humphrey Institute of Public Affairs, AM
Geoffrey Maruyama, Educational Psychology, M
Wendy M. Rahn, Political Science, M
Alexander J. Rothman, Psychology, M
W. Phillips Shively, Political Science, M
Mark Snyder, Psychology, M
Daniel B. Wackman, Journalism and Mass Communication, M

Associate Professor

Christopher Federico, Psychology, Political Science, M
Martha H. Gonzales, Psychology, M
Paul Goren, Political Science, M
Joanne M. Miller, Political Science, M
Martin W. Sampson III, Political Science, M
Brian Southwell, Journalism and Mass Communication, M
Albert R. Tims Jr., Journalism and Mass Communication, M

Assistant Professor

Marco YzerBrian Southwell, Journalism and Mass Communication, AM

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 of political psychology: social attitudes and cognition, judgment and decision making, group relations, personality and leadership, mass communication, public opinion, mass political behavior, and political socialization. In addition to providing a background in political psychology, the program trains students in the theory and methods useful to this field, such as content analysis, survey analysis, and experimental design. The faculty is drawn from 10 programs within the Graduate School and Law School.

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 (with a grade of B or better) two or more methodology 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—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 South, 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

Professor

Michael Barnett, SM
Raymond D. Duvall, SM
John R. Freeman, SM
Lawrence R. Jacobs, SM
Robert B. Kvavik, SM
August H. Nimtz Jr., SM
Wendy M. Rahn, SM
Steven J. Rosenstone, SM
Thomas M. Scott, SM
W. Phillips Shively, SM
Joe Soss, SM
David E. Wilkins, ASM

Associate Professor

Scott Abernathy, M2
Teri Caraway, M2
Kathleen Collins, M2
Christopher Frederico, M2
Paul Goren, M2
Timothy R. Johnson, M2
Daniel Kelliher, SM
Ronald Krebs, M2
Joanne Miller, M2
Martin W. Sampson III, SM
David J. Samuels, SM
Dara Strolovitch, M2

Assistant Professor

Ben Ansell, M2
Elizabeth Beaumont, M2
Songying Fang, M2
Jane Gingrich, M2
Elisabeth Hilbink, M2
Kathryn Pearson, M2
Shawn Treier, M2
Antonio Y. Vazquez-Arroyo, M2

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

Curriculum—The curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

Prerequisites for Admission—The department's graduate admissions committee selects the strongest applicants based upon consideration of all components

of the application file. The committee accepts students who have or are completing B.A. or B.S. degrees and students who have or are completing M.A. degrees.

Special Application Requirements—All students are admitted directly into the Ph.D. program. The following should be sent directly to the department: department application form; GRE scores; a complete set of transcripts in addition to that required by the Graduate School; a brief statement expressing the applicant's purpose and goals in pursuing graduate work (in addition to and separate from the statement required as part of the Graduate School application form); three letters of recommendation from professors who know the applicant's academic work, particularly in political science; samples of the applicant's written work (papers written for political science courses preferred); and a curriculum vitae. Send photocopies of written work; the department cannot guarantee that materials will be returned.

Graduate study in the Ph.D. program must begin in fall semester; the application deadline is December 15.

The department and the Humphrey Institute of Public Affairs jointly offer a program that leads to an M.A. in public affairs and a Ph.D. in political science. To be eligible, students must be admitted separately by political science and public affairs. Normally, students begin their study in public affairs and later apply to the Ph.D. program in political science. However, students may begin in either program, so it is possible to apply initially to either program or both. Students interested in this joint degree program should contact the director of graduate studies.

Courses—Refer to Political Science (POL) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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, which leads to an M.A. in public affairs from the Hubert H. Humphrey Institute of Public Affairs and a Ph.D. in political science, is also available .

Students concentrate in two of the five subfields and take a minimum of nine political science seminars, including POL 8101 and the core seminars in each of their subfields (POL 8120, 8201, 8301, 8401, 8601). In addition, they take three advanced seminars in their first subfield and three in their second, or four advanced seminars in their first subfield and two in their second subfield (formal models and methodology can be used only as a second subfield).

Language Requirements—Students must demonstrate one of the following: a) high proficiency in one foreign language; b) high proficiency in research methodology; c) low proficiency in two foreign languages; d) low proficiency in one foreign language and low proficiency in research methodology.

Students who concentrate in comparative politics must have appropriate language competence in their area(s) of specialization.

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@pop.umn.edu; www.pop.umn.edu/training/population-minor).

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

Professor

John S. Adams, (emeritus), Geography, M
Ragui A. Assaad, Humphrey Institute of Public Affairs, M
John M. Eyler, History of Medicine, M
Katherine Fennelly, Humphrey Institute of Public Affairs, M
Paul W. Glewwe, Applied Economics, M
Robert E. McCaa, History, M
Phyllis E. Moen, Sociology, M
Jeylan T. Mortimer, Sociology, M
Samuel L. Myers Jr., Humphrey Institute of Public Affairs, M
Steven Ruggles, History, M

Associate Professor

Kathleen Thiede Call, Health Policy and Management, M
Jeffrey R. Crump, Design, Housing, and Apparel, M
Elizabeth E. Davis, Applied Economics, M
Wendy L. Hellerstedt, Epidemiology, M
Deborah Levison, Humphrey Institute of Public Affairs, M
Ian Ross Macmillan, Sociology, M
J. Michael Oakes, Epidemiology, M
Joan M. Patterson, Epidemiology, M
Lisa Park, Sociology, M
John Robert Warren, Sociology, M

Assistant Professor

Cawo Abdi, Sociology, M
Michael E. Davern, State Health Access Data Assistance Center, M
Eric Grodsky, Sociology, M
Carolyn Liebler, Sociology, M
Ann Meier, Sociology, M

Research Associate

Pamela Jo Johnson, Minnesota Population Center, M
Miriam L. King, Minnesota Population Center, M

Curriculum—Population studies is a multidisciplinary research area at the intersection of the mathematical sciences, the health and social sciences, and public policy. The curriculum provides solid grounding in the theories and methods of demography, with additional specialized training across five interdisciplinary subject areas: historical demography, population geography, economic demography, public health demography, and family and life course demography.

Prerequisites for Admission—Enrollment in the population studies minor program is contingent upon prior admission to a master's or doctoral degree-granting program within the Graduate School. Students need not formally apply to enroll in the minor; any student currently in good standing in the Graduate School may elect to complete the minor by fulfilling the requirements and filing a Program Completion Form with the director of graduate studies.

Special Application Requirements—None.

Courses—Refer to the minor program Web site at www.pop.umn.edu/training/population-minor for information on coursework pertaining to the program.

Use of 4xxx Courses—4xxx courses may not be included on Degree Program Forms for the population studies minor.

Language Requirements—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 or SOC 5090—World Population Issues. In addition to the core course, master's students take at least three credits and doctoral students take at least 9 credits from the list of approved courses at www.pop.umn.edu/training/population-minor/curriculum. All courses should be from the same subject area and may not be in the student's major field. A total of 6 credits at the master's level and 12 credits at the doctoral level is required for the minor. Students must register for all courses A-F; courses taken on a pass/fail basis may not count toward the minor (with the exception of PUBH 5628, which is currently offered only S-N).

Prevention Science

Minor Only

Contact Information—Prevention Science Program, 202 Child Development, 51 East River Parkway, Minneapolis, MN 55455 (612-625-4321; fax: 612-624-6373; prevsci@umn.edu; www.preventionscience.umn.edu).

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

Professor

Gerald August, Psychiatry, M
Helen Q. Kivnick, Social Work, M
Morris M. Kleiner, Public Affairs, AM
Ann S. Masten, Child Development, M
Arthur J. Reynolds, Child Development, M
John L. Romano, Educational Psychology, M
Esther F. Wattenberg, Social Work, AM
Maureen R. Weiss, Kinesiology, M

Associate Professor

Nicola Alexander, Educational Policy and Administration, M
Michael L. Bloomquist, Psychiatry, AM
Jayne Fulkerson, Nursing, M
Richard M. Lee, Psychology, M
Linda L. Lindeke, Nursing, AM
Joan Patterson, Epidemiology, AM
Judy Temple, Applied Economics, M
Diane Wiese-Bjornstal, Kinesiology, M

Assistant Professor

Darin J. Erickson, Epidemiology, M
Abigail Gewirtz, Family Social Services, M

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

Curriculum—Prevention science is defined for the purposes of this program as the scientific study of systematic efforts to reduce the incidence of unhealthy or maladaptive behavior, and to promote health and adaptive behavior in populations across the life span through designing and evaluating interventions, and utilizing knowledge about them more strategically.

The fundamental assumption of this free-standing minor is that future researchers and scholars will be most able to meet the challenges and changes occurring in society and in their chosen professions and disciplines if their training is comprehensive and transdisciplinary.

Prevention science is a rapidly expanding interdisciplinary field and this program will increase opportunities for the University's academic researchers to partner with communities to address the complex issues facing society.

Initially, six areas of concentration will be offered. Students will be expected to select one as a major emphasis. Proposed initial areas of concentration are: 1) promotion of mental health and wellbeing across the lifespan; 2) interventions in education, health, and social services; 3) social policy; 4) family and community studies (early stage research, needs assessments, action research); 5) methodology; 6) individualized concentration. For more information about these areas of concentration, visit www.cehd.umn.edu/icd/PrevSci/concentrations.html.

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 prevention science. Doctoral students must apply prior to their preliminary orals.

Special Application Requirements—Students are required to make formal application. The admission application must include acompleted Application Form, which can be downloaded from www.cehd.umn.edu/icd/PrevSci/admission.html; a statement of interest; documentation of enrollment as a master's or doctoral student (current unofficial transcript is acceptable); and specification of an area of concentration within the minor.

Courses—Refer to Prevention Science Minor (PREV) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program. Contact the minor program office for information on other relevant courses.

Use of 4xxx Courses—4xxx courses are not allowed in the minor.

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 prevention science. The master's minor requires at least 9 credits, including PREV 8001—Introduction to Prevention Science (3 cr) and 6 credits of elective courses primarily from the student's area of concentration.

The doctoral minor requires at least 13 credits, ordinarily including PREV 8001—Introduction to Prevention Science (3 cr), PREV 8005—Capstone course (1 cr), and 9 credits of elective courses primarily from the students area of concentration.

The purpose of the minor is to provide students with interdisciplinary training in prevention science; therefore, all students will be required to fulfill the elective requirements for the minor by taking courses outside their major. Courses counting toward a student's major may not be counted toward the minor.

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; kingx004@umn.edu; http://education.umn.edu/EdPA/Evaluation/minor.html).

For latest graduate faculty listings, see 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 Integration, M
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 of Child Development, M
Karen R. Seashore, M

Associate 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 or in Twin Cities Courses on the University Catalog Web site 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 by the student, the major adviser, and the director of graduate studies.

Psychology

Contact Information—Department of Psychology, University of Minnesota, S253 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax 612-626-2079; psyapply@umn.edu; http://www.psych.umn.edu).

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

Regents Professor

Ellen S. Berscheid, SM
Megan R. Gunnar, Child Development, ASM
Matthew K. McGue, SM

Professor

Joyce E. Bono, ASM
Eugene Borgida, SM
Thomas J. Bouchard Jr., SM
Dwight A. Burkhardt, SM
John P. Campbell, SM
Marilyn E. Carroll, Psychiatry, ASM
Sandra L. Christenson, Educational Psychology, ASM
Scott J. Crow, Psychiatry, AM2
Bruce N. Cuthbert, SM
Mark L. Davison, Educational Psychology, ASM
René V. Dawis, (emeritus), ASM
Byron Egeland, Child Development, ASM
Stephen A. Engel, SM
Patricia A. Frazier, SM
Theresa M. Glomb, Human Resources and Industrial Relations, AM2
Jo-Ida C. Hansen, SM
Dorothy K. Hatsukami, 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, AM2
Eric Klinger, (emeritus), Social Sciences, Morris, ASM
Matt G. Kushner, Psychiatry, ASM
Gordon E. Legge, SM
Gloria R. Leon, (emeritus), ASM
Allen S. Levine, Psychiatry, ASM
Rodney G. Loper, (emeritus), Counseling and Consulting Services, ASM
Angus MacDonald III, SM
Chad J. Marsolek, SM
Ann S. Masten, Child Development, ASM
Michael H. Miner, Family Medicine and Community Health, AM2
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 Sroufe, Child Development, ASM
Thomas Stoffregen, Kinesiology, ASM
Auke Tellegen, (emeritus), ASM
Travis Thompson, Pediatrics, ASM
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

Kathy J. Christensen, Neurology, AM2
Christopher M. Federico, SM
Charles R. Fletcher, SM
Jonathan C. Gewirtz, SM
Martha H. Gonzales, SM
William M. Grove, SM
Darwin D. Hendel, Educational Policy and Administration, AM2
Yuhong Jiang, M2
Wilma Koutstaal, SM
Richard M. Lee, SM
Monica Luciana, SM
Traci L. Mann, M2
Andrew J. Oxenham, SM
Gail Burton Peterson, SM
Scott R. Sponheim, Psychiatry, AM2

Adjunct Associate Professor

Celia W. Gershenson, AM2
Harriett L. C. Haynes, University Counseling and Consulting Services, AM

Assistant Professor

James P. Cleary, Neurology, AM2
Colin G. DeYoung, SM
Nathan R. Kuncel, SM
Cheryl A. Olman, M2
Patricia J. Pardo, Psychiatry, AM2
Joe Rausch, M2
Paul R. Schrater, SM
Mark J. Thomas, M2
Linda K. Van Egeren, AM2

Adjunct Assistant Professor

Abigail Gewirtz, Child Development, AM
John C. Gonsiorek, AM2

Research Associate

Christophe D. Micheyl, AM
Carol B. Peterson, Psychiatry, AM

Along with the program-specific requirements listed below, 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 strongly recommended. Applicants whose native language is not English should submit the results of the TOEFL iBT. 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 or in Twin Cities Courses on the University Catalog Web site 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 Requirements—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 Graduate Student Services, 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.

Professor

Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John M. Bryson, M2
Nancy N. Eustis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoenack, M2
Lawrence R. Jacobs, M2
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Greg H. Lindsey, M2
Samuel L. Myers, M2
Joe Soss, M2

Associate Professor

Barbara Crosby, M2
Maria J. Hanratty, M2
Jennifer Kuzma, M2
Deborah Levison, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa M. Stone, M2
Judy Temple, M2

Assistant Professor

Ryan P. Allen, M2
Jason Cao, M2
Yingling Fan, M2
Greta Friedemann-Sanchez, M2
Carissa Schively Slotterback, M2
Elizabeth J. Wilson, M2
Zhirong Zhao, M2

Other

Steven P. Andreasen, AM
Harry C. Boyte, M2
Gary M. DeCramer, M2
Kaye Husbands Fealing, AM2
Sherry Gray, M
Steve Kelley, M
P. Jay Kiedrowski, M2
Lee Munnich, M2
Joseph H. Nathan, M2
Timothy Penny, AM
Sudha Shetty, M
Paul C. Stone, M2

Along with the program-specific requirements listed below, 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. This program prepares mid-career students for public 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; global public policy; public and nonprofit leadership and management; science, technology and environmental policy; social policy; women and public policy; land use/urban design planning; economic and workforce development; housing and community development; environmental planning; and transportation planning.

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 are 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 or in Twin Cities Courses on the University Catalog Web site 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

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

Diane Katsiaficas, Art, M
Thomas A. Rose, Art, M

Associate Professor

Jane M. Blocker, Art History, M
Lyndel I. King, Art History, M
Rebecca J. Krinke, Landscape Architecture, 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 (PArt) is an interdisciplinary program designed to expose students to the history of public art, contemporary issues, and current practices. The minor provides students the opportunity to work with instructors and other students with backgrounds in studio arts, design, architecture, landscape architecture, urban design, and public policy to learn collaborative methods essential to public art making and public art administration. Specifically, the minor provides students with a theoretical basis to both understand and produce public art projects. The minor includes a set of core courses in public art history, current issues and criticisms, and public engagement.

Prerequisites for Admission—This graduate minor is available to master' 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; sph.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
Bernard L. Harlow, M
Robert W. Jeffery, M
Barbara J. Leonard, Nursing, M
A. Marshall McBean, M
Patricia M. McGovern, M
Lisa A. Peterson, M
Michael D. Resnick, Pediatrics, M
Francois Sainfort, M
William A. Toscano, M

Associate Professor

Kristin E. Anderson, M
Jeff B. Bender, M
Leslie A. Grant, M
Linda L. Halcon, Nursing, M
Rhonda J. Jones-Webb, M
James S. Pankow, M
Joan M. Patterson, M
Renee E. Sieving, Nursing, M

Assistant Professor

Carolyn M. Garcia, Nursing, M
Melissa A. Nelson, AF
Peter C. Raynor, M

Clinical Assistant Professor

Mary J. Findorff, Nursing, 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 as early as possible. Enrollment is contingent upon approval of the application by the director of graduate studies, after which a minor program adviser(s) is assigned.

Courses—Refer to Public Health (PUBH) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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

Minor Only Requirements

The master's minor requires a minimum of 8 graduate credits; the doctoral minor requires a minimum of 14 graduate credits. Courses for the minor must be selected from those offered by the School of Public Health. In order to meet the minor requirements, students must successfully complete graduate coursework in each of the following disciplines: biostatistics, epidemiology, and environmental health. Suggested courses include PUBH 6101—Environmental Health or PUBH 6102—Issues in Environmental Health; PUBH 6320—Fundamentals of Epidemiology or PUBH—6341 Epidemiologic Methods I; and PUBH 6414—Biostatistical Methods I or PUBH 6450—Biostatistics I.

If students have already taken comparable graduate-level courses in these disciplines, other public health courses can be used to complete the minor requirement with the approval of the public health adviser and the director of graduate studies. Since public health courses may have prerequisites or enrollment limitations, early planning with an adviser is suggested.

Language Requirements—None.

Public Policy

Contact Information—Director of Graduate Student Services, 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.

Professor

Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, 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
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Greg H. Lindsey, M2
Samuel L. Myers, M2
Joe Soss, M2

Associate Professor

Barbara Crosby, M2
Maria J. Hanratty, M2
Jennifer Kuzma, M2
Deborah Levison, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa Stone, M2
Judy Temple, M2

Assistant Professor

Ryan P. Allen, M2
Jason Cao, M2
Yingling Fan, M2
Greta Friedemann-Sanchez, M2
Carissa Schively Slotterback, M2
Elizabeth J. Wilson, M2
Zhirong Zhao, M2

Other

Steven P. Andreasen, AM
Sheila D. Ards, AM2
Harry C. Boyte, M2
Gary DeCramer, M2
Kaye Husbands Fealing, AM2
Sherry Gray, M
Steve Kelley, M2
P. Jay Kiedrowski, M2
Lee W. Munnich, M2
Joseph H. Nathan, M2
Timothy Penny, AM
Sudha Shetty, M
Paul C. Stone, M2

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

Curriculum—The master of public policy (M.P.P.) curriculum is built upon a core of required theoretical and methodological courses. In remaining courses, students choose either to emphasize more advanced study of analysis or management, or to focus on a particular substantive area of public policy. Structured concentrations include advanced policy analysis methods; economic and community development; global public policy; public and nonprofit leadership and management; science, technology and environmental policy; social policy; and women and public policy. Students have multiple opportunities to apply the concepts learned in their coursework to real-life policy problems, including cases presented in courses, their internships, and workshops. Dual degrees include M.P.P./master of business administration, M.P.P./juris doctor; M.P.P./master of science in health services research, policy, and administration; and M.P.P./master of social work.

Prerequisites for Admission—Students are expected to have completed the equivalent of an introductory course in microeconomics, have basic competency in college algebra and computers, 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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

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 noncredit 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 Paleoecology

Minor Only

Contact Information—Director of Graduate Studies, Quaternary Paleoecology Graduate Program, University of Minnesota, 108 Pillsbury Hall, 310 Pillsbury Drive S.E., Minneapolis, MN 55455 (612-624-7881; fax 612-625-3819; qpminor@umn.edu).

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

Regents Professor

Thomas C. Johnson, Geological Sciences, Large Lakes Observatory, Duluth, M

Professor

Subir K. Banerjee, Geology and Geophysics, M
James Cotner, Ecology, Evolution, and Behavior, M
R. Lawrence Edwards, Geology and Geophysics, M
Guy E. Gibbon, Anthropology, M
Emi Ito, Geology and Geophysics, M
Edward A. Nater, Soil, Water, and Climate, M
Peter S. Wells, Anthropology, M

Associate Professor

David L. Fox, Geology and Geophysics, M
Katherine Klink, Geography, M
Martha Tappen, Anthropology, M

Assistant Professor

Kurt F. Kipfmueller, Geography, M
Susy S. Ziegler, Geography, M

Adjunct Professor

Daniel R. Engstrom, Geology and Geophysics, AM

Curriculum—The faculty of the graduate minor in quaternary paleoecology 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.

Prerequisites for Admission—Admission is contingent on prior admission to a Graduate School degree-granting program.

Special Application Requirements—Students apply by sending a letter of application to the director of graduate studies (qpminor@umn.edu) as well as a letter of recommendation from their current adviser. Application may be made at any time.

Courses—Contact the director of graduate studies at qpminor@umn.edu for information on relevant coursework.

Use of 4xxx Courses—Any 4xxx course that meets the approval of the director of graduate studies 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 paleoecology. Students choose courses from relevant fields outside their major field. Master's students must take a total of 6 credits. Ph.D. students take a total of 9 credits (one course may be in the major field). Some requirements may be waived depending on the student's background.

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; www.med.umn.edu/rehabscience/).

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

Professor

James Carey, SM
Richard DiFabio, SM
Carl Kukulka, SM
Walter C. Low, SM
Robert Patterson, SM
LaDora Thompson, SM

Associate Professor

Dennis Dykstra, SM
Paula Ludewig, SM
Virgil Mathiowetz, SM
Erica Stern, SM

Assistant Professor

Kathleen Anderson, SM
Lisa Dorsey, SM
Teresa Jacobson Kimberley, SM
Dawn Lowe, SM
David J. Nuckley, SM
Patricia Schaber, SM
LeAnn Snow, SM

Along with the program-specific requirements listed below, 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 or in Twin Cities Courses on the University Catalog Web site 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.

Religious Studies

Minor Only

Contact Information—Director of the Program in Religious Studies, University of Minnesota, 245 Nicholson Hall, 216 Pillsbury Avenue S.E., Minneapolis, MN 55455 (612-625-5353; rels@umn.edu).

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
Iraj Bashiri, History, M
Penny Edgell, Sociology, 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. Stavrou, History, M
James D. Tracy, History, M
Ann Waltner, History, M

Associate Professor

Bernard M. Levinson, Classical Near Eastern Studies, M
Philip H. Sellew, Classical Near Eastern Studies, M

Other

Jeanne Kilde, 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 applicant'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 committees. All students enrolled in the minor take RELA 5001—Theory and Method in the Study of Religion, and choose two (M.A.) or three (Ph.D.) courses in consultation with the director of graduate studies. For appropriate courses, see www.religiousstudies.umn.edu/courses.

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 Wesbrook Hall, 77 Pleasant Street 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.html.

Professor

Carol Ann Berkenkotter, SM
Karlyn K. Campbell, Communication Studies, ASM
Ann Hill Duin, SM
Shirley N. Garner, English, ASM
Alan G. Gross, Communication Studies, ASM
Laura J. Gurak, SM
Joseph A. Konstan, Computer Science and Engineering, ASM
Earl E. McDowell, SM
Donald J. Ross Jr., SM
Edward A. Schiappa, Communication Studies, ASM
Mary M. Lay Schuster, SM
Elaine E. Tarone, ILES, ASM
Billie J. Wahlstrom, SM
Arthur E. Walzer, Communication Studies, ASM

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
John Logie, SM
Bernadette C. Longo, SM
Daniel J. Philippon, English, ASM
Thomas Reynolds, M2
Kirt H. Wilson, Communication Studies, ASM

Other

Kirsten Jamsen, Center for Writing, M

Along with the program-specific requirements listed below, 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, research, and practice in rhetoric and scientific and technical communication; analysis of scientific or technical discourse; and coursework in a minor or related field.

All M.A. and Ph.D. applicants must meet the admission requirements of the Graduate School. M.A. and Ph.D. applicants should have a strong interest in language and rhetorical theory or communication theory. A background in a science, Internet studies, environmental studies, or pedagogy and technology is helpful.

Special Application Requirements—Scores from the General Test of the GRE that are less than five years old are required of students with baccalaureate degrees from U.S. institutions. International students are encouraged to take the General Test of the GRE and to have those results forwarded to the Graduate School. Nonnative speakers of English are required to take the TOEFL with satisfactory scores. All applicants must submit three letters of recommendation, two writing samples, and a professional objective statement. All M.A. and Ph.D. applicants begin in the fall semester and should apply by the January 1 application deadline.

Courses—Refer to Writing Studies (WRIT) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 to 30 works related to their interests and coursework. Students are then required to do a written 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), 6 credits in a selected specialty area, 6 credits in a minor or support program, 12 electives to fulfill the minimum 33-credit course requirement, and either WRIT 8792 for the exam option or WRIT 8794 for the Plan B option. See www.writingstudies.umn.edu/grad/rstcMA.html.

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 by 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 master's degree 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 rhetoric seminars and courses—two of those seminars must be in rhetorical theory and criticism within departmental course offerings. Students take two courses (6 cr) in rhetorical theory and criticism; two courses in technical communication research and theory (6 cr), 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 cr) and research methods courses (0–6 cr); 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). See www.writingstudies.umn.edu/grad/rstcPhD.html for more information.

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—Reading 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.

Risk Analysis for Introduced Species and Genotypes

Minor Only

Contact Information—Director of Graduate Studies, Risk Analysis for Introduced Species and Genotypes University of Minnesota, 200 Hodson Hall, 1980 Folwell Avenue, Saint Paul, MN 55108 (612-625-0890; fax 612-625-5299; isgigert@umn.edu; www.isg-igert.umn.edu).

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

Regents Professor

Peter B. Reich, Forest Resources, M
G. D. Tilman, Ecology, Evolution, and Behavior, M

Professor

David Andow, Entomology, M
Gary J. Balas, Aerospace Engineering and Mechanics, M
Roger Becker, Agronomy and Plant Genetics, M
Susan M. Galatowitsch, Horticultural Science, M
William D. Hueston, Veterinary Population Medicine, M
William D. Hutchison, Entomology, M
Nicholas R. Jordan, Agronomy and Plant Genetics, M
Anne R. Kapuscinski, Fisheries, Wildlife and Conservation Biology, M
James J. Luby, Horticultural Science, M
Mary H. Meyer, Horticultural Science, M
Roger D. Moon, Entomology, M
Raymond M. Newman, Fisheries, Wildlife, and Conservation Biology, M
Gary W. Oehlert, Statistics, M
Alan S. Polasky, Applied Economics, M
David W. Ragsdale, Entomology, M
Michael J. Sadowsky, Soil, Water, and Climate, M
Ruth G. Shaw, Ecology, Evolution, and Behavior, M
Peter W. Sorensen, Fisheries, Wildlife, and Conservation Biology, M
Deborah L. Swackhamer, Environmental Health Sciences, M
Sanford Weisberg, Statistics, M
Donald L. Wyse, Agronomy and Plant Genetics, M

Adjunct Professor

Robert G. Haight, Forest Resources, M
Douglas H. Johnson, Fisheries, Wildlife, and Conservation Biology, M
Carl Richards, Biology, Duluth, M

Associate Professor

John L. Adgate, Environmental Health Sciences, M
Neil O. Anderson, Horticultural Science, M
Robert B. Blair, Forest Resources, M
Donn K. Branstrator, Biology, Duluth, M
George E. Heimpel, Entomology, M
Sarah E. Hobbie, Ecology, Evolution, and Behavior, M
Frances R. Homans, Applied Economics, M
Terry Hurley, Applied Economics, M
Vera A. Krischik, Entomology, M
Jennifer Kuzma, Humphrey Institute of Public Affairs, M
Kristen C. Nelson, Forest Resources, M
Karen S. Oberhauser, Fisheries, Wildlife, and Conservation Biology, M
Daniel J. Philippon, English, M
Rachel Schurman, Sociology, M
Alan G. Smith, Horticultural Science, M
George D. Weiblen, Plant Biology, M

Adjunct Associate Professor

Robert C. Venette, Entomology, M

Assistant Professor

Diane Larson, Ecology, Evolution, and Behavior, M
Rebecca A. Montgomery, Forest Resources, M

Research Associate

Lee E. Frelich, Forest Resources, M

Curriculum—The minor in risk analysis for introduced species and genotypes is available to master's (M.A. and M.S.) and doctoral students. The minor provides an interdisciplinary curriculum that addresses all phases of risk analysis pertaining to the introduction of exotic species and novel genotypes. The curriculum is based on collaborative learning and includes a survey course, discussions, a problem solving practicum, and a cooperative learning practicum. The minor complements major programs in applied economics; applied plant sciences; conservation biology; ecology, evolution, and behavior; entomology; natural resources science and management; plant biological sciences; and water resources science,

Prerequisites for Admission—Admission to a master's or doctoral degree-granting program within the Graduate School. Students from programs other than the complementary programs listed above should consult the director of graduate studies in risk analysis for introduced species and genotypes to determine if they have adequate training in the science (including social and economic sciences) to complete the minor.

Courses—Refer to Introduced Species and Genotypes (ISG) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 13 graduate credits. Master's students must take ISG 5010 (3 cr), ISG 5020 (1 cr) and ISG 8001 (1 cr; taken

twice for credit). The doctoral minor requires at least 13 credits, including the master's courses, plus ISG 8021 (3 cr), ISG 8031 (1 cr) and a 3-credit course in quantitative modeling or a decision analysis course offered by another program.

Science, Technology, and Environmental Policy

Contact Information—Director of Graduate Student Services, 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.

Professor

Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John M. Bryson, M2
K. William Easter, Applied Economics, AM2
Nancy N. Eustis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoenack, M2
Lawrence R. Jacobs, M2
Anne Kapuscinski, Fisheries, Wildlife, and Conservation Biology, AM
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Greg H. Lindsey, M2
Ann R. Markusen, M2
Samuel L. Myers, M2
Philip G. Pardey, Applied Economics, AM2
Joe Soss, M2

Associate Professor

Barbara Crosby, M2
Maria J. Hanratty, M2
Jennifer Kuzma, M2
Deborah Levison, M2
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa M. Stone, M2
Judy Temple, M2

Assistant Professor

Ryan P. Allen, M2
Jason Cao, M2
Yingling Fan, M2
Greta Friedemann-Sanchez, M2
Carissa Schively Slotterback, M2
Elizabeth J. Wilson, M2
Zhirong Zhao, M2

Other

Harry C. Boyte, M2
Gary DeCramer, M2
Kaye Husbands-Fealing AM2
Sherry Gray, M
Steve Kelley, M
P. Jay Kiedrowski, M2
Lee W. Munnich, M2
Joseph H. Nathan, M2
Timothy Penny, AM
Sudha Shetty, M
Paul C. Stone, M2

Along with the program-specific requirements listed below, 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 society, including food and agriculture, the economy, energy and the environment, security, health, and education; the impact of science and technology on the political and economic relationships within and among nations; and the analysis and design of policies for appropriate promotion and regulation of science and technology regionally, nationally, and internationally. The program educates students with natural and social science backgrounds to assume roles in public policy development. A dual M.S./juris doctor 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. For students without significant coursework in the natural or engineering sciences, the M.P.P. program with a concentration in science, technology, and environmental policy is recommended.

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 or in Twin Cities Courses on the University Catalog Web site 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 cr). 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 Wesbrook Hall, 77 Pleasant Street 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.html.

Professor

Carol Ann Berkenkotter, M2
Ann Hill Duin, M2
Alan G. Gross, AM2
Laura J. Gurak, M2
Earl E. McDowell, M2
Donald Ross, M2
Mary M. Lay Schuster, M2
Billie J. Wahlstrom, M2
Arthur E. Walzer, AM2

Associate Professor

Lee-Ann Kastman Breuch, M2
Patrick Bruch, M2
Richard J. Graff, M2
John Logie, M2
Bernadette C. Longo, M2
Daniel J. Philippon, AM2
Thomas Reynolds, M2

Along with the program-specific requirements listed below, 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 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 April 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 or in Twin Cities Courses on the University Catalog Web site 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 cr) 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 cr) 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 a capstone course (3 cr) 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, see www.msstc.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.html.

Regents Professor

Apostolos P. Georgopoulos, Neuroscience, SM
Donald G. Truhlar, Chemistry, SM

Professor

Douglas N. Arnold, Mathematics, SM
Victor H. Barocas, Biomedical Engineering, SM
Daniel L. Boley, 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
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
Jaideep Srivastava, Computer Science and Engineering, SM
Harlan W. Stech, Mathematics and Statistics, Duluth, SM
Ellad Tadmor, Aerospace Engineering and Mechanics, 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, Geology and Geophysics, SM

Associate Professor

Scott Fahrenkrug, Animal Science SM
George Karypis, Computer Science and Engineering, M2
Krishnan Mahesh, Aerospace Engineering, SM
Darrin M. York, Chemistry, SM

Assistant Professor

Bagrat Amirikian, Neuroscience, M2
Rui Kuang, Computer Science and Engineering, M2

Lecturer

Norman J. Troullier, Chemistry, M2

Along with the program-specific requirements listed below, 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. The program and degree requirements are described in detail on the program website.

Prerequisites for Admission—Applicants fill out the online Graduate School Application and the Survey of Research Interests Form found on the program website. 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 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 assistantships.

Courses—Refer to the Scientific Computation (SCIC) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.

Security Technologies

NOTE: *The first entering graduate class for this program will matriculate in June 2010. The information on this program, including courses and requirements, is preliminary and may change as the curriculum is finalized.*

Contact Information—Security Technologies Graduate Program, Technological Leadership Institute, University of Minnesota, 510 West Bank Office Building, 1300 South Second Street, Minneapolis, MN 55454 (612-624-5747; fax 612-624-7510; tliss@umn.edu; www.tli.umn.edu).

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

Professor

Trevor R. Ames, Veterinary Population Medicine, M2
Massoud Amin, Electrical and Computer Engineering, M2
Frank F. Busta, (emeritus) National Center for Food Protection and Defense, M2
Alok Gupta, Carlson School of Management, M2
Theodore P. Labuza, Food Science and Nutrition, M2
Alfred Marcus, Strategic Management and Organization, M2
Andrew Odlyzko, Mathematics, M2
Dennis L. Polla, Electrical Engineering, M2

Associate Professor

Kevin W. Linderman, Operations and Management Science, M2
Srinand Sreevatsan, Veterinary Population Medicine, M2

Assistant Professor

Elizabeth A. Amin, Medicinal Chemistry, M2
Nicholas Hopper, Computer Science and Engineering, M2
Frederick J. Riggins, Information and Decision Sciences, M2

Senior Fellow

Kirk Froggatt, Agilent Technologies, M2
Steve Kelley, Center for Science, Technology and Public Policy, M2

Other

Jeff Bender, Veterinary Medical Center, M2
Lockwood Carlson, Management of Technology, M2
Shaun Kennedy, National Center for Food Protection and Defense, M2

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

Curriculum—The Master of Science in Security Technologies (M.S.S.T.) shapes tomorrow's analytical and risk management policymakers and innovators through a multi-disciplinary graduate program developed in response to growing demand in many levels of industry and government. During the 14-month program and through a multi-disciplinary systems approach, the program synthesizes core learning in four areas: security methods and foundations; application expertise (including cyber, bio, food, infrastructure, global supply chains); systems science (interdependency among critical networks, components, human capital, organizational dimensions); and social and policy dimensions. Through elective courses, students also choose a learning track in either security systems technologies or security risk management. Students can further specialize through a range of elective courses. This program bridges disciplines to address local, regional, national, and global areas of need, seeding innovative capabilities while enabling interdisciplinary connections through direct links to industry, business, and government partners.

Prerequisites for Admission—Qualified applicants must hold at least a bachelor's degree in a related field, e.g. in biological or physical sciences, engineering, computer science, mathematics, statistics, social sciences, or public policy. Minimum requirements also include one year of calculus, probability/statistics, two science or engineering courses. Preference will be given to applicants with an undergraduate GPA of 3.00 or above.

Use of 4xxx Courses—4xxx courses may not be included on Degree Program Forms.

M.S.S.T. Degree Requirements

The M.S.S.T. program requires 32 credits in the fields of systems risk analysis, engineering (hardware and software), emerging technologies, economics, human factors, law, food and bio safety, and public policy to teach and investigate security technologies and address pertinent issues. The curriculum comprises a balance of courses from the following core areas:

- Foundations of security science and technology, methods, and algorithms
- Application areas, including critical infrastructures—e.g., communications/IT/cyber, power/energy, water, and transportation; food/infectious diseases, financial networks, supply chain management, etc.
- Coupled dynamic systems—infrastructure interdependencies and dynamics of coupled infrastructures,

system-wide risk/threat management, and complex interactive networks (including finance and economics, policy and regulation);
- Regulatory, policy, legal, economic, and business implications;
- Management and leadership development (including communication skills, change management, ethics, project management, and conflict management).

Language Requirements—None

Final Exam—An oral presentation of the capstone project is required.

Minor Requirements for Students Majoring in Other Fields—The master's minor requires 7 credits. The Ph.D minor requires 12 credits.

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; cremi001@umn.edu).

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

Professor

Barbara Brandt, Pharmaceutical Care and Health Systems, SM
Richard C. Brundage, Experimental and Clinical Pharmacology, SM
Robert J. Cipolle, Pharmaceutical Care and Health Systems, SM
James C. Cloyd, 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. Hadsall, Pharmaceutical Care and Health Systems, SM
Charles E. Halstenson, Experimental and Clinical Pharmacology, ASM Robert Kriel, Pediatrics, M2
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. Ranelli, 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
Mark R. Schleiss, Pediatrics, AM2
Jon C. Schommer, Pharmaceutical Care and Health Systems, SM
Stephen W. Schondelmeyer, Pharmaceutical Care and Health Systems, SM
Randall D. Seifert, Pharmaceutical Care and Health Systems, SM
Stuart M. Speedie, Health Informatics, Medical School, SM
Robert J. Straka, Experimental and Clinical Pharmacology, M2
Timothy P. Stratton, 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
Thomas S. Rector, College of Pharmacy, AM2
Leo J. Sioris, Experimental and Clinical Pharmacology, M2

Associate Professor

Sidney B. Benson, Pharmaceutical Care and Health Systems, M2
Angela K. Birnbaum, Experimental and Clinical Pharmacology, SM
Michael C. Brown, Pharmaceutical Care and Health Systems, M2
Richard R. Cline, Pharmaceutical Care and Health Systems, SM
Brian J. Isetts, Pharmaceutical Care and Health Systems, M2
Pamala A. Jacobson, Experimental and Clinical Pharmacology, SM
Kristin K. Janke, Pharmaceutical Care and Health Systems, M2
Mark Kirstein, Experimental and Clinical Pharmacology, M2
Michael Kotlyar, Experimental and Clinical Pharmacology, M2
Ayman M. Noreddin, Pharmacy Practice and Pharmaceutical Sciences, Duluth, M2
William S. Oetting, Experimental and Clinical Pharmacology, M2
Pamela Phelps, Pharmacy, M2
Mark E. Schneiderhan, Pharmaceutical Care and Health Systems, M2
Wendy L. Saint Peter, Pharmaceutical Care and Health Systems, M2
Craig Weinert, Experimental and Clinical Pharmacology, AM2
Marcia M. Worley, Pharmaceutical Care and Health Systems, M2

Adjunct Associate Professor

Sauwakon Ratanawijitrasin, Pharmaceutical Care and Health Systems, AM
Robert F. O'Dea, Pharmacology, AM2
John V. St. Peter, Experimental and Clinical Pharmacology, M2

Assistant Professor

Terrence J. Adams, Pharmaceutical Care and Health Systems, M2
Bjoern Bauer, Pharmaceutical Care and Health Systems, M
L'Aurelle A. Johnson, Experimental and Clinical Pharmacology, M
Jatinder K. Lamba, Experimental and Clinical Pharmacology, M2
Susan E. Marino, Experimental and Clinical Pharmacology, M
Serguei V. Pakhomov, Pharmaceutical Care and Health Systems, M2
Marnie L. Peterson, Experimental and Clinical Pharmacology, SM
Raquel Rodriguez, Pharmaceutical Care and Health Systems, M2
Doneka R. Scott, Pharmaceutical Care and Health Systems, M
Debra J. Skaar, Experimental and Clinical Pharmacology, M2
Heather E. Vezina, Experimental and Clinical Pharmacology M2

Adjunct Assistant Professor

Puree Anantachoti, Pharmaceutical Care and Health Systems, AM
Joshua W. Devine, Pharmaceutical Care and Health Systems, AM
Nitin Kaila, Experimental and Clinical Pharmacology, AM
Chulaporn Limwattananon, Pharmaceutical Care and Health Systems, AM
Supon Limwattananon, Pharmaceutical Care and Health Systems, AM
Djenane R. Oliveira, Pharmaceutical Care and Health Systems, ASM
Amy L. Pittenger, Pharmaceutical Care and Health Systems, M
Burin Sriwong, Pharmaceutical Care and Health Systems, AM
Samuel Wagner, Pharmaceutical Care and Health Systems, AM2
Xin Ye, Pharmaceutical Care and Health Systems, AM

Clinical Professor

Daniel E. Keyler, Experimental and Clinical Pharmacology, AM2

Clinical Assistant Professor

Angeline M. Carlson, Pharmaceutical Care and Health Systems, M2
Scott J. Knoer, Fairview Pharmacy, M2

Adjunct Clinical Assistant Professor

Patrick P. Gleason, Pharmaceutical Care and Health Systems, AM2

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

Curriculum—Students are prepared for research and related activities investigating relationships between biological and physical factors in social settings that involve the drug use process. This flexible interdisciplinary program uses the resources of the University's many health and social science departments. Programs include courses and offerings from public health, geriatrics, management, sociology, psychology, and public affairs.

The program focuses on the discovery and dissemination of new knowledge to foster appropriate use of drugs to improve patient outcomes at the individual and societal level. Students are educated and

mentored to become professional scientists. Those who complete the program will understand the process of conducting high quality research and problem solving through the application of disciplinary and interdisciplinary knowledge, theory, and research methodology.

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.

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 or in Twin Cities Courses on the University Catalog Web site 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

The M.S. program is offered under Plan A and Plan B. 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 by agreement between the student and adviser. Plan B also requires two papers of publishable quality; one paper must include a research component with an analysis of data.

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 in program courses, which are determined in consultation with the director of graduate studies.

Ph.D. Degree Requirements

The Ph.D. requires 34 credits in the major, 12 credits in a minor or supporting program, and 24 thesis credits. Two preliminary written exams are required: one concentrates on research design, methodological issues, and statistical analysis; the other on material specific to the student's chosen track. Students must also pass a preliminary oral exam.

Language Requirements—None.

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.html.

Professor

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

Peter W. Demerath, Educational Policy and Administration, M
Arthur M. Harkins, Educational Policy and Administration, M

Lecturer

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.

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—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

Contact Information—School of Social Work, University of Minnesota, 105 Peters Hall, 1404 Gortner Avenue, Saint Paul, MN 55108 (612-625-1220 or 1-800-779-8636; fax 612-624-3744; jreinard@umn.edu; www.ssw.che.umn.edu).

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

Professor

Darlyne Bailey, SM
Michael Baizerman, SM
Jerome Beker, SM
Velmer S. Burton Jr., SM
Jeffrey L. Edleson, SM
Jane F. Gilgun, SM
C. David Hollister, SM
Rosalie A. Kane, Public Health, SM
Helen 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

Assistant Professor

Colleen Fisher, M2
Hee Yun Lee, M2
Ross R. VeLure Roholt, M2

Other

Tracy A. Crudo, M2
Sonia Davila-Williams, M2
Peter Dimock, M2
M. J. Gilbert, M2
Trude D. Hendrickson, M2
Judith M. Hoy, M2
Nancy J. Johnston, M2
Lisa Kimball, M2
Traci L. LaLiberte, M2
Steve Maxwell, M2
Janelle Rae Miedema, M2
Megan H. Morrissey, M2
Victoria Van Slyke, M2
Anne W. Vande Berg, Rochester, M2
Kate Walthour, M2

Along with the program-specific requirements listed below, 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.U.R.P.). 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 that 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. Applicants should review the current application packet on the School of Social Work Web site at www.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. Applicants are preferred to 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 résumé documenting social service experience, a complete set of transcripts (in addition to those 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. Check the School of Social Work Web site at www.cehd.umn.edu/ssw for specific dates.

Courses—Refer to Social Work (SW) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 cr), courses from a selected concentration, two field internships, and social work electives.

A maximum of 24 credits may be transferred from the following sources with School of Social Work approval: up to 8 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota; up to 24 credits from another regionally and professionally accredited school of social work if the student was registered as a graduate student in the program.

The 34-credit advanced standing program includes courses from a selected concentration, one field internship, and social work electives. A maximum of 16 credits may be transferred from the following sources with School of Social Work approval: 16 credits completed as a graduate student in another accredited M.S.W. program; up to 6 credits as a non-degree-seeking student registered for social work graduate credit at the University of Minnesota.

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 the student's background and educational goals. Typically 40 credits plus 24 required thesis credits beyond the M.S.W. are required. Required courses include core seminars in social work research, social welfare history, social welfare policy, and theory and model development; a social work teaching course; a supervised research practicum and practicum seminar; supporting program courses; statistics courses. Students must also have teaching experience in the School of Social Work while in the program and fulfill the computer skills requirement.

Language Requirements—None.

Sociology

Contact Information—Graduate Program Associate, Department of Sociology, University of Minnesota, 909 Social Sciences Building, 267 19th Avenue South, 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.

Regents Professor

Steven Ruggles, History, AM2

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. Edgell, SM
Barry C. Feld, Law School, AM2
David H. Knoke, SM
Carl P. Malmquist, SM
Dario Menanteau, Social Work, AM2
Phyllis E. Moen, SM
Jeylan T. Mortimer, SM
David M. Pellow, SM
Joel B. Samaha, SM
Joachim J. Savelsberg, SM
Karen R. Seashore, Educational Policy and Administration, AM2
Mark Snyder, Psychology, AM2
Joe Soss, Public Affairs, AM
Christopher Uggen, SM

Associate Professor

Elizabeth H. Boyle, SM
Jeffrey P. Broadbent, SM
Kathleen T. Call, Public Health, AM2
Joseph H. Gerteis, SM
Michael R. Goldman, SM
Douglas Hartmann, SM
Kathleen E. Hull, SM
Walt Jacobs, Postsecondary Teaching and Learning, AM2
Erin L. Kelly, SM
Jeffrey R. Maahs, Sociology/Anthropology, Duluth, AM
Ian Ross Macmillan, SM
Donna D. McAlpine, Health Services Research, Policy, and Administration, AM2
J. Michael Oakes, Epidemiology, AM2
Lisa Sun-Hee Park, SM
Jennifer L. Pierce, American Studies, ASM
Rachel Schurman, SM
John Robert Warren, SM

Adjunct Associate Professor

Michael David Finch, Health Services Research, Policy, and Administration, AM2

Assistant Professor

Cawo M. Abdi, M2
Teresa Gowan, M2
Eric S. Grodsky, M2
Carolyn Liebler, AM
Enid L. Logan, M2
Ann Meier, M2
Joshua A. Page, M2
Teresa T. Swartz, M2

Along with the program-specific requirements listed below, 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; and political sociology and social movements. Methodological training is available in historical and comparative research, survey research, network analysis, advanced statistical analysis, and qualitative research. Training for students interested in 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 Form and required documents, applicants must submit the following: valid GRE scores; 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 fall 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 or in Twin Cities Courses on the University Catalog Web site 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 enrolled in the doctoral program.

Students must take six required core courses (17 cr) and two additional substantive courses in sociology (6 cr). Students must also complete a minimum of 6 credits in a minor or related field and must complete a minimum of 30 credits total. Courses are chosen in consultation with the adviser and the program committee to meet the student's educational and professional goals. Plan B students submit two papers, at least one of which is empirical. Plan A students are required to submit a master's thesis and register for 10 thesis credits.

Language Requirements—None.

Final Exam—The M.A. 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 cr), including two 1-credit courses on professional skills development. Beyond that, each student's program is individually planned in consultation with the adviser and program committee to meet both the student's goals and broad program requirements. Those requirements include four substantive courses in sociology (12 cr minimum) and at least one semester of training in advanced methods (3 cr minimum). Students must also complete a minimum of 12 credits in a minor or supporting program and register for 24 thesis credits. Students who enter the program with an M.A. in sociology must earn a minimum of 18 credits in the department regardless of the number of courses the department approves eligible for transfer credit from other institutions. Students prepare for a written preliminary examination by developing in close consultation with the adviser a reading list covering the scope of the preliminary exam paper. The reading list selections and the preliminary exam paper must be logically related to the student's major interest in the field. Three representatives from the sociology department must serve on the student's preliminary oral examining and prospectus hearing committees.

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 Ph.D. 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, 200 Union Street S.E., 4-192 EE/CS Building, Minneapolis, MN 55455 (612-625-1381; fax 612-625-0572; msse@cs.umn.edu; www.msse.umn.edu).

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

Professor

John V. Carlis, M2
Mats P. E. Heimdahl, M2
Joseph A. Konstan, M2
Shashi Shekhar, M2
Jaideep Srivastava, M2

Assistant Professor

John E. Collins, M2

Other

Michael Barton, AM2
Neil A. Bitzenhofer, AM2
Michael Calvo, AM2
Jesse D. Freese, AM2
Richard Hedger, AM2
Stephen Kan, AM2
John Kruse, AM2
Kevin Larson, AM2
Nathaniel Schutta, AM2
Elizabeth M. Sisley, AM2
John Skovbroten, AM2
Jeffrey Thompson, AM2
Jamshid A. Vayghan, AM2

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

Curriculum—The master of science in software engineering (M.S.S.E.) program provides a thorough understanding of the fundamental issues related to software development and the software development process. It fosters an awareness of the problems and opportunities associated with software-intensive systems and explains the methods for quickly evaluating, adopting, and taking advantage of emerging technologies. This program introduces emerging technologies and their applications and lays the foundation for lifelong learning and professional development in a rapidly changing field. The M.S.S.E. program is an interdisciplinary program administered by the Institute of Technology's Department of Computer Science and Engineering.

The program is offered in a format designed for full-time working professionals. Students take courses one day per week (alternating Fridays and Saturdays) and move through the curriculum as a cohort, taking all classes together for the first three semesters.

Prerequisites for Admission—Prospective students should have an undergraduate degree in computer science or a closely related field and a minimum of one year of professional experience working in the software industry. Students with degrees in other fields may be considered for admission based on extensive industrial experience.

Courses—Refer to Software Engineering (SENG) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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.

M.S.S.E. Degree Requirements

The M.S.S.E. requires 30 credits. Students take eight core courses, two industrial seminar courses and two elective courses. The project requirement can be met by a combination of class projects, or by an independent project elective.

Language Requirements—None.

Final Exam—None.

Soil Science

Contact Information—Director of Graduate Studies, Department of Soil, Water, and Climate, University of Minnesota, 439 Borlaug Hall, 1991 Upper Buford Circle, Saint Paul, MN 55108 (612-625-1244; fax 612-625-2208; dgs@soils.umn.edu; www.soils.umn.edu).

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

Professor

Deborah L. Allan, 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. Mulla, 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
Jonathan A. Foley, SM
William C. Koskinen, SM
Michael P. Russelle, SM

Associate Professor

Timothy J. Griffis, SM
Jennifer Y. King, M2
Albert L. Sims, M2
Jeffrey S. Strock, SM

Assistant Professor

Daniel Kaiser, M2
Joe Knight, M2
Dylan B. Millet, M2
Jennifer S. Powers, M2
Peter K. Snyder, M2
Brandy Marie Toner, M2
Tracy E. Twine, M2

Adjunct Assistant Professor

Adam S. Birr, AM2
Jane Johnson, AM2
Randall Kolka, AM2
Tyson Ochsner, AM2
Pamela J. Rice, AM2
Kurt A. Spokas, AM2
Rodney T. Venterea, AM2

Along with the program-specific requirements listed below, 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; students whose native language is not English are also required to submit TOEFL scores meeting the general Graduate School requirements and 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 cr) teaching experience, and a minimum of 6 credits in a minor or related field. Plan A students must take a minimum of 10 thesis credits: Plan B students must complete a Plan B paper and fulfill the 30 credit minimum by taking 10 credits of coursework or a special project to replace the 10 thesis credits.

Plan A students in the soil science concentration must take three out of the four core courses in soil science. Plan A students in the climatology concentration must take two or more courses in climatology or atmospheric sciences (approved by the student's advisory committee) and two of the four core courses in soil science. Plan B students in the soil science concentration must take all four core courses in soil science. Plan B students in the climatology concentration must take three or more courses in climatology or atmospheric sciences (approved by the student's advisory committee) and two of the four core courses in soil science.

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 course in soil science.

Language Requirements—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.

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.html.

Professor

Arlene E. Carney, SM
Joe E. Reichle, SM
Dianne Van Tasell, ASM
Jennifer Windsor, SM

Associate Professor

Mary R. T. Kennedy, M2
Kathryn Kohnert, M2
Benjamin Munson, M2
Peggy B. Nelson, M2
Robert S. Schlauch, SM

Assistant Professor

Timothy D. Trine, AM
Aparna Rao, M
Jayanthi Sasisekaran, M2
Peter Watson, M2
Yang Zhang,M2

Clinical Specialist

Sarah Angerman, M2
Mark DeRuiter, SM
Leslie E. Glaze, M2

Along with the program-specific requirements listed below, 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 focuse 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 or in Twin Cities Courses on the University Catalog Web site 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 an additional year of study. In addition to study in the major field, the degree requires 8 related-fields credits. Students may complete a M.A. degree before their final year of study. During the final year, students complete a clinical externship. Summative evaluations will include a written comprehensive examination followed by an oral exam, and a written capstone project that includes an oral presentation and an oral defense of the project.

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.

Sport Management

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; @cehd.umn.edu/kin).

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

Professor

Mary Jo Kane, SM
Maureen Weiss, SM

Associate Professor

Stephen D. Ross, SM
Diane M. Wiese-Bjornstal, SM

Assistant Professor

Lisa A. Kihl, M2

Lecturer

Rayla Allison, M2
Eric A. Brownlee, M2
Jo Ann Buysse, M2
James C. Turman, AM2

Other

Anthony Brown, Recreational Sports, AM2
James C. Turman, AM2

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

Curriculum—Sport management is an interdisciplinary field that provides students with academic training and field experience for careers in sport and fitness management professions. Typical professions in this field include sport organization management, sport information management (including marketing, promotion, advertising, and fundraising), and exercise and sports science (including fitness assessments and exercise prescriptions). Program graduates are prepared for careers in a variety of settings, including sport agencies, professional and amateur sport organizations, and sport media. The sport management program encompasses many different subjects, including sociology, business, marketing, communications, and psychology.

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 sport management may be admitted. Admitted students may be required by their adviser 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. Submission of all application materials by December 15 is strongly encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. Students can be admitted any term.

Research Facilities—Research facilities for graduate students in sport management include the Sports Business Institute; the Sport Marketing Research Group; and the Tucker Center for Research on Girls and Women in Sport.

Courses—Refer to Kinesiology (KIN) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site 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 Plan A and Plan B. Plan A requires 36 credits, including 16 core course credits in kinesiology, 6 research core course credits, 4 elective credits, and 10 thesis credits (8777). The program must include 6 course credits in a minor or related field. Plan B also requires 36 credits, including 16 core course credits in kinesiology, 6 research core course credits, 10 elective credits, and 4 credits of a research project (8995). The program must include 6 course credits in a minor or related field. A GPA of at least 3.00 is required to maintain good standing and to graduate.

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 sport management courses.

Statistics

Contact Information—School of Statistics, University of Minnesota, 313 Ford Hall, 224 Church Street S.E., Minneapolis, MN 55455 (612-625-8046; fax 612-624-8868; info@stat.umn.edu).

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

Professor

R. Dennis Cook, SM
Charles J. Geyer, SM
Douglas M. Hawkins, SM
Glen D. Meeden, SM
Christopher J. Nachtsheim, Operations and Management Science, SM
Gary W. Oehlert, SM
Peihua Qiu, SM
Ronald R. Regal, Mathematics and Statistics, Duluth, SM
Xiaotong Shen, SM
William D. Sudderth, SM
Sanford Weisberg, SM
Yuhong Yang, SM

Associate Professor

Singdhansu Chatterjee, SM
Birgit Grund, SM
Tiefeng Jiang, SM
Galin Jones, SM

Assistant Professor

Lan Wang, M2
Hui Zou, M2

Research Associate

Aaron K. Rendahl, AM2

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

Curriculum—The School of Statistics is the primary venue at the University for research, teaching, and dissemination of the theory, methodology, and applications of statistical procedures. Students may specialize in any area of statistics. The core program for all students has strong components of both theoretical and applied statistics.

Prerequisites for Admission—Applicants to the master's program must be familiar with basic statistical concepts and methods, and with mathematics through multivariable calculus and linear algebra. Applicants to the doctoral program must, in addition to the above, be familiar with the elements of real analysis.

Special Application Requirements—Applications should be complete by January 1 for admission the following fall semester; spring semester admission is only considered under unusual circumstances. Three letters of recommendation and the GRE General Test are required. Applicants whose native language is not English must submit a TOEFL score (or equivalent IELTS or MELAB) and should have a score of at least 600 (paper), 250 (computer), or 100 (Internet). See www.stat.umn.edu/Admissions/HowToApply.html for complete details.

Courses—Refer to Statistics (STAT) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Certain 4xxx courses from other departments may be used to meet degree requirements with the approval of the director of graduate studies. STAT 4101–2 can be used in statistics graduate minors.

M.S. Plan B Degree Requirements

The program prepares students for jobs in industry and the public sector and also for study at the doctoral level.

During the first year, students take a two-semester theory sequence (STAT 8101–8102) and a two-semester methods sequence (STAT 8051–8052). In addition, they usually take two supporting field courses (at least 6 cr) from other departments.

During the second year, students take three courses (at least 9 cr) of approved 5xxx or 8xxx statistics courses; some of this requirement can be satisfied by taking approved courses with heavy statistical content from other departments. Students also take a 3-credit statistical consulting course and complete their Plan B project. A total of at least 34 course credits is required. A written preliminary examination is taken at the beginning of the second year.

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 9 credits of 5xxx or 8xxx statistics courses. STAT 4101–4102 may be used to satisfy this requirement.

Ph.D. Degree Requirements

The Ph.D. program core courses cover statistical theory (STAT 8101, 8102, 8111, and 8112; 14 cr), statistical methods (STAT 8051, 8052, 8053, and 8054; 14 cr), and statistical practice (STAT 8802 and 8055; 4 cr). In addition to this core, students take 12 credits outside of statistics in a supporting program, 12 credits of 8xxx statistics electives, 4 credits of literature seminar, and 24 thesis credits. Courses with heavy statistical content from other departments and some 5xxx statistics courses may be used as electives, and students are strongly encouraged to include MATH 8651–8652—Theory of Probability Including Measure Theory in the supporting program. Students entering with a master's degree or other advanced training are not required to duplicate previous coursework. The Ph.D. preliminary written examination is given at the end of the first year of study and covers theory and methods at the level of STAT 8051, 8052, 8101, and 8102. For more complete information, consult the School of Statistics *Graduate Student Handbook* or www.stat.umn.edu/Programs/PhDrequirements.html.

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. **NOTE:** STAT 4101 and 4102 are available to graduate students from other programs, but not to statistics majors.

Stem Cell Biology

Contact Information—Stem Cell Biology Graduate Program, Stem Cell Institute, University of Minnesota, MC 2873, 2001 6th Str. S.E., Minneapolis, MN 55455 (612-625-0602; fax 612-624-2436; SCBgrad@umn.edu).

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

Regents Professor

Bruce R. Blazar, Pediatric Hematology/Oncology/Bone Marrow Transplantation, M2

Professor

Daniel J. Garry, Medicine/Cardiology, M2
Wei-Shou Hu, Chemical Engineering/Material Science, M2
Steven K. Juhn, Otolaryngology, M2
Walter C. Low, Neurosurgery, M2
Steven McLoon, Neuroscience, M2
Jaime Modiano, Veterinary Clinical Sciences, M2
Timothy D. O'Brien, Veterinary Population Medicine, M2
Mark E. Rosenberg, Medicine/Renal, M2
Jonathan M. W. Slack, Genetics, Cell Biology and Development, M2
Doris A. Taylor, Integrative Biology and Physiology, M2
LaDora V. Thompson, Physical Medicine and Rehabilitation, M2
Jianyi Zhang, Medicine, M2

Associate Professor

Dan S. Kaufman, Medicine/Hematology, Oncology and Transplantation, M2
Rita C. R. Perlingeiro, Medicine, M2

Assistant Professor

Christina E. Clarkson, Veterinary Biosciences, M2
James R. Dutton, Genetics, Cell Biology and Development, M2
Scott C. Fahrenkrug, Animal Science, M2
Meri Firpo, Medicine/Endocrinology, M2
Sandeep Gupta, Medicine/Renal, M2
Yasuhiko Kawakami, Genetics, Cell Biology and Development, M2
Susan A. Keirstead, Integrative Biology and Physiology, M2
Noubaki J. Kikyo, Medicine/ Hematology, Oncology and Transplantation, M2
Naoko Koyano Nakagawa, Neuroscience, M2
Michael Kyba, Pediatrics, M2
Jizhen Lin, Otolaryngology, M2
Jonathan S. Marchant, Pharmacology, M2
Yasushi Nakagawa, Neuroscience, M2
John R. Ohlfest, Pediatrics/Hematology, Oncology and Bone Marrow Transplantation, M2
Jakub Tolar, Pediatrics/Hematology, Oncology and Bone Marrow Transplantation, M2

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

Curriculum—This degree program offers training in stem cell biology, which is a rapidly growing interdisciplinary field that rests on foundations provided by molecular, cellular, and developmental biology. Students will take lecture, lab, and seminar classes in these various disciplines, in addition to stem cell biology. They will interact with members of the Stem Cell Institute through participation in research seminars and journal clubs, and will spend a full calendar year conducting stem cell research in the laboratory of a stem cell biology graduate program faculty member. This research will form the basis of the master's thesis.

Prerequisites for Admission—A bachelor's degree or foreign equivalent in biological science or a related field, with a 3.20 GPA. A preferred TOEFL score of 580 (paper), 237 (computer) with a minimum score of 4 in the TWE, or 92 (Internet) with a minimum score of 21 on each of the two components, or 6.5 on the IELTS (with not less than 6.0 in each of the four components) is required for applicants whose native language is not English.

Special Application Requirements—Applicants must forward to the Stem Cell Biology Graduate Program two letters of recommendation; a brief (max. 500 words) personal statement outlining previous research experience, research interests, long and short term goals; TOEFL or IELTS results (international students only); a curriculum vitae or résumé, and copies of transcripts.

Courses—See Stem Cell Biology (SCB) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—This program does not accept 4xxx courses.

M.S. Plan A Degree Requirements

The M.S. is a multidisciplinary program that prepares the basic science undergraduate for a career in research, teaching, or industry within the field of stem cell biology. In addition to taking courses in two or three semesters, students will concurrently conduct research for a full calendar year; this research will form the basis for the thesis.

Requirements include at least 20 course credits and 10 thesis credits.

Language Requirements—None

Final Exam—The final exam consists of an oral presentation based on the written thesis.

Minor Requirements for Students Majoring in Other Fields

The minor in stem cell biology is available to students in relevant Ph.D. programs such as molecular, cellular, developmental biology and genetics; microbiology, immunology and cancer biology; neuroscience; pharmacology; and bioengineering with an interest in stem cell biology. In addition to the major requirement appropriate to the specific program, the stem cell biology minor will require 12 credits from designated courses with a minimum GPA 3.00. The main research project of the Ph.D. degree must be done in the lab of a faculty member of the stem cell biology graduate program.

Strategic Communication

Contact Information—Graduate Studies Office, Strategic Communication M.A. Program, School of Journalism and Mass Communication, University of Minnesota, 111 Murphy Hall, 206 Church Street S.E., Minneapolis MN 55455 (612-625-4054; fax 612-626-8251; sjmcgrad@umn.edu).

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

Professor

John Eighmey, M2
Ronald Faber, M2
Daniel B. Wackman, M2

Associate Professor

Kenneth O. Doyle, M2
Brian Southwell, M2
Albert R. Tims, M2

Assistant Professor

Jisu Huh, M2

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

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 that the communication industry is changing rapidly and is more volatile than ever. With Internet use moving well beyond its infancy, and massive organizational and global forces reshaping the U.S. economy, communications leaders face significant challenges and can prepare themselves by in-depth study of strategic process management.

Prerequisites for Admission—The minimum requirement for admission is a B.A. or equivalent. Professionals in strategic communication—currently employed in advertising, public relations, or marketing firms, or in a communications function within a corporation or nonprofit organization—must have a baccalaureate degree from an accredited U.S. institution or its foreign equivalent and at least two years' professional experience. This professional experience should be in any of the following areas: account planning, account management, advertising management, media planning or buying, media sales, promotion marketing, corporate communications, public affairs, public relations, investor relations, direct marketing, sales management, marketing management, brand management, market research, or event management.

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 the School of Journalism and Mass Communication) must be completed.

Students must maintain a GPA of at least 3.00 and achieve a grade of B or better on their final 6-credit project. Student progress is evaluated by the academic director, program coordinator, and program faculty. Students must progress each semester to continue in the program, though a student who unexpectedly must temporarily leave the program can return to the program at a later date and résumé 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, Saint Anthony Falls Laboratory, 2 Third Avenue S.E., Minneapolis, MN 55414 (612-624-4606; fax 612-624-0066; srsegrad@umn.edu; www.nced.umn.edu/sr_certificate_uofm).

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 Hondzo, Civil Engineering, M
Claudia Neuhauser, Ecology, Evolution, and Behavior, M
Ray Newman, Fisheries, Wildlife, and Conservation Biology, M
John Nieber, Bioproducts and Biosystems 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
Jacques Finlay, Ecology, Evolution, and Behavior, M

Assistant Professor

Lesley Perg, Geology and Geophysics, M

Senior Research Associate

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 the Web site, www.nced.umn.edu/sr_certificate_uofm, for detailed listings).

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 Form, students must submit a program application and submit one letter of reference. The SRSE program application form and directions for submission can be found at www.nced.umn.edu/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 Saint 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 in which students participate in a stream restoration design experience. Students obtaining a degree in either geology and geophysics; civil engineering; or ecology, evolution and behavior should register for these courses under a designator other than their major field. In addition to core courses, students are required to take a minimum of 11 elective credits from four theme areas: river and floodplain science and engineering (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 South, 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

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
John S. Wright, African American and African Studies, M

Associate Professor

Keletso 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
Walt Jacobs, African American and African Studies, M
Tricia Keaton, American Studies, M
Tade O. Okediji, African American and African Studies, M
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. Coifman, African American and African Studies, M
Njeri R. Githire, African American and African Studies, M
Keith A. Mayes, African American and African Studies, M
Yuichiro Onishi, African American and African Studies, AM
Alexs D. Pate, African American and African Studies, AM
Charles Ben Pike, African American and African Studies, M

Along with the program-specific requirements listed below, 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 the African diaspora. It is organized around a group of core seminars and focuses on two broad areas: the humanities and the arts, and the social and behavioral sciences.

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 or in Twin Cities Courses on the University Catalog Web site 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 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 Avenue South, Minneapolis, MN 55455; (612-625-6635; fax 612-626-8380; mcps@umn.edu; www.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
Fred N. Finley, Curriculum and Instruction, M
Alan G. Gross, Communication Studies, M
Laura J. Gurak, Writing Studies, 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
Thomas J. Misa, History of Science and Technology, M
Naomi Scheman, Philosophy, M
Robert W. Seidel, Charles Babbage Institute, M
Alan E. Shapiro, Physics, M
C. Kenneth Waters, Philosophy, M

Associate Professor

Jennifer K. Alexander, Mechanical Engineering, M
Bruce P. Braun, Geography, M
Jennifer Lee Gunn, History of Medicine, M
Michel H. Janssen, History of Science and Technology, M
Susan D. Jones, Ecology, Evolution, and Behavior, M
Jean M. Langford, Anthropology, M
Daniel J. Philippon, English, M
John B. Shank, History, M
Karen Sue Taussig, Anthropology, M

Assistant Professor

Mark E. Borrello, Ecology, Evolution, and Behavior, M
Alan C. Love, Philosophy, M
Hiromi Mizuno, History, M

Curriculum—Studies of science and technology (SST) deals with a rapidly expanding field that seeks to understand the conceptual foundations, historical development, and social dimensions and context of science and technology. SST faculty are drawn from a number of research and teaching units dedicated in whole or in part to the history, philosophy and social studies of science and technology. The SST minor is for students from any major who want to gain a deeper understanding of the nature and development of science and technology.

The SST minor provides introductory core courses in historiography and philosophy of science, followed by research seminars and other elective courses in four main research areas: models, theories, and reality; physical science; biological and biomedical sciences; and science, technology, and society. Seminar topics vary yearly depending on faculty and student interest.

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

Special Application Requirements—Prospective students should contact director of graduate studies.

Courses—Refer to Studies of Science and Technology (SST) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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

Minor Only Requirements

A master's minor requires 7 graduate credits and a doctoral minor requires 12 graduate credits. Both minors must include HSCI 8112 or HMED 8112; one of either PHIL 8601, 8602, or 8605; and SST 8000—Colloquium (one semester for master's, two for doctoral students). Doctoral students must also take one of the SST seminars (SST 8100, 8200, 8300, 8400, or 8420) in an area primarily outside the student's major.

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; surgwww@umn.edu).

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

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
William C. Engeland, Neuroscience, SM
John E. Foker, SM
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
Ashok K. Saluja, SM
Steven M. Santilli, M2
Sara J. Shumway, M2
David E. R. Sutherland, SM
Herbert B. Ward, M2

Adjunct Professor

Arnold S. Leonard, ASM

Associate Professor

Jerome H. Abrams, M2
Richard Bianco, SM
Daniel Saltzman, M2

Assistant Professor

Robert D. Acton, M2
Rafael S. Andrade, M2
Ranjit John, M2
Karen R. Wasiluk, SM

Along with the program-specific requirements listed below, 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).

Prerequisites for Admission—Prospective students must be in the general surgery training program and have two to three clinical years of training completed.

Courses—Refer to Surgery (SURG) in the course section of this catalog or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

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

M.S.Exp.Surg. Plan A Degree Requirements

The master's degree in experimental surgery (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.

M.S.Surg. Plan A Degree Requirements

The master's degree in surgery (M.S.Surg.) is offered Plan A only. Students spend two to three years in the Medical School's general surgery program. A minimum of 53 course credits (47 in the major, plus 6 in the minor or related fields) plus 10 thesis credits are required for a total of 63 credits.

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.

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, Saint Paul, MN 55108 (612-625-8235; fax 612-625-1268; jorda020@umn.edu; www.misa.umn.edu).

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

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. Moon, Entomology, M
D. J. Mulla, Soil, Water, and Climate, M
Kent D. Olson, Applied Economics, M
James H. Orf, 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 C. Sheaffer, Agronomy and Plant Genetics, M
John M. Shutske, Biosystems and Agricultural Engineering, M
Marla Spivak, Entomology, M
William F. Wilcke, Biosystems and Agricultural Engineering, M
Donald Wyse, Agronomy and Plant Genetics, M

Associate Professor

John Deen, Veterinary Population Medicine, M
Ruth Dill-Macky, M
Jeffrey H. Gillman, Horticultural Science, M
Craig A. Hassel, Food Science and Nutrition, M
Kristen C. Nelson, Forest Resources, M

Assistant Professor

Helene Murray, Agronomy and Plant Genetics, M

Fellow

Carl 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.

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—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 or in Twin Cities Courses on the University Catalog Web site 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 Street 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.html.

Professor

Carol Ann Berkenkotter, M
Ann Hill Duin, M
Alan G. Gross, M
Laura J. Gurak, M
Earl E. McDowell, M
Donald Ross, M
Mary M. Lay Schuster, M
Billie J. Wahlstrom, M
Arthur E. Walzer, M

Associate Professor

Lee-Ann Kastman Breuch, M
Patrick Bruch, M
Richard J. Graff, M
John Logie, M
Bernadette C. Longo, M
Daniel J. Philippon, M
Thomas Reynolds, M

Assistant Professor

Chris Russill, M

Along with the program-specific requirements listed below, 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. (Students who have relevant professional experience, but who don't have a 3.00 GPA should contact the director of graduate studies.)

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 or in Twin Cities Courses on the University Catalog Web site 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: 12 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 3 credits in an elective class in either usability or research in the field.

If interested, a student may apply up to 12 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, see www.msstc.umn.edu/certificate.html and www.cce.umn.edu/certificates/tech/techcomm.

Language Requirements—None.

Theatre Arts

Contact Information—Department of Theatre Arts and Dance, University of Minnesota, 580 Rarig Center, 330 21st Avenue South, Minneapolis, MN 55455 (612-625-5029; fax 612-625-6334; theatre@umn.edu).

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

Professor

C. Lance Brockman, M2
Michal Kobialka, SM
Mathew J. LeFebvre, M2

Associate Professor

Louis R. Bellamy, M2
Ananya Chatterjea, M2
Carl L. Flink, M2
Martin B. Gwinup, M2
Sonja Arsham Kuftinec, SM
Elizabeth H. Nash, M2
Joan A. Smith, M2

Assistant Professor

Lisa Channer, M2
Marcus Dillard, M2
Cindy García, M2
Diyah Larasati, M2
Michael Sommers, M2
Dominic Taylor, M2
Margaret L. Werry, M2

Education Specialist

Susan M. Binder, M
Brent "Mickey" Henry, M
Christine Swartwout, M
Sherry L. Wagner-Henry, M

Along with the program-specific requirements listed below, 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 or related disciplines, 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 be submitted with the department application.

The M.F.A. design and technology program requires a portfolio review either through the Chicago U/RTA 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 or in Twin Cities Courses on the University Catalog Web site 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. are devised in collaboration with a faculty adviser, and demand original and challenging research in the fields of theatre historiography or performance criticism.

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 an 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 specializes in design and technical production. All areas of design are studied to increase understanding in specialization areas, and technology is studied as an essential part of design. Students are expected to achieve proficiency in at least two areas of any combination of design and technology (scenery/properties, costuming, lighting, sound) and a level of expertise in at least one of these areas. Program faculty work with students to identify the final areas for the degree. The M.F.A. degree is considered a terminal degree in these areas of theatre arts.

The M.F.A. requires 60 graduate credits, although a particular program's requirements may exceed this minimum. The degree requires 6 credits of dramatic literature or theatre history, which may be fulfilled by TH 4177 and 4178; and a minimum of 6 credits from outside the department (at least 3 credits of which must be a University course that contributes substantially to the degree program). Each program requires a final performance practicum and written record of it. For specific program requirements, contact the director of graduate studies.

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. are devised in collaboration with a faculty adviser, and demand original and challenging research in the fields of theatre historiography or performance criticism.

The core curriculum, designed to help students finish the program within five years, consists of two parts: coursework (three years); and research and dissertation writing. The three years of coursework are tailored so that the first two years are structured, with the third year 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 cr); 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.

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@cce.umn.edu; cts@umn.edu; www.cts.umn.edu).

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

Professor

Gary Davis, Civil Engineering, M

Associate Professor

Karen Donohue, Operations and Management Sciences, M
David Levinson, Civil Engineering, M

Assistant Professor

Jason Cao, Humphrey Institute of Public Affairs, M
Yingling Fan, Humphrey Institute of Public Affairs, M
Nikolas Geroliminis, Civil Engineering, M
Henry Liu, Civil Engineering, M

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

Prerequisites for Admission—Admission requires a B.S. or B.A. from an accredited U.S. institution or foreign counterpoint. The degree must be in a field related to transportation issues through work experience, community involvement, political leadership, or other activity.

A performance level of 3.00 is preferred for the undergraduate GPA. (Students who do not meet this level of 3.00, should describe relevant nonacademic experience as well as explain any other relevant factors in their application for consideration by the Graduate School and program faculty).

Study in one or more of the following technical course topics, demonstrating proficiency in physical science and/or quantitative analysis: intermediate economics, theory, statistics, calculus, physics. **Note:** One year of successful undergraduate study (with at least a 3.00 or B grade) in any combination of the above or related topics. The GRE is not required.

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

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

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

Use of 4xxx Courses—Use of 4xxx courses toward requirements is subject to director of graduate studies approval.

Certificate Requirements—Completion of two of the four core courses along with the seminar, three 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 Graduate Student Services, 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.

Professor

Ragui A. Assaad, M2
J. Brian Atwood, M2
Michael Barnett, M2
John M. Bryson, M2
Nancy N. Eustis, M2
Katherine Fennelly, M2
Edward G. Goetz, M2
Stephen A. Hoenack, M2
C. David Hollister, AM2
Lawrence R. Jacobs, M2
Anne R. D. Kapuscinski, Fisheries, Wildlife, and Conservation Biology, AM
Sally J. Kenney, M2
Morris M. Kleiner, M2
Robert T. Kudrle, M2
Greg H. Lindsey, M2
Samuel L. Myers, M2
David G. Pitt, Landscape Architecture, AM2
Carlisle F. Runge, Applied Economics, AM
Joe Soss, M2

Associate Professor

Barbara Crosby, M2
Maria J. Hanratty, M2
Laura T. Kalambokidis, AM
Jennifer Kuzma, M2
David M. Levinson, Civil Engineering, AM2
Deborah Levison, M2
Laura Musacchio, AM
Joseph A. Ritter, M2
Jodi R. Sandfort, M2
Melissa M. Stone, M2
Judy Temple, M2

Assistant Professor

Ryan P. Allen, M2
Jason Cao, M2
Yingling Fan, M2
Greta Friedemann-Sanchez, M2
Julian Marshall, Civil Engineering, AM
Carissa Schively Slotterback, M2
Elizabeth J. Wilson, M2
Zhirong Zhao, M2

Other

Harry C. Boyte, M2
William Craig, Geography, AM
Gary DeCramer, M2
Kaye Husbands Fealing, AM2
Sherry Gray, M
Steve Kelley, M
P. Jay Kiedrowski, M2
Judith Martin, AM
Lee W. Munnich, M2
Joe Nathan, M2
Myron W. Orfield Jr., AM
Timothy Penny, AM
Sudha Shetty, M
Paul C. Stone, M2

Along with the program-specific requirements listed below, 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./juris 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.

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 Form, 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 or in Twin Cities Courses on the University Catalog Web site 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 cr), specialization electives (9 cr), 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 cr) 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 Avenue, Saint Paul, MN 55108 (612-626-1948; fax 612-626-2825; cvmmsphd@umn.edu; www.cvm.umn.edu/vmed).

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, (emeritus), 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
Jody P. Lulich, Veterinary Clinical Sciences, SM
Louis Mansky, Diagnostic and Biological Sciences, SM
James Mickelson, Veterinary and Biomedical Sciences, SM
Jaime Modiano, Veterinary Clinical 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
Kakambi 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
Scott J. Wells, Veterinary Population Medicine, SM

Adjunct Professor

Kay S. Faaberg, Veterinary and Biomedical Sciences, SM

Clinical Professor

Betty A. Heffernan, Veterinary Clinical Sciences, M2
Paul Rapnicki, Veterinary Population Medicine, M2

Associate Professor

Jeff B. Bender, Veterinary Population Medicine, SM
John Deen, Veterinary Population Medicine, SM
Scott Fahrenkrug, Animal Science, SM
Sandra M. Godden, Veterinary Population Medicine, SM
Yinduo Ji, Veterinary and Biomedical Sciences, M2
James R. Lokensgard, Medicine, M2
Moses K. Njenga, Veterinary and Biomedical Sciences, M2
Elizabeth Pluhar, Veterinary Clinical Sciences, SM
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
Ashok Singh, Veterinary Population Medicine, 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
Julia Wilson, Veterinary Population Medicine, M2
Arno Wunschmann, 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
Roberto Novo, Veterinary Clinical Sciences, M2
Jane E. Quandt, Veterinary Clinical Sciences, M2
Kurt D. Rossow, Veterinary Population Medicine, SM
Jerry Torrison, Veterinary Population Medicine, M2
Andre Ziegler, Veterinary Population Medicine, M2

Assistant Professor

Hwa Choi, Veterinary Clinical Sciences, M2
Connie J. Gebhart, Veterinary and Biomedical Sciences, SM
Timothy Johnson, Veterinary and Biomedical Sciences, M2
Molly E. McCue, Veterinary Population Medicine, M2
Claudia Munoz-Zanzi, School of Public Health, M2
Ned Patterson, Veterinary Clinical Sciences, M2
Katey Pelican, Veterinary Population Medicine, M2
Pamela Skinner, Veterinary and Biomedical Sciences, M2
Catherine St. Hill, M2
Troy Trumble, 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
Simone Oliveira, Veterinary Population Medicine, M2
Vicke Wilke, Veterinary Clinical Sciences, M2

Assistant Clinical Specialist

Margaret M. Duxbury, Veterinary Clinical Sciences, M2
Marie R. Gramer, Veterinary Population Medicine, M2
Devi Patnayak, Veterinary Population Medicine, M2
Albert Rovira, Veterinary Population Medicine, M2

Adjunct Instructor

Montserrat Torremorell, Veterinary Population Medicine, M2

Other

Ann M. Fitzpatrick, Office of Regulatory Affairs, M2

Along with the program-specific requirements listed below, 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 are a complete set of official transcripts, a C.V. 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. 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 1 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 or in Twin Cities Courses on the University Catalog Web site for courses pertaining to the program.

Use of 4xxx Courses—Use of select 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 24–30 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.

Work and Human Resource Education

Note: *This program is currently undergoing significant revisions. Contact the department or the Graduate School for information on the status of the program and current admissions.*

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, Saint 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.html.

Professor

Darlyne Bailey, M2
James M. Brown, SM
Judith J. Lambrecht, SM
Theodore Lewis, SM
Gary N. McLean, SM
James R. Stone III, SM
Ruth G. Thomas, SM
Baiyin Yang, SM

Associate Professor

Alexandre A. Ardichvili, SM
Kenneth R. Bartlett, SM
Richard M. Joerger, M2
Gary W. Leske, SM
Rosemarie J. Park, SM
Jane Plihal, SM
Marilyn Rossmann, SM

Assistant Professor

Brad Greiman, M2
Shari L. Peterson, SM

Other

Mauvalyn M. Bowen, AM2
Marie J. Maher, AM2
Tom Stertz, AM2
John R. Vreyens, AM2
Joyce A. Walker, AM2
Robert D. Shumer, ASM
Catherine C. Twohig, M2
Jerome A. Stein, Social Work, AM2

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

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 or in Twin Cities Courses on the University Catalog Web site 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 those courses is available for graduate credit. Degree Program Forms 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 above, 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 Course section in this catalog.

Family Practice and Community Health

Professor

Sharon S. Allen

Neurosurgery

Professor

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
Chandy John, E

Assistant Professor

Elizabeth E. Giles, E
Aaron S. Kelly, E

Senior Research Associate

Nancy L. Leland, 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
Matt G. Kushner, E
Thomas B. Mackenzie, E
Michael K. Popkin, E
Nancy C. Raymond, E
George Realmuto, E

Associate Professor

Michael L. Bloomquist, E
Daniel R. Hanson, E
Scott R. Sponheim, E

Assistant Professor

John P. Vuchetich, E
Tonya J. White, E

Russian

Professor

Gary R. Jahn, E

Associate Professor

Leonard A. Polakiewicz, E

Therapeutic Radiology

Professor

Bruce J. Gerbi, E
Patrick D. Higgins, E
John J. Kersey, Pediatrics, E
Chang W. Song, E

Associate Professor

Parham Alaei, E