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; hrp@umn.edu)

Qualifying courses must be taken prior to approval of the minor. Qualifying courses are determined in consultation with the adviser.

A master’s minor in human rights requires 12 credits: 2 core courses, at least 2 elective courses, and one six-week internship approved by the program director.

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: 2 core courses, at least 1 elective course taken from a designated course list, and one six-week internship approved by the program director.

Courses—Elective courses are taken from a designated course list at http://hrp.cla.umn.edu/academics.html/grad_mino

Immunology

See Microbiology, Immunology, and Cancer Biology.

Industrial Engineering

Contact Information—Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax 612-624-2010; gradinfo@me.umn.edu)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

Sant Ram Arora, SM
Saifallah Benjaafar, SM
Diwakar Gupta, SM
Caroline C. Hayes, SM
Arthur V. Hill, Operations and Management Sciences, ASM
Tara O. Kvalseth (emeritus), ASM
Patrick J. Starr, SM

Associate Professor

William L. Cooper, SM

Assistant Professor

Karen L. Donohue, Operations and Management Sciences, ASM
Lisa A. Miller, SM

Special Application Requirements—Students should submit a letter of application that describes the student’s background and motivation for applying to the minor program to the director of graduate studies. Further information may be requested by the director of graduate studies.

Plan A (thesis) required courses include three of the five following courses: IE 5531, 5545, 5551, 8532, and 8541. Plan B (non-thesis) required courses include four of the five following courses: IE 5531, 5545, 5551, 8532, and 8541. Students must either take the Plan B course, IE 8581/8583, 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 industrial engineering is 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; 24 thesis credits are also required. Four of the following five courses are required for the Ph.D. degree: IE 5531, 5545, 5551, 8532, and 8541.

Language Requirements—None.
Minor Requirements for Students Majoring in Other Fields—At least 12 credits in industrial engineering is 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). For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Gary A. Davis, M2
Andrew Drescher, M2
Catherine E. French, M2
John S. Gulliver, M2
Joseph F. Labuz, M2
Panos G. Michalopoulos, M2
Michael J. Semmens, M2
Heinz G. Stefan, M2
Vaughan R. Voller, M2

Associate Professor
Randal J. Barnes, M2
Robert J. Dexter, M2
Raymond M. Hozalski, M2
Arturo E. Schultz, M2
Carol K. Shield, M2
Karl A. Smith, M2

Lecturer
Charles Hathaway, AM2
Bradford Henry, AM2
Peter Hilger, AM2
Patrick Hirf, AM2
Richard Kavaney, AM2
Eil Kwon, AM2
Tom Maze, AM2
Steven Olson, AM2
Howard Preston, AM2
Raymond Spark, AM2
Edward Warn, AM2

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

Curriculum—The master of science in the infrastructure systems engineering (M.S.I.S.E.) program focuses on developing management and engineering tools that address the issues in local, county, and state infrastructure. It is an interdisciplinary program offered through the Institute of Technology’s Center for the Development of Technological Leadership and the Department of Civil Engineering. The two-year, professional-format program integrates the fields of water systems, pavement, structures, mechanics modeling, traffic engineering, transportation policy, and environmental issues, among others.

Prerequisites for Admission—A B.S. degree in engineering plus a minimum of one year of professional work experience in an infrastructure area or a B.S. degree in a related science or technology field and a minimum of two years professional work experience in an infrastructure area are required.

Special Application Requirements—None.

Courses—Please refer to Infrastructure Systems Engineering (ISE) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Applying 4xxx courses toward degree requirements is extremely limited. Such requests will be reviewed on a case by case basis and will require director of graduate studies approval.

M.S.I.S.E. Plan B Degree Requirements
The M.S.I.S.E. in infrastructure systems engineering 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.

International Education
Minor Only

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Patricia G. Avery, Curriculum and Instruction, M
William M. Bart, Educational Psychology, M
David Chapman, Educational Policy and Administration, M
John J. Cogan, Curriculum and Instruction, M
Gerald W. Fry, Educational Policy and Administration, M
Gary N. McLean, Work and Human Resource Education, M
Josef A. Mestenhauser, Educational Policy and Administration, M
R. Michael Paige, Educational Policy and Administration, M

Associate Professor
Philip R. Goodrich, Biosystems and Agricultural Engineering, M

Assistant Professor
Kay A. Thomas, Educational Psychology, M

Lecturer
Deanne L. Magnusson, Educational Policy and Administration, M

Curriculum—The interdisciplinary minor in international education is for students enrolled in any M.A. or doctoral program who wish to enter careers in research, consulting, administration, and teaching in an international context. The minor offers a coordinated set of courses from 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. or Ph.D. program at the University of Minnesota. For an application form visit the International Education Minor Web site at http://education.umn.edu/EdPA/CI/IDE/minor.html or consult with the director of graduate studies for more information.

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

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

Minor Only Requirements
At least 9 graduate credits at the master’s level, 12 at the doctoral level. Each program is developed in consultation with the student, the student’s adviser, major director of graduate studies, and director of graduate studies for international education. Requirements include EdPA 5103—Comparative Education and 5124—Critical Issues in International Education (one for M.A., both for doctoral minor); research (EdPA 5121; for doctoral students only); and area-specific coursework (at least one course for M.A. and doctoral minors: ATEE 5351, CI 5747, EdHD 5001, EdPA 5048, 5080, 5101, 5102, 5104, 5121, 5132, 8104, EPsy 5101, 5112, 5113, 5401, 5431, 5432, 5461, 8403, HRD 5408, 5496, WHRE 5821, Kin 5900, 8607, WHRE 8142.

Interpersonal Relationships Research
Minor Only
Contact Information—Doctoral Minor Program in Interpersonal Relationships Research, Institute of Child Development, University of Minnesota, 104 Child Development, 51 East River Road, Minneapolis, MN 55455 (612-624-2396; fax 612-624-6373; bcollins@umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.
Japanese
See Asian Literatures, Cultures, and Media.

Journalism
See Mass Communication.

Kinesiology
Contact Information—Marta Fahrenz, Coordinator of Graduate Studies, School of Kinesiology, University of Minnesota, 223B Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax 612-626-7700; kin@umn.edu; http://education.umn.edu/kin/).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
Fred S. Apple, Laboratory Medicine and Pathology, ASM
James R. Carey, Physical Medicine and Rehabilitation, AM2
Richard S. Crow, Epidemiology, AM2
Arthur Erdman, Mechanical Engineering, AM2
Mary Jo Kane, SM
Arthur S. Leon, SM
Herbert L. Pick, Jr., Child Development, AM2
Thomas Stoffregen, SM
Michael Wade, SM
Albert Yonas, Child Development, AM2

Associate Professor
Donald Dengel, SM
Juergen Koncak, SM
Virgil G. Mathiowetz, AM2
Robert C. Serfass, SM
M. Kathryn Schmitz, Epidemiology, AM2
Diane M. Wiese-Bjornstal, SM

Adjunct Associate Professor
Catherine M. Kotz, Food Science and Nutrition, AM2

Associate Professor
Yingjie Chen, Medicine, AM2
Lisa A. Kihl, M2
Dawn A. Lowe, Biochemistry, AM2
Moira A. Petit, M2
Stephen D. Ross, M2

Adjunct Assistant Professor
Daniel Kaiser, Medicine, AM2

Lecturer
JoAnn Buyse, M2
Christopher Draheim, M2
Stacy Ingraham, M2
Aynsley M. Smith, AM2
Thomas J. Smith, M2

Senior Fellow
Victor S. Koscheyev, M2

Research Associate
Bruce David Johnson, AM2
Carol A. Leitschuh, M2

Other
Anthony Brown, Recreational Sports, AM2
Paul E. Cassidy, AM2
Carol Gruber, Athletics, AM2
Aaron Scott Kelly, AM2
James C. Turman, Recreational Sports, AM2
Nicholas J. Ward, Mechanical Engineering, AM2

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

Curriculum—Emphasis areas in the master’s and doctoral programs are adapted physical education, biomechanics/neural control, exercise physiology and health promotion, human factors/ergonomics, motor learning/development, sport management, sport psychology, or sport sociology.

Prerequisites for Admission—Although prospective master’s students generally have an undergraduate degree in kinesiology, physical education, or sport and exercise science, others with a baccalaureate degree who have related preparation and a significant background and interest in the scientific study of physical activity may be admitted. Prospective doctoral students have generally completed a master’s degree in a field related to kinesiology. Admitted students may be required by their 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 Division of Kinesiology application form; written statement of academic interests, goals, and objectives; scores from the General Test of the GRE (verbal and quantitative) or Miller Analogies Test that are less than five years old; three letters of recommendation from persons familiar with their scholarship and research potential; scholarly paper; and copies of official transcripts. Students may apply at any time; however, submission of all application materials by December 15 is encouraged to ensure priority consideration for admission and for teaching and research assistantships awarded for the next academic year. The three letters of recommendation must be sent directly to the department. Students can be admitted any term.

Research Facilities—Research facilities for graduate students in kinesiology include the following: Human Factors Research Laboratory; Human Sensormotor Control Laboratory; Gait and Posture Laboratory; Laboratory of Physiological Hygiene and Exercise Science; Laboratory for Health and Human Performance and Extreme Environments; Tucker Center for Research on Girls and Women in Sport.

Courses—Please refer to Kinesiology (Kin) in the course section of this catalog for courses pertaining to the program.

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

Italian
See French and Italian.
M.A. Degree Requirements

M.A. students select an emphasis in adapted physical education, biomechanics/neutral control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport psychology, or sport sociology.

The M.A. is offered under Plan A and Plan B. Plan A requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field, and 10 thesis credits (8777). Plan B also requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field, 4 credits of a research project (8995), and 6 additional credits in any of these areas. For both Plan A and Plan B, students must take Kin 5981 (3 credits), Kin 8980 (1 credit), and in the related field or minor, EPsy 5261 (3 credits) or EPsy 8261 (3 credits) 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 adapted physical education, biomechanics/neutral control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport psychology, or sport sociology.

The Ph.D. requires at least 48 course credits and 24 thesis credits, for a total of 72 credits. Course credits include 24 credits in kinesiology, 9 credits in statistical methods, 12 credits in a supporting program or minor (statistical methods courses may be included), and an additional 3 credits in any of these areas. Kinesiology course credits must include 5171 and 5981 (achieving a grade of A or B in each), 2 to 6 credits of 8980, and at least 12 credits of 8xxx. Statistical methods courses must include EPsy 8261 or equivalent and EPsy 8262 or equivalent (achieving a grade of A or B in each). A GPA of at least 3.00 is required to maintain good standing and to graduate.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires at least 12 credits of graduate-level kinesiology courses, including 5171 (3 credits) and 8980 (1 credit).

Landscape Architecture

Contact Information—Department of Landscape Architecture, University of Minnesota, 144 Ralph Rapson Hall, 89 Church Street S.E., Minneapolis, MN 55455 (612-625-8680); fax 612-625-0710; caland@umn.edu [www.cala.umn.edu].

For up-to-date graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/step1.asp].

Professor
Ann Forsyth, M2
John F. Hart, Geography, M2
Lance M. Neckar, M2
Peter J. Olin, Horticultural Science, M2
David G. Pitt, M2

Associate Professor
Susan M. Galatowitsch, Horticultural Science, M2
Clint H. Hewitt, M2
John A. Koepeke, M2
Rebecca J. Krinke, M2
Robert D. Sykes, M2

Assistant Professor
Kristine F. Miller, M2
Laura R. Musacchio, M2

Adjunct Assistant Professor
Joseph R. Favour, AM
Jon Erik Kingstad, AM
Richard T. Murphy, AM
Daniel B. Shaw, AM

Lecturer
Dean F. Abbott, M2
L. Peter Macdonagh, AM

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

Curriculum—Students are directed toward developing professional design skills rooted in a deep understanding of the intrinsic physical and aesthetic characteristics of natural systems in the landscape. The faculty believes this is the best way for landscape architects to help people transform, conserve, rebuild, and steward the natural and cultural places within which their lives and communities unfold. Students learn to develop and apply place-based design to address local, urban, and regional landscape issues. The curriculum is structured to teach students to be professional landscape architects who use ecological systems-thinking as the basis for artistic design, and to develop in them design literacy based on ecology, art, technology, history, behavior, and place theory. The department offers the professional master of landscape architecture (M.L.A.), required to become a registered landscape architect, and the master of science (M.S.), a research-oriented (non-professional) degree offering opportunity for a specialized focus within the field of landscape architecture in the context the professional curriculum. The department also offers a dual degree with urban and regional planning (M.L.A./M.U.R.P.) in cooperation with the Humphrey Institute of Public Affairs.

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 related discipline. All applicants are asked to explain the relationship of their previous academic work and work experience to their proposed graduate study.

Special Application Requirements—M.L.A. program applicants must apply by January 1 for entry the following fall in order to receive first consideration for admission, fellowships, and assistantships. In addition to completing the application requirements for the Graduate School, applicants should complete the departmental graduate application materials (available from the department office). The departmental application includes a completed departmental application form, a clearly written statement of intent that discusses the applicant’s understanding of landscape architecture, goals, objectives, and career interests specific to the profession; three letters of reference (use the special form available from the department); and photocopies of all official transcripts. An 8.5 x 11 inch portfolio of examples of creative work is preferred. A portfolio is required to obtain advanced standing in design. 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 on their departmental application form. GRE scores are preferred, but not required for entry. GRE scores 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.

M.S. prospective students may apply at any time, however application by January 1 is strongly encouraged to ensure priority consideration for fellowships and assistantships awarded for the next academic year. In addition to completing the application requirements for the Graduate School, applicants should obtain and complete the departmental graduate application materials (available from the department office). The department prefers that applicants submit GRE scores. Applicants should submit a statement of intent outlining research objectives and examples of previous research or design work related substantively or methodologically to the applicant’s proposed research, or examples of academic or professional work that include 10 to 30 pages of writing, published or unpublished. Successful applicants will have secured the participation of a faculty adviser before completing their applications. Prospective students are encouraged to contact the director of graduate studies to discuss areas of focus and potential...
Degree Programs and Faculty

Faculty Advisers. Students may be admitted to the MS program for any academic term.

Courses—Please refer to Landscape Architecture (LA) in the course section of this catalog for courses pertaining to the programs.

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

M.L.A. Plan B, Coursework Only Degree Requirements

The M.L.A. program, which is accredited by the national Landscape Architecture Accreditation Board (LAAB), is for students who wish to become registered professional landscape architects. Areas of required coursework within the program include design, technology and ecology, graphic and written communication, landscape history, and research methods. To develop a special focus or to explore areas in more depth, students are encouraged to select from among the graduate seminars offered to fulfill elective requirements. To meet the LAAB standards, 88 graduate credits are required for students without previous design experience. Because coursework is organized in a sequential framework of six 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 credits 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 oral.

Minor Requirements for Students Majoring in Other Fields—Minor requirements are determined in consultation with the director of graduate studies.

Latin

See Classical and Near Eastern Studies.

Law

Minor Only

Contact Information—Meredith M. McQuaid, Associate Dean, Law School, University of Minnesota, 285 Law Building, 229 19th Avenue S., Minneapolis, MN 55455 (612-625-3025; fax 612-626-1874; lsserv@umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

Edward S. Adams, AM
Stephen F. Befort, M
Brian H. Bix, M
David P. Bryden (emeritus), AM
Dan Burk, M
Ann Burkhart, AM
Jim Chen, M
Carol Chomsky, AM
Laurie Cooper, AM
John J. Coud (emeritus), AM
Barry C. Feld, M
Mary L. Fellows, AM
Richard S. Frase, AM
Daniel J. Gifford, AM
Oren Gross, AM
Kristin E. Hickman, AM
Joan S. Howland, AM
Peter H. Huang, AM
Robert J. Levy (emeritus), AM
Donald G. Marshall, (emeritus), AM
John H. Matheson, AM
Fred L. Morrison, AM
Fionnuala Ni Aolain, AM
Ruth L. Okejiji, M
Michael S. Paulson, AM
Gregg D. Polsky, AM
Ferdinand P. Schoettle, Jr. (emeritus), AM
David Stras, AM
Michael Tonry, AM
David Weissbrodt, AM
Susan Wolf, M
Judith T. Younger, AM

Associate Professor

Dale A. Carpenter, AM
Guy-Urleil Charles, AM
Jamie Anne Grosky, AM
Brett H. McDonnell, AM
Myron W. Orfield, AM
Shayna M. Sigman, AM
Kevin K. Washburn, AM

Other

Beverly Balos, AM
Maurys L. Landsman, AM
Meredith M. McQuaid, M
Kathryn J. Sedo, AM
Stephan M. Simon, AM
Carl M. Warren, AM

Curriculum—A law minor is available to both master’s (M.A. and M.S.) and doctoral students and is individually tailored to their academic interests.

Prerequisites for Admission—Admission to the law graduate minor is contingent upon prior admission to a master's or doctoral degree-granting program within the Graduate School. Enrollment in Law School courses is on a space-available basis, with preference given to law-degree-seeking candidates.

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

Minor Only Requirements

A master's minor requires at least 6 graduate credits; a doctoral minor requires at least 12 graduate credits.

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 up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Fred Amram, General College, M2
Kent R. Bales, English, M2
Jill Barnum, General College, M2
Terrence Collins, General College, M2
Daniel Detzner, General College, M2
Stephen Feinstein, History, M2
Gerald Fry, Education Policy and Administration, M2
Maria Gini, Computer Science, M2
Judith A. Martin, Geography, M2
Victoria Mikelonis, Rhetoric, M2
Randy Moore, General College, M2
Philip Regal, Ecology, Evolution, Behavior, M2
Karen Seashore, Education and Human Development, M2
John Wallace, Philosophy, M2
Jack Zipes, Germanic Studies, M2

Associate Professor
Rose Brewer, Studies in Africa and the African Diaspora, M2
Barbara Crosby, Public Affairs and Public Policy, M2
George Green, History, M2
Arthur M. Harkins, Educational Policy and Administration, M2
Carol A. Miller, American Studies, M2
Roger Miller, Geography, M2
Lisa Norling, History, M2
Byron Schneider, Educational Policy and Administration, M2
Robert Silberman, Art History, M2
Jacquelyn N. Zita, Feminist Studies, M2

Other
Michael M. Andregg, M2
Stephen L. Daniel, M2
Robert Del Tredici, AM2
Sarah Dennison, M2
William Dikel, M2
Margot Galt, M2
Joseph Goldman, M2
Isabel Gomez, M2
Anita Gonzalez, M2
Donna Mac J. Gustafson, M2
John Hasselberg, M2
Janet Hively, M2
Jeremy F. Igers, M2
Jack Johnson, M2
Judith Katz, M2
Roseann Lloyd, M2
Peter Lock, M2
Justin O’Brien, M2
Nicholas Pease, M2
David A. Shape, M2
Roslye Ultan, M2

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

Curriculum—The graduate major in liberal studies offers an interdisciplinary curriculum that includes an introductory seminar, a choice of liberal studies seminars, a choice of electives from disciplines throughout the Graduate School, and a final project seminar. Although

seminars for the M.L.S. are scheduled 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—Please refer to Liberal Studies (LS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Contact the M.L.S. office prior to taking a 4xxx course.

M.L.S. Degree Requirements
The M.L.S. is a specific variation of the master’s Plan B option. The program requires at least 30 credits. Required are the Introduction to Interdisciplinary Inquiry (3 credits) and the Final Project (3 credits) seminars. 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, 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, LES@umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Genevieve J. Escuré, English, AM2
Jeanette K. Gandel, SM
Michael B. Kac, Philosophy, SM
Michael P. Maratos, Child Development, AM2
John D. Nichols, American Indian Studies, AM2
Maria D. Sera, Child Development, AM2
Nancy J. Stenson, SM

Amy L. Sheldon, Communication Studies, SM
Polly E. Szatrowski, AM2

Associate Professor
Bruce T. Downing, SM
Charles R. Fletcher, Psychology, AM2
Betsy K. Kerr, French and Italian, AM2
Carol A. Klee, Spanish and Portuguese Studies, AM2

Assistant Professor
Benjamin Munson, AM2
Hoo Ling Soh, M2

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

Curriculum—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 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—Please refer to Linguistics (Ling) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Inclusion of 4xxx courses in degree programs is subject to 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: six courses covering core areas of language structure (phonology, syntax, semantics/pragmatics); one course in field methods; and one research paper course. The total number of credits, assuming no prior coursework in linguistics, is 36 (30 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 taken these courses or their equivalents as undergraduates can substitute other linguistics courses. The M.A. minor requires at least 9 credits.

Ph.D. Degree Requirements

The Ph.D. program focuses on theoretical issues in core areas of language structure (phonology, syntax, semantics/pragmatics), language processing (cognitive processes that underlie language use) and language acquisition. The program especially emphasizes research that integrates core areas of theoretical linguistics with language processing or acquisition.

For the Ph.D., no minimum number of credits is required besides the 12 credits in related fields and 24 thesis credits. However, all Ph.D. students are expected to have completed M.A. course requirements (30 credits or less, depending on prior coursework in linguistics), a second-semester course in field methods (3 credits), and an individualized plan of study (including at least three 8xxx courses) to be determined in consultation with the student’s committee. Upon completion of required coursework, students must pass a preliminary written exam in phonology, syntax, and their primary and secondary areas of concentration. Papers judged to be of near publishable quality by the student’s committee can be substituted for exam questions in any of these areas. The preliminary oral exam is a presentation and defense of a research paper-length dissertation prospectus, which introduces and motivates the student’s dissertation topic and provides a detailed plan for completion of the dissertation.

Language Requirements—The Ph.D. degree requires knowledge of two languages not native to the student. Mechanisms for demonstrating such knowledge are described in the program’s Graduate Student Handbook.

Minor Requirements for Students Majoring in Other Fields—The doctoral minor requires at least 15 credits (five courses). Students who have had 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, 227 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-626-7583; fax 612-626-7580; writing@umn.edu; http://writing.umn.edu/lrs/index.htm).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

Richard W. Beach, Curriculum and Instruction, M
Karlyn K. Campbell, Communication Studies, M
Andrew D. Cohen, Linguistics, English as a Second Language, M
Terence G. Collins, General College, M
Hazel Dicken-Garcia, Journalism and Mass Communication, M
Edward M. Griffin, English, M
Alan G. Gross, Rhetoric, M
Laura J. Gurak, Rhetoric, M
Michael Hancher, English, M
Ruth-Ellen B. Joeres, German, Scandinavian, and Dutch, M
Earl E. McDowell, Rhetoric, M
Donald J. Ross, Jr., English, M
Edward Siachi, Communication Studies, M
Mary M. Schuster, Rhetoric, M
Amy L. Sheldon, Communication Studies, M
Geoffrey Sirc, General College, M
Elaine E. Tarone, Linguistics, ESL, Slavic Languages and Literatures, M
Barbara M. Taylor, Curriculum and Instruction, M
Paulus W. van den Broek, Educational Psychology, M
Billie J. Wahlstrom, Rhetoric, M
Arthur E. Walzer, Rhetoric, M

Associate Professor

Lisa Albrecht, School of Social Work, M
Thomas E. Augst, English, M
Lee-Ann Kastman Breuch, Rhetoric, M
Daniel Brewer, French and Italian, M
Robert L. Brown, Jr., Cultural Studies and Comparative Literature, M
Patrick Bruch, General College, M
Patricia A. Crain, English, M
Rebecca L. Krug, English, M
Amy M. Lee, General College, M
Carol A. Miller, American Studies, M
Rosemarie J. Park, Work, Community, and Family Education, M
Gwendolyne Pough, Women’s Studies, M
Thomas J. Reynolds, General College, M
Diane J. Tedick, Curriculum and Instruction, M
Constance L. Walker, Curriculum and Instruction, M
Kirt H. Wilson, Communication Studies, M
Thomas Wolfe, History, M

Assistant Professor

Richard J. Graff, Rhetoric, M
John Logie, Rhetoric, M

Thomas J. Reynolds, General College, M

Lecturer

Julie Kalnin, Curriculum and Instruction, M

Curriculum—The minor in literacy and rhetorical studies (LRS) was created to provide a forum for students and faculty interested in various facets of writing and communication. By crafting an individualized program of study including literacy theory and practice, research methods, and historical inquiry, students can complement their disciplinary degree and thereby open up new perspectives for their teaching and research. Students develop an interdisciplinary program of study in consultation with their major adviser (preferably one of the faculty above), the director of graduate studies in their major, and the director of graduate studies in LRS.

Prerequisites for Admission—Admission is contingent upon enrollment in good standing in a relevant doctoral or master’s program within the Graduate School of the University.

Special Application Requirements—Entrance to the minor is granted by permission of the director of graduate studies in LRS and the faculty selection committee. Application materials include a completed application form, 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 http://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), one course each from 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, or of rhetoric, or of literacy. Students must also write a substantial paper that emerges from one of the three courses.

A doctoral minor requires four graduate courses or seminars (12 credits minimum). Three courses must be in each of the categories enumerated above for the master’s minor. In addition, students must take 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 one of the three courses at the master’s level, or two of the four courses at the doctoral level, may be from the student’s home department.

Language Requirements—None.
Luso-Brazilian Literature

Contact Information—See Hispanic and Luso-Brazilian Literatures and Linguistics. For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Associate Professor
Fernando E. Arenas, M2
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—See Hispanic and Luso-Brazilian Literature and Linguistics for program description.

Prerequisites for Admission—Prospective students generally have completed an undergraduate degree or substantial coursework in the field, although individuals with other backgrounds may be admitted. The Graduate Studies Committee may require completion of background coursework, without graduate degree credit, for admitted students with insufficient preparation.

Special Application Requirements—Three letters of recommendation from previously attended institutions evaluating the applicant’s scholarship, a sample of a writing project, and a complete set of transcripts in addition to that required by the Graduate School should be sent to the director of graduate studies. The GRE is desirable. The deadline for application for admission and financial aid is January 15 for fall entry. Applicants who wish to be considered for teaching assistantships or Graduate School fellowships are encouraged to apply early.

Courses—Please refer to Portuguese (Port), Spanish (Span), and Spanish-Portuguese (SpPt) information section of this catalog for courses pertaining to the program.

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

M.A. Degree Requirements

The M.A. is offered under both Plan A and Plan B. Plan A requires at least 33 credits, including 15 credits in the major field taken from among designated 5xxx core courses, plus one 6xxx capstone course. Plan B requires at least 33 course credits and two Plan B papers. Most students pursue Plan B.

Language Requirements—For the M.A., students must have a reading knowledge of at least one foreign language in addition to Portuguese.

Final Exam—The final exams are written and oral.

Minor Requirements for Students Majoring in Other Fields—The master’s minor requires at least 6 credits.

Management of Technology

Contact Information—Management of Technology Graduate Program, Center for the Development of Technological Leadership, University of Minnesota, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55454 (612-624-5747; fax 612-624-7510; MOT@cdtl.umn.edu, www.cdtl.umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Carl Adams, Information and Decision Sciences, M2
Massoud Amin, Electrical and Computer Engineering, M2
Philip Bromiley, Strategic Management, AM2
Norman L. Chervany, Information and Decision Sciences, M2
William K. Durfee, Mechanical Engineering, M2
W. Bruce Erickson, Strategic Management, 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
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
Kelvin W. Willoughby, Management of Technology, M2

Associate Professor
Douglas Ernie, Electrical and Computer Engineering, M2

Assistant Professor
Frederick J. Riggins, Information and Decisions Sciences, M2

Other
Lockwood Carlson, Management of Technology, M2

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

Curriculum—The master of 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 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 Systems Engineering

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

Contact Information—Management of Technology Graduate Program, Center for the Development of Technological Leadership, University of Minnesota, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55454 (612-624-5747, fax 612-624-7510; general@cdtl.umn.edu; www.cdtl.umn.edu).

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

Curriculum—The master of science in manufacturing systems engineering (M.S.M.S.E) program is an interdisciplinary program offered through the Institute of Technology’s Center for the Development of Technological Leadership and the Department of Mechanical Engineering. Students gain familiarity with manufacturing systems and practices. The program emphasizes issues surrounding factory logistics and supply chain management, global markets and their implications for manufacturing, and manufacturing processes that are friendly to the environment.

Courses—Please refer to Manufacturing Systems (MS) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses may not be included on degree program forms.

M.S.M.S.E. Plan B Degree Requirements

At least 30 credits, including 23 credits from the manufacturing systems program, 4 credits from the capstone project, and 3 elective credits from systems and technology themes are required. The curriculum includes six core courses, four short courses, three elective short courses, and a capstone course (Plan B final project).

Language Requirements—None.

Final Exam—The final exam is oral. An oral presentation and written report on a final project are also required.

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; 612-624-4054, fax 612-626-8251; sjmegrad@tc.umn.edu.

For up-to-date graduate faculty listings, see: www.grad.umn.edu/faculty_rosters/step1.aspx.

Professor
Tsan-Kuo Chang, SM
Hazel Dicken-Garcia, SM
John Eighmey, SM
Ronald J. Faber, SM
David P. Fan, Genetics and Cell Biology, ASM
John R. Finnigan, Jr., ASM
Kathleen A. Hanson, SM
Jane E. Kirtley, SM
Mark Snyder, Psychology, ASM
Daniel J. Sullivan, SM
Daniel B. Wackman, SM

Associate Professor
Kenneth O. Doyle, SM
Donna B. Schwartz, SM
Albert R. Tims, Jr., SM
Thomas Wolfe, History, AM2

Assistant Professor
Linus Abraham, M2
Donald Brazeal, M2
Jisu Huh, M2
Marco Izer, MA
Linda Jean Kenix, M2
Gary Schwitzer, M2
Brian Southwell, M2

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

Curriculum—The mass communication M.A. 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 does not offer 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. or equivalent.

Special Application Requirements—Applicants must submit a departmental application; a clearly written statement of career interests, goals, and objectives; three letters of recommendation from persons familiar with their scholarship and research potential; a complete set of transcripts; academic work samples in English; and scores from the General Test of the GRE. Students whose native language is not English are required to submit scores from the TOEFL or IELTS (academic). In addition, such students seeking teaching assistanships are required to pass the SPEAK test of spoken-English proficiency prior to appointment. Admission is considered for fall semester only; the application deadline is December 31.

Special Facilities—Special facilities include the Minnesota Journalism Center, the Silha Center for the Study of Media Ethics and Law, the Institute for New Media Studies, the Digital Information Resource Center (which houses the Eric Sevareid Library), and the SJMC Research Division.

Courses—Please refer to Journalism and Mass Communication (Jour) in the course section of this catalog for courses pertaining to this program.

M.A. Plan A Degree Requirements

A minimum of 27 course credits and 10 thesis credits are required. Coursework must include 12 credits in required core courses and 15 other credits (6-9 credits in other journalism and mass communication seminars or courses, and 6-9 credits in other departments). All coursework must be taken A-F.

Language Requirements—No foreign language is required. However, for the master’s program, foreign language proficiency is recommended for students interested in international mass communication.

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 which at least 21 credits must come from SJMC courses and at least 18 credits outside the SJMC. All courses included on the Ph.D. degree program form must be graduate level (4xxx, 5xxx or 8xxx) and taken A-F.

Language Requirements—No foreign language is required. However, it is recommended that doctoral students pursuing international study have to obtain, high language proficiency, or obtain it, in the appropriate area.
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.

Mathematics

Contact Information—School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-624-5550; fax 612-624-6702; math@umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.as.

Professor

Scott Robert Adams, SM
Stephen B. Agard, 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
Jay R. Goldman, SM
Lawrence F. Gray, SM
Robert D. Gulliver, SM
Dennis A. Hejhal, SM
Naresh C. Jain, SM
Dihua Jiang, SM
Max A. Jodeit, Jr., SM
Donald William Kahn, SM
Harvey Bayard Keynes, SM
Nicolai Vladimir Krylov, SM
Nai-Chung Conan Leung, 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. Moebel, 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

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 desiring 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—Please refer to Mathematics (Math) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—In exceptional cases 4xxx courses may be permitted as part of degree programs subject to director of graduate studies approval.

M.S. Degree Requirements

The School of Mathematics offers a M.S. in mathematics. M.S. degrees are also offered with emphasis in applied and industrial mathematics, with emphasis in mathematics education, and with emphasis in actuarial science. For more information, see the Graduate Studies in Mathematics brochure. The M.S. is offered under Plan A and Plan B. Plan A requires at least 20 course credits and 10 thesis credits. Plan B allows more breadth; students complete at least 30 course credits, half of which may be in areas outside of mathematics.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—The master’s minor requires a two-semester 8xxx or 5xxx sequence.

Ph.D. Degree Requirements

The School of Mathematics offers a Ph.D. in mathematics and a Ph.D. in mathematics with emphasis in applied and industrial mathematics.

Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics.

The Ph.D. preliminary written examination, given twice each year, covers real analysis, complex analysis, algebra, and manifolds and topology. Students must pass the exam by the end of their second year. After passing the exam and completing the coursework, students may take the preliminary oral exam, which they must pass by the end of their fourth year. If a supporting program is chosen, it may consist partly or entirely of mathematics courses.
The choice of courses and exams for the emphasis in applied and industrial mathematics is different from those in the general program. In particular, applications are stressed early on.

For more information, see the program’s Graduate Studies in Mathematics brochure.

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.

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 (612-624-0862; fax 612-624-1010; gradinfo@me.umn.edu, www.me.umn.edu)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Regents Professor
Richard J. Goldstein, SM
Benjamin Y. H. Liu (emeritus), ASM

Professor
Roger E. Arndt, Civil Engineering, ASM
Saifallah Benjaafar, SM

Mrinal Bhattacharya, Biosystems and Agricultural Engineering, ASM
John C. Bischof, SM
Perry L. Blackshear (emeritus), ASM
Thomas R. Chase, SM
Jane H. Davidson, SM
Max Donath, SM
William K. Durfee, SM
Arthur G. Erdman, ASM
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. Klamkei, SM
Uwe R. Kortshagen, SM
Thomas H. Kuehn, SM
Francis A. Kulacki, SM
Arthur G. Erdman, SM

Talal O. Kyalseth (emeritus), SM
Jack L. Lewis, Orthopaedic Surgery, ASM
Susan C. Mantell, SM
Virgil A. Marple, SM
Peter H. McMurry, SM

Katsuhiko Ogata (emeritus), ASM
Suhas V. Patankar (emeritus), ASM
Emil Pfender (emeritus), ASM
David Y. H. Pui, SM
Subbiah Ramalingam, SM
James W. Ramsey, SM

Sridharan Ramaswamy, Bio-based Products, ASM

Jeffrey T. Roberts, Chemistry, ASM
Terrence W. Simon, SM
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

Vauhn R. Voller, Civil Engineering, ASM

Associate Professor
Victor H. Barocas, Biomedical Engineering, ASM
Tianhong Cui, SM
Sean C. Garrick, SM
Allison Hubel, SM
Perry Y. Li, SM
Rajesh Rajaman, SM

Assistant Professor
Jennifer Alexander, AM
Kathleen A. Bechtold, Orthopaedic Surgery, ASM
Tran D. Dinh, SM
Heinrich O. Jacobs, Electrical and Computer Engineering, ASM

Associate Program Director
Craig R. Shankwitz, AM
Nicholas J. Ward, AM

Research Associate
Ramesh Kanapathy, AM

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

Curriculum—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.

Courses—Please refer to Mechanical Engineering (ME) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Selected 4xxx courses from other departments may be applied toward the degree in consultation with the student’s advisor 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)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor

Yusuf J. Abul-Hajj, SM
Patrick E. Hanna, SM
Stephen S. Hecht, Laboratory Medicine and Pathology, SM
Thomas R. Hoye, Chemistry, SM
Rodney L. Johnson, SM
Philip S. Portugese, SM
Rory P. Remmel, SM
W. Thomas Shier, SM
Marilyn K. Speedie, SM
Robert Vinc, SM
Carston R. Wagner, SM

Adjunct Professor

Herbert T. Nagasawa, SM

Associate Professor

David M. Ferguson, SM
William B. Gleason, Laboratory Medicine and Pathology, SM
Ramah Muthyala, SM
Lisa A. Peterson, Environmental and Occupational Health, SM
Nataliya Y. Tretyakova, SM

Assistant Professor

Robert A. Fecik, SM
Shana J. Sturla, SM
Chengguo Xing, SM

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

Curriculum—The program emphasizes the application of chemical principles to research on the action of drugs on biological systems. Courses offered by the program focus on general principles of medicinal chemistry, drug design and synthesis, chemical aspects of drug metabolism, chemical mechanisms of drug toxicity and carcinogenicity, computer-assisted drug design and receptor modeling, and combinatorial chemistry.

Prerequisites for Admission—Applicants should have a B.S. or M.S. degree in an appropriate related science field such as pharmacy, chemistry, or biology. Students majoring in other degree programs that encompass chemical, biochemical, or biological fields of study are also encouraged to apply. All applicants should have completed undergraduate chemistry through elementary organic chemistry. Undergraduate coursework in biochemistry and physical chemistry also is a prerequisite, but under certain circumstances such coursework may be taken during the first year. Students usually are admitted fall semester only and admissions are for the Ph.D. program only.

Special Application Requirements—Scores from the General (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—Please refer to Medicinal Chemistry (MedC) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—With the exception of BioC 4331, use of 4xxx courses is not permitted toward degree requirements.

M.S. Plan A Degree Requirements

The medicinal chemistry program does not offer admission for a master’s degree. Students must complete a core curriculum of advanced courses in organic chemistry (4 credits) and medicinal chemistry (10 credits), and 6 credits in a minor or related field.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A minimum of 6 credits is required for a master’s minor.

Ph.D. Degree Requirements

All students must complete a core curriculum of advanced courses in organic chemistry (7 credits), biochemistry (8 credits), and medicinal chemistry (12 credits). Students must also participate in the department seminar program, successfully complete a cumulative exam requirement that serves as the preliminary written exam, and prepare and defend an original research proposal which serves as the preliminary oral exam.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A minimum of 12 credits is required for the doctoral minor, including an introductory courses (MedC 5700 and 5710), advanced medicinal chemistry courses, and other courses in the medicinal chemistry core curriculum.

Medieval Studies

Minor Only

Contact Information—Center for Medieval Studies, University of Minnesota, 304 Walter Library, 117 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-0805; fax 612-626-7735; medst@umn.edu)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor

Ronald F. Akehurst, French and Italian, M

Bernard S. Bachrach, History, M
Caezar E. Farah, African American and African Studies, M
Evelyn S. Firchow, African American and African Studies, M
Donna G. Cardamone Jackson, Music, M
Klaus P. Jankofsky, English, Duluth, M
Ruth M. Karras, History, M
Calvin B. Kendall, English, M
Anatoly Liberman, German, Scandinavian, and Dutch, 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
Robert P. Sonkowski, Classical and Near Eastern Studies, M
John A. Watkins, English, M
Peter Wells, Anthropology, M

Associate Professor

G. Lee Fullerton, German, Scandinavian, and Dutch, M
Kaaren E. Grimmstad, German, Scandinavian, and Dutch, M
Nita Krevans, Classical and Near Eastern Studies, M
Rebecca L. Krug, English, M
Oliver Nicholson, Classical and Near Eastern Studies, M
John W. Steyaert, Art History, M
Ray M. Wakefield, German, Scandinavian, and Dutch, M
Barbara Weissberger, Spanish and Portuguese, M

Assistant Professor

Lianna Farber, English, M
Michael T. Lower, History, 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 1500 A.D. and may include the geographical area of Europe, the Middle East, and Russia. The primary emphasis of the program is on Latin, which is the most common learned and written language of the period, and secondarily on an interdisciplinary approach to medieval culture. The minor involves the Departments of History; Art History; Theatre Arts; Music; English; French and Italian; German, Scandinavian, and Dutch; Spanish and Portuguese Studies; and Classical and Near Eastern Studies.

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—Please refer to Medieval Studies (MeSt) in the course section of this catalog for courses pertaining to the program.
Use of 4xxx Courses—Use of 4xxx courses toward degree requirements is permitted based on director of graduate study approval.

Minor Only Requirements
The master’s minor requires 6 graduate credits: two courses in medieval studies outside the student’s major department, including a Latin course (Lat 8120 or any Latin course at 5xxx or above) and either one MeSt core course (5610 or 8110) or another approved course with medieval or Latin content; if the latter option is chosen, MeSt 8010 (the medieval colloquium course) is also required.

The doctoral minor requires 12 graduate credits, comprising courses in medieval studies outside the student’s major department and including an additional Latin course at 5xxx or above. Students from Classical fields using Latin to satisfy requirements in those fields must substitute an equivalent quantity of a medieval vernacular language for the medieval studies Latin requirement.

Microbial Ecology
Minor Only
For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

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
Jean-Alex E. Molina, Soil, Water, and Climate, M
Philip J. Regal, Ecology, Evolution, and Behavior, M
Michael J. Sadowsky, Soil, Water, and Climate, M
Lawrence P. Wackett, Biochemistry, M

Curriculum—This minor is available to master’s (M.S.) and doctoral (Ph.D.) students. Microbial ecology is an interdisciplinary research area concerned with the relationships of microorganisms to their natural environment. The microbial ecology minor offers core coursework in microbiology, microbial physiology, microbial genetics, microbial 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—Please contact the minor program office for information on relevant coursework.

Use of 4xxx Courses—Inclusion of more than one 4xxx course on degree program forms is subject to adviser and director of graduate study approval.

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 4111) course chosen from the list below. The remaining courses must be 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); MIMP 8002 (4 cr). Additional courses: CE 8511, 8541, 8542, 8551, EEB 4601, 4609, PIPa 8102, 8103, Soil 5515, 5611.

Microbial Engineering
Contact Information—M.S. Program in Microbial Engineering, University of Minnesota, 1479 Gortner Avenue, Suite 140, St. Paul, MN 55108 (612-624-2706; www.bti.umn.edu/microbialms.html).

Prerequisites for Admission—A baccalaureate degree in biological sciences, microbiology, biochemistry, chemistry, or chemical engineering is preferred. Undergraduate coursework should include one year each of calculus, organic chemistry, physics, microbiology, and basic chemical engineering, as well as a background in basic biology, physical chemistry, biochemistry, and genetics. Deficiencies may be made up during the first year of graduate studies.

Special Application Requirements—Three letters of recommendation, scores from the General Test of the GRE, the TOEFL score for international applicants, transcripts, and an autobiographical statement including occupational goals must be submitted to the director of graduate studies. Applications are accepted at any time, but the majority of students are accepted for fall semester. To receive full consideration for financial aid, Michael J. Sadowsky, Soil, Water, and Climate, M2
Janet L. Schottel, Biochemistry, M2
W. Thomas Shier, Medicinal Chemistry and Pharmacognosy, M2
Friedrich Srieh, Chemical Engineering and Materials Science, M2
Lawrence P. Wackett, Biochemistry, M2
Carston Wagner, Medicinal Chemistry, M2

Associate Professor
Antony Michael Dean, Ecology, Evolution, and Behavior, M2
Romas Kazlauskas, Biochemistry, M2
Daniel J. O’Sullivan, Food Science and Nutrition, M2
Claudia Schmidt-Dannert, Biochemistry, M2
Peter Southern, Microbiology, M2

Assistant Professor
Daniel R. Bond, Microbiology, M2
Arkady Khodursky, Biochemistry, M2
Jennifer Maynard, Chemical Engineering and Materials Science, M2

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

Curriculum—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), involving faculty from ten departments and four institutes of the University.

Degree Programs and Faculty
Degree Programs and Faculty

students must apply for fall semester admission by February 1.

Courses—Please refer to Microbial Engineering (MicE) in the course section of this catalog 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 (including 10 thesis credits) for Plan A and 32 credits (including 1-4 research credits) for Plan B. The two-year program comprises coursework in a specialized program of microbiology, molecular biology, immunology, and chemical engineering. In addition, students present two seminars and teach one laboratory course in advanced microbiology, biochemistry, molecular biology, immunology, or chemical engineering. Students may choose supporting coursework (at least 6 credits) from specified fields, including biochemistry, food science, pharmacognosy, genetics, and cell biology and must demonstrate proficiency in computer programming and one computer language. Plan A students carry out a research project resulting in a thesis. Plan B students complete a summer preceptorship (about 2 1/2 months) in a private company research laboratory or at a research institute in the University, and prepare a Plan B paper based on the research project. Presentation of the original laboratory research thesis/project to the graduate faculty is required at the end of the second year.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A minor in microbial engineering is offered at the doctoral level only. Students must complete at least 12 credits, selected in consultation with the director of graduate studies for microbial engineering.

Microbiology, Immunology, and Cancer Biology

Contact Information—Microbiology, Immunology, and Cancer Biology Program, University of Minnesota, MMC 196, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-624-5047; fax 612-626-0623; micab@mail.ahc.umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Regents Professor
Ashley T. Haase, Microbiology, SM

Professor
Mitchell S. Abrahamsen, Veterinary Pathobiology, SM
Khalil Ahmed, Laboratory Medicine and Pathology SM
Dwight L. Anderson, Oral Sciences, SM
Timothy W. Behrens, Medicine, SM
Judith G. Berman, Genetics, Cell Biology, and Development, SM
Peter B. Bitterman, Medicine, SM
Bruce R. Blazar, Pediatrics, SM
Paul P. Cleary, Microbiology, SM
Denis R. Clohisy, Orthopedic Surgery, SM
Agustin P. Dalnasso, 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
Ronald R. W. Jemmerson, Microbiology, SM
Marc K. Jenkins, Microbiology, SM
Vivek Kapur, Microbial Plant Genetics, SM
Tucker W. LeBien, Laboratory Medicine and Pathology, SM
Walter C. Low, Neurosurgery, SM
Paul T.Magee, Genetics, Cell Biology, and Development, SM
Patrick W. Mantyh, Preventive Sciences, SM
James B. McCarthy, Laboratory Medicine and Pathology, SM
R. Scott Melvor, Laboratory Medicine and Pathology, SM
Larry L. McKay, Food Science and Nutrition, SM
Matthew F. Mescher, Laboratory Medicine and Pathology, SM
Jeffrey S. Miller, Medicine, SM
Daniel L. Mueller, Medicine, SM
Sundaram Ramakrishnan, Pharmacology, SM
Michael J. Sadowski, Soil, Water, and Climate, SM
Michel M. Sanders, Biochemistry, Molecular Biology, and Biophysics, SM
Leslie A. Schiff, Microbiology, SM
Patrick M. Schlievert, Microbiology, SM
Janet L. Schottel, Biochemistry, Molecular Biology, and Biophysics, SM
Yoji Shimizu, Laboratory Medicine and Pathology, SM
Daniel A. Valleria, Therapeutic Radiology, SM
Brian G. Van Ness, Genetics, Cell Biology, and Development, SM
Gregory M. Vercellotti, Medicine, SM
Catherine M. Verfaillie, Medicine, SM
Kenneth D. Vernick, Microbiology, SM
Lawrence P. Wackett, Biochemistry, Molecular Biology, and Biophysics, SM
Carol L. Wells, Laboratory Medicine and Pathology, SM
Douglas Yee, Medicine, SM

Associate Professor
Sandra K. Armstrong, Microbiology, SM
Vivian J. Bardwell, Genetics, Cell Biology, and Development, SM
Paul Bohjanen, Microbiology, SM
Kathleen F. Conklin, Microbiology, SM

Kristin A. Hoggquist, Laboratory Medicine and Pathology, SM
Stephen C. Jameson, Laboratory Medicine and Pathology, SM
Carol A. Lange, Medicine, SM
David A. Largaespada, Genetics, Cell Biology, and Development, SM
Louis M. Mansky, Oral Sciences, SM
Daniel J. O’ Sullivan, Food Science and Nutrition, SM
Christopher A. Pennell, Laboratory Medicine and Pathology, SM
Amy P. Skubitz, Laboratory Medicine and Pathology, SM
Peter Southern, Microbiology, SM
Bruce K. Walcheck, Veterinary and Biomedical Sciences, SM
Jennifer J. Westendorf, Orthopedic Surgery, SM

Assistant Professor
Daniel R. Bond, SM
Wade A. Bresnahan, Microbiology, SM
Dana Davis, Microbiology, SM
Michael A. Farrar, Laboratory Medicine and Pathology, SM
Patrick M. Gaffney, Medicine Hematology, SM
Jennifer L. Hall, Medicine, SM
Linda K. Hansen, Laboratory Medicine and Pathology, SM
Koh Iizuka, Medicine Hematology, SM
Elizabeth G. Ingulli, Pediatrics, SM
Dan S. Kaufman, Medicine, SM
Ameeta Kelekar, Laboratory Medicine and Pathology, SM
Nobuki Kikyo, Medicine, SM
Alexander Khoruts, Medicine, SM
Brett K. Levay-Young, Surgery, SM
Kim C. Mansky, Diagnostic/Surgical Sciences, SM
Christian D. Mohr, Microbiology, SM
Erik J. Peterson, Medicine, SM
Stephen A. Rice, Microbiology, SM
Robert J. Sheaff, Biochemistry, Molecular Biology, and Biophysics, SM
Pamela J. Skinner, Veterinary and Biomedical Sciences, SM
Wufan Tao, Medicine, SM

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

Curriculum—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 autoimmune, 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—College coursework should include a year of general chemistry; organic chemistry; physics; calculus; and one academic year or the equivalent of courses in the biological sciences supplemented by courses in biochemistry and genetics. A course in microbiology, immunology, or histology is highly recommended but not 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 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—Please refer to Microbiology, Immunology, and Cancer Biology (MICa) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx Courses on degree program forms is permitted based on director of graduate study approval.

M.S. Plan A Degree Requirements

Students are not admitted directly into the master’s program; it is available only by special arrangement with the program. Students complete 14 MICa course credits, 6 credits in the minor or related field, and 10 thesis credits. Students must write and defend a thesis based on original research.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements

The Ph.D. requires a minimum of 22 course credits in the major, 12 course credits in a minor or supporting program, and 24 thesis credits.

Beginning study in the fall, students spend their first year on major coursework, identifying an adviser by doing laboratory rotations, selecting a concentration, and initiating their thesis research project. All students take courses on the structure, function, and metabolism of microorganisms; molecular immunology; and cancer biology, as well as in their chosen concentration during their first two years.

In addition to coursework and research, students have opportunities to participate in laboratory meetings, journal clubs, and student research seminars, and to assist in laboratory courses. Most students complete the Ph.D. in four to five years.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires MICa 8001 (3 credits), MICa 8910 (1 credit), and other 8xxx MICa courses at 3 or 4 credits, totaling a minimum of 12 credits.

Molecular, Cellular, Developmental Biology and Genetics

Contact Information—Director of Graduate Studies, Molecular, Cellular, Developmental Biology and Genetics, University of Minnesota, 6-160 Jackson Hall, 321 Church St. S.E., Minneapolis, MN 55455 (612-624-7470, fax 612-626-6140, 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 up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/stepf.asp.

Regents Professor

Ronald L. Phillips, Agronomy and Plant Genetics, SM

Professor

Timothy W. Behrens, Medicine, SM
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
Perry B. Hackett, SM
David W. Hamilton, SM
Thomas S. Hays, SM
Robert K. Herman, SM
Ross G. Johnson, SM
Richard A. King, Medicine, SM
Ryoko Kuriyama, SM
Paul A. Lefebvre, Plant Biology, SM
Paul C. Letourneau, Neuroscience, SM
Richard W. Linck, SM
Dennis M. Livingston, Biochemistry, Molecular Biology, and Biophysics, SM
Paul T. Magee, SM
Cary N. Mariash, Medicine, SM
James B. McCarthy, Laboratory Medicine and Pathology, SM
R. Scott McVor, SM
Steven C. McLoon, Neuroscience, SM
Matthew F. Mescher, Laboratory Medicine and Pathology, SM
Michael B. O’Connor, SM
Neil E. Olszewski, Plant Biology, SM
Harry T. Orr, Laboratory Medicine and Pathology, SM
Laura P. W. Ranum, SM
Janet L. Schottel, Biochemistry, Molecular Biology, and Biophysics, SM
Scott B. Selleck, Pediatrics, SM
Yoji Shimizu, Laboratory Medicine and Pathology, SM
Carolyn D. Silflow, Plant Biology, SM
Michael J. Simmons, SM
Robert L. Sorenson, SM
Clifford J. Steer, Medicine, SM
Howard C. Towle, Biochemistry, Molecular Biology, and Biophysics, SM
Brian G. Van Ness, SM
Catherine M. Verfaillie, Medicine, SM
Chester B. Whitley, Pediatrics, SM
Robin L. Wright, SM
Susan M. Wick, Plant Biology, SM

Associate Professor

Vivian J. Bardwell, SM
Kathleen F. Conklin, SM
Stephen C. Ekker, SM
Betsy A. Hirsch, Laboratory Medicine and Pathology, SM
Kristin A. Hugquist, Laboratory Medicine and Pathology, SM
Victoria Iwani, SM
Stephen C. Jameson, Laboratory Medicine and Pathology, SM
David A. Largesaepa, SM
Bonnie S. LeRoy, SM
Louis M. Mansky, Dentistry, SM
M. David Marks, Plant Biology, SM
Linda K. McLoon, Ophthalmology, SM
Mary E. Porter, SM
Ann E. Roughvij, SM
Joceyn E. Shaw, SM
Jeffrey A. Simon, SM
Amy P. Skubitz, Laboratory Medicine and Pathology, SM
Margaret A. Titus, SM
Kenneth D. Vernick, Microbiology, SM
David A. Zarkower, SM

Assistant Professor

Linhia Chen, SM
Duncan Clarke, SM
Sean D. Conner, M2
Electra C. Cucouvanis, SM
Dana Davis, Microbiology, M2
Michael A. Farrar, Laboratory Medicine and Pathology, SM
William M. Gray, Plant Biology, M2
David T. Kirkpatrick, SM
Deanna Koepp, M2
Michael D. Koob, Medicine, M2
Lorene M. Lanier, Neuroscience, M2
Paul C. Marker M2
Nancy J. Mendelsohn, AM
Jeffrey R. Miller, SM
Kathy L. Moser, Medicine, SM
Hiroshi Nakato, M2
Thomas P. Neufeld, SM
Sue V Petzel, Obstetrics/Gynecology, AM
Anton Sanderfoot, Plant Biology, M2
Lisa A Schimmenti, Pediatrics, AM
Howard C. Towle, Biochemistry, Molecular Biology, and Biophysics, SM
Robert L. Sorenson, SM
Thomas P. Neufeld, SM
Sue V Petzel, Obstetrics/Gynecology, AM
Anton Sanderfoot, Plant Biology, M2
Lisa A Schimmenti, Pediatrics, AM
William Shawlot, SM
Nikunj Somia, SM

Other

Mary J. Ahrens, AM
Janice Baker, AM
Shari R. Baldinger, AM
Beth Conrad, AM
Vicki L. Couch, AM
Maryann V. Fox, AM
Katherine A. Nelson Fuhrman, AM
Judy Garza, AM
Degree Programs and Faculty

Joy Gustin, AM  
Bonnie A. Hatten, AM  
Beth A. Henderson-Conrad, AM  
Jennifer A. Roggenbuck, AM  
Karol R. Rubin, AM  
Alysia B. Spear, AM  
Catherine M. Walsh Vockley, AM

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

Curriculum—This 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 Agricultural, Food and Environmental 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 highly desirable. For students of demonstrated ability, background deficiencies can be made up during the first year of graduate study. Exceptional international applicants with TOEFL scores of 625 (paper based) or 263 (computer based) or higher 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. Recommended date for receipt of completed applications is January 2. Graduate studies begin in the fall semester.

Courses—Please refer to Molecular, Cellular, Developmental Biology and Genetics (MCDG) and Genetics, Cell Biology, and Development (GCD) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx Courses toward degree requirements is permitted 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; in both cases, applicants must also be competitive for admission at the Ph.D. level.

The M.S. is offered under Plan A and Plan B. Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits and the completion of Plan B papers. Students take a core curriculum, which is multidisciplinary and contributes to both the major and minor or related field requirements. Students may choose a concentration or specialization within the program such as cell biology, developmental biology, genetics, or human genetics. The M.S. on average takes two years to complete.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master's minor requires 6 credits.

Ph.D. Degree Requirements

The Ph.D. program is designed by the student and the adviser to meet individual interests and goals. Advanced courses in genetics, molecular biology, cell biology, developmental biology, and biochemistry are required, in addition to special courses, topical seminar courses, laboratory research rotations, thesis research, student research seminars, departmental seminars, and journal clubs. The student's core curriculum is multidisciplinary and contributes to both major and minor field requirements.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor typically includes the genetics core (GCD 8131 and BioC 8002 or GCD 8121 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 up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Regents Professor  
Joanne B. Eicher, M

Professor  
Robert J. Poor, AM  
Peter S. Wells, AM

Associate Professor  
Margaret K. DiBlasio, M  
Lyndel L. King, Art History, M

Assistant Professor  
David J. Rhee, AM

Lecturer  
Anita F. Cholewa, AM

Other  
Robert D. Jacobsen, AM  
Gordon R. Murdock, M  
Colleen J. Sheehy, 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—Please refer to Museum Studies (MSt) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses towards degree requirements is permitted based on director of graduate studies approval.

Minor Only Requirements

The master's and doctoral minors require 7 and 12 credits respectively. Each requires the introductory seminar (MSt 5011, 3 credits), the museum practices course (MSt 5012, 3 credits), and at least one credit of internship (MSt 5020). Additional credits for the doctoral minor may be internship or directed study (MSt 8993).
Music

Contact Information—School of Music, University of Minnesota, 100 Ferguson Hall, 2106 4th Street South, Minneapolis, MN 55455 (phone 612-624-0071; fax 612-624-8001; email music-adm@umn.edu)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
John E. Anderson, SM
Lydia Artymiw, SM
Thomas J. Ashworth, SM
David B. Baldwin, SM
Alexander Braginsky, SM
Michael Cherlin, SM
David A. Grayson, SM
Paul A. Haack, SM
Donna C. Jackson, SM
Craig J. Kirchhoff, SM
Korey B. Konkol, SM
Alex J. Luber, SM
Glenda Maurice, SM
Sally O’Reilly, SM
Tanya Remenikova, SM
Rebecca P. Shockey, SM
D. Clifton Ware, Jr., SM
Lawrence Weller, SM
Noel Zahler, SM
Judith L. Zaimont, SM

Associate Professor
Akosua Addo, M2
Dean W. Billmeyer, SM
Mark P. Bjork, SM
David A. Damschroder, SM
Jean Del Santo, SM
Charles E. Furman, SM
Keitha Lucas Hamann, SM
Kelley A. Harness, SM
Young Nam Kim, SM
Jerry Luckhardt, SM
Peter Mercer-Taylor, SM
Fernando A. Meza, SM
Paul M. A. Shaw, SM

Assistant Professor
Matthew Bribitzer-Stull, M2
Immanuel Davis, SM
John De Haan, M2
Doug Geers, M2
Mirjana Lausevic, M2
Timothy Lovelace, SM
Akira Mori, SM
Kathy S. Romey, M2
Linda Thompson, M2
David Walsh, M2

Instructor
Rosalind L. Laskin, AM
John W. Miller, Jr., AM
Dean Sorenson, AM

Lecturer
James L. Clute, AM
Jorja Fleezanis, AM
Brian Grivna, AM
Charles D. Kavalovski, AM
Kathy Kienzle, AM
Peter M. Lloyd, AM
Basil Reeve, AM
Eugene Rousseau, SM
John Snow, AM2
Charles Ullery, AM
Jeffrey W. Van, AM
Herbert E. Winslow, AM
Wendy Zaro-Mullins, AM

Other
Julia Bogorad, AM
Gary A. Bordner, AM
Christopher Brown, AM
Timothy Diem, AM
Burt Hara, AM
Barbara G. Kierig, AM
Clara Zahler, AM

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

Curriculum—The School of Music offers a master of arts (M.A.) in music, an M.A. in music education, a master of music (M.M.), a doctor of musical arts (D.M.A.), and a doctor of philosophy (Ph.D.) degree. The School of Music also cooperates with the College of Education and Human Development in offering the master of education (M.Ed.) with an emphasis in music education/therapy. Applications for the M.Ed. are available from Student and Professional Services in the College of Education and Human Development. Specific degree plans and emphases are listed in each degree’s requirements below.

Prerequisites for Admission—Applicants must hold a bachelor’s degree or its equivalent with a major emphasis in one of the following areas of music: musicology/ethnomusicology, theory and/or composition, performance, or music education/therapy. Applicants to the M.A. in music education also generally hold an appropriate teaching license.

Special Application Requirements—All applicants must submit three current letters of recommendation. 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 University fellowships. Applicants whose primary language is not English must score a minimum of 6.5 on the IELTS test or 565 (paper)/223 (computer) on the TOEFL test to be exempt from further English study (ESL).

The various degree programs also require additional application materials. See above. 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 both audio and video formats. 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 January 10. 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 twentieth-century music theory and ear training. Similarly, they must demonstrate proficiency in music history from the Middle Ages to the present. Individual programs may require additional diagnostic exams.

Degree Programs and Faculty

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Courses—Please refer to Music (Mus), Music Applied (MusA), and Music Education (MuEd) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx Courses toward degree requirements is subject to adviser and/or director of graduate studies approval.

M.A. Degree Requirements
The master of arts in music offers emphases in musicology/ethnomusicology (Plan A and Plan B), theory (Plan B only), and composition (Plan B only).

The M.A. in music with emphasis in musicology/ethnomusicology requires 35 credits (25 course credits and 10 thesis credits) for Plan A and 31 course credits for Plan B; the emphasis in composition (Plan B only) requires 41 course credits, and the emphasis in music theory (Plan B only) requires 30 course credits. The credit totals for all emphases include 6 credits required for courses outside the major field.

Language Requirements—A reading knowledge of French, German, or Italian is required for all M.A. degree emphases.

Final Exam—For the emphasis in musicology/ethnomusicology, the final exams are written and oral. For the emphases in theory and composition, 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, piano pedagogy, accompanying and coaching, orchestral conducting, wind ensemble and 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 Mus 5xxx or 8xxx musicology/ethnomusicology and theory/composition, with a minimum of 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 live 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 the complements the performance major. The secondary area option requires the approval of the student’s adviser and of the director of graduate studies, and is limited to secondary areas approved by the Graduate Committee of the School of Music. Under this option, students perform three doctoral recitals instead of five (12 credits total, at 4 credits each). The remaining requirements are the same as in the first option for a D.M.A. Students must also 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 live 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.—the areas of musicology, theory, pedagogy, etc. The distribution of these credits depends upon the specific secondary area chosen.

A secondary area concentrates either on a single discipline—e.g., musicology, music theory, composition, choral conducting, or pedagogy. All 15 credits of a secondary area must be achieved 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 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—The D.M.A. with emphasis in accompanying and coaching requires two languages chosen from French, German, and Italian; the emphasis in conducting requires German or either French or Italian.

Ph.D. Degree Requirements
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).

Music Education
Contact Information—See Music

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
Paul A. Haack, M2
Associate Professor
Akosua Addo, M2
Charles E. Furman, M2
Keitha Lucas Hamann, M2
Assistant Professor
Linda Thompson, M2

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

Curriculum—The M.A. in Music has a track in music education (Plan B only). This degree also offers an emphasis music therapy. The music education track involves planning, teaching, learning, and evaluating processes with musical content applied across education settings. While knowledge of acculturation...
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 612-625-4334; mnanoigert@umn.edu; www.nanoigert.umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

Stephen A. Campbell, Electrical and Computer Engineering, M
Robert Carr, Chemical Engineering and Materials Science, M
C. Barry Carter, Chemical Engineering and Materials Science, M
Jim Chelikowsky, 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 Y. H. Pui, Mechanical Engineering, M
Jeff Roberts, Chemistry, M
Donald G. Truhlar, Chemistry, M
Randall Victora, Electrical and Computer Engineering, M

Associate Professor

C. Daniel Frischie, Chemical Engineering and Materials Science, M
Sean Garrick, Mechanical Engineering, M
Heiko O. Jacobs, Electrical and Computer Engineering, M
Richard B. McClurg, Chemical Engineering and Materials Science, M
R. Lee Penn, Chemistry, M
David J. Norris, Chemical Engineering and Materials Science, M
Michael Tsapatsis, Chemical Engineering and Materials Science, M

Curriculum—The Integrative Graduate Education and Research Traineeship program offers a minor in nanoparticle science and engineering for M.S. and Ph.D. students. The curriculum is designed to allow completion of the minor without an increase in overall course load. The minor requires one or two core courses and electives relevant to nanoparticle research. The program of courses is tailored in advance consultation 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 credits) and 3 elective credits. PhD students must complete NPSE 8001 and 8002—Nanoparticle Science and Engineering Laboratory (3 credits) 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.
Degree Programs and Faculty

Kristen C. Nelson, SM
Michael E. Ostry, AM
Steven J. Severson, SM
Thomas L. Schmidt, ASM
Timothy M. Smith, SM
Steven J. Taff, Applied Economics, AM2
Ulrike W. Tschirner, SM

**Adjunct Associate Professor**

David N. Bengston, ASM
Erwin R. Berglund, AM2
Stephen M. Bratkovich, ASM
Karyn Eckman, Institute for Global Studies, AM2
David C. Fulton, Fisheries, Wildlife, and Conservation Biology, ASM
Mark H. Hansen, AM2
Pamela J. Jakes, AM2
Joseph G. O’Brien, AM
Brian J. Palik, AM
Don E. Riemenschneider, AM
Jerryl L. Thompson, M2

**Assistant Professor**

Michael C. Demchik, AM2
Daniel W. Gilmore, M2
Michael A. Kilgore, SM
Kristine A. Miller, Landscape Architecture, AM
Rebecca A. Montgomery, SM
Karen S. Oberhauser, ASM
Harlan D. Petersen, M
Michael J. Phillips, AM
Michael R. Reichenbach, Cloquet Forestry Center, M
Rubin Shmulsky, M2
Eric K. Zenner, Forest Resources, M2

**Adjunct Assistant Professor**

Mary M. Blickenderfer, AM
Meredith W. Cornett, ASM
Daniel L. Erkila, M2
C. Hobart Perry, AM2
Stephanie Snyder, AM2

**Research Associate**

Dean A. Current, M2
Kevin J. Dodds, AM
Lee E. Frelich, SM
Jacek Oleksyn, AM
Ingrid E. Schneider, SM
Robert T. Seavey, M2
Robert A. Stine, Cloquet Forestry Center, M2

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

**Curriculum**—Students 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; or 7) paper science and engineering.

**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 continually, and students are admitted each semester. However, submission of application materials by January 3 (for fall admission) is encouraged to ensure consideration for fellowships and assistantships. General GRE scores are required. Letters of recommendation are strongly encouraged. Applicants for the doctoral program should supply the names and addresses of three people who can provide evaluations of their capacity for advanced study and independent research.

**Courses**—Please refer to Natural Resources Science and Management (NR), Forest Resources (FR), Environment and Natural Resources (ENR), and Bio-based Products (BP) in the course section of this catalog.

**Use of 4xxx Courses**—Inclusion of 4xx Forest Resources (FR), Environment and Natural Resources (ENR), and Bio-based Products (BP) courses on degree program forms of natural resources science and management majors or minors for the M.S. or Ph.D. 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. Although there is no set maximum number of 4xxx credits, programs with insufficient 5xxx and 8xxx coursework will not be approved.

**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 credits and Plan B requires at least 30 credits; Plan A students 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.

**Language Requirements**—None.

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

**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.

**Ph.D. Degree Requirements**

The doctoral program varies from 30 to 60 credits. In addition, students must register for 24 thesis credits. Course selection and thesis proposals are developed by each student in consultation with the faculty adviser and are approved by the Natural Resources Science and Management Graduate Studies Committee.

**Language Requirements**—None.

**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.

**Neuroscience**

Contact Information—Neuroscience Program, University of Minnesota, D-610 Mayo Building, MMC 265, 420 Delaware St. S.E., Minneapolis, MN 55455 (612-626-5898; fax 612-626-6460; neuroscience.umn.edu)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

**Professor**

James Aske, Neuroscience, SM
Karen Hsiao Aske, Neurology, SM
Alvin J. Beitz, Veterinary and Biomedical Sciences, SM
David R. Brown, Veterinary Medicine, SM
Dwight A. Burkhardt, Psychology, SM
Marlyn E. Carroll, Psychiatry, SM
H. Brent Clark, Laboratory Medicine and Pathology, SM
Bianca M. Conti-Fine, Biochemistry, SM
John W. Day, Neurology, SM
Richard Di Fabio, Physical Therapy, SM
Janet M. Dubinsky, Neuroscience, SM
Timothy J. Ebnner, Neuroscience, SM
Robert P. Elde, Biological Sciences, SM
Esam E. El-Fakahany, Psychiatry, SM
William C. Engeland, Surgery, SM
Martha Flanders, Neuroscience, SM
William H. Frey, Pharmacy, SM
Michael K. Georgieff, Pediatrics, SM
Apostolos P. Georgopoulos, Neuroscience, SM
Glenn J. Giesler, Jr., Neuroscience, SM
Christopher M. Gomez, Neurology, SM
Rolf Gruetter, Radiology, SM
Boyd K. Hartman, Psychiatry, SM
Bin He, Biomedical Engineering, 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, Neuroscience, SM
Allen S. Levine, Psychiatry, SM
Kelvin O. Lim, Psychiatry, SM
Walter C. Low, Neurosurgery, SM
Patrick W. Mantyh, Preventive Sciences, SM
Steven C. McLoon, Neuroscience, SM
Karen A. Mesce, Entomology, SM
Robert F. Miller, Neuroscience, SM
Charles A. Nelson, Child Development, SM
Eric A. Newman, Neuroscience, SM
Michael B. O'Connor, Genetics, Cell Biology, and Development, SM
Harry T. Orr, Laboratory Medicine and Pathology, SM
John W. Osborn, Physiology, SM
Hans G. Otthmer, Mathematics, SM
J. Bruce Overmier, Psychology, SM
Jose V. Pardo, Psychiatry, SM
Richard E. Poppele, Neuroscience, SM
Philip S. Portoghesi, Pharmacy, SM
Laura P. Ranum, Genetics, Cell Biology, and Development, SM
David A. Rottenberg, Neurology, SM
Peter A. Santi, Otolaryngology, SM
Ronald J. Sawchuk, Pharmaceutics, SM
Martin W. Wessendorf, Neuroscience, SM
Virginia S. Seybold, Neuroscience, SM
Donald A. Simone, Oral Sciences, SM
John F. Soechting, Neuroscience, SM
Peter W. Sorenson, Fisheries and Wildlife, SM
Stanley A. Thayer, Pharmacology, SM
David D. Thomas, Biochemistry, SM
Kamil Ugurbil, Radiology, SM
Catherine Verfaillie, Medicine, SM
Neal F. Viemeister, Psychology, SM
George L. Wilcox, Pharmacology, SM

Associate Professor
John H. Anderson, Otolaryngology, SM
W. Dale Branton, Neuroscience, M2
William Elmqquist, Pharmaceutics Research, SM
Patricia L. Faris, Psychiatry, SM
S. Hossein Fatemi, Psychiatry, SM
Janet L. Fitzarkerley, Pharmacology Duluth, SM
Jurgen F. Fohlmeister, Physiology, SM
Jon Gottesman, Neuroscience, M2
Sheng He, Psychology, SM
Christopher N. Honda, Neuroscience, SM
Eric Javel, Otolaryngology, SM
Paulo Kofuji, Neuroscience, SM
Juergen Konczak, Kinesiology, SM
Linda K. McLoon, Ophthalmology, SM
Moses K. Njenga, Veterinary, SM
LiLian Yuan, Neuroscience, SM
Lance Zirpel, Neuroscience, SM

Ph.D. Degree Requirements

The course requirements for a Ph.D. degree are described under Curriculm (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. The program for an individual student is developed by consultation between the student and the DGS of the Graduate Program in Neuroscience. Students are required to take one of the following core courses: Function/Structure: NSc 5561; Systems Neuroscience (4 credits) or Cellular/Molecular: NSc 5461; Cellular and Molecular Neuroscience (4 credits)

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)

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.aspx

Associate Professor
William Riley, Public Health
Melissa Stone, Public Affairs

Lecturer
Alice Thomas, Educational Policy and Administration
Victoria Van Slyke, Social Work
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 the business aspects of managing 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](http://www.cce.umn.edu/certificates/mgmt/nonprofit).

Certificate Requirements—Twenty-one credits of coursework are required, including seven credits of required core courses and a minimum of 14 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 (1.5 cr), PA 5101—Management 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—Courtney Striet, Recruiter, School of Nursing, University of Minnesota, 5-160 Weaver Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-4454; fax 612-624-3174; [nurseoss@umn.edu](mailto:nurseoss@umn.edu); [www.nursing.umn.edu](http://www.nursing.umn.edu)).

For up-to-date graduate faculty listings, see [www.grad.umn.edu/faculty_rosters/step1.asp](http://www.grad.umn.edu/faculty_rosters/step1.asp).

Professor

- Lyn Bearinger, SM
- Donna Bliss, SM
- Joanne Disch, AM
- Sandra Edwardson, AM
- Ann Garwick, SM
- Cynthia Gross, SM
- Susan Henly, SM
- Barbara Leonard, SM
- Jean Wyman, SM

Associate Professor

- Melissa Avery, SM
- Linda Chlan, M2
- Laura Duckett, SM
- Jayne Falkerson, AM
- Linda Halcon, SM
- Helen Hansen, SM
- Merrie Kaas, SM
- Madeleine Kerr, SM
- Kathie Krichbaum, SM
- Marsha Lewis, SM
- Joan Liaschenko, SM
- Linda Lindeke, SM
- Ruth Lindquist, SM
- Christine Mueller, SM
- Cynthia J. Peden-McAlpine, SM
- Janice Post-White, SM

Assistant Professor

- Diane Bohn, M2
- Linda Gerder, M2
- Laila Gilzaz, M2
- Ann Jones, AM
- Mary Jo Kreitzer, AM
- Martha Kubik, AM
- Margaret Moss, M2
- Carol O’Boyle, M2
- Cheryl Robertson, M2
- Renee Sieving, AM
- Roxanne Struthers, M2
- Diane Treat-Jacobsen, SM
- Gretchen Zunkel, M2

Other

- Karen Alaniz, AM
- Bradley Cohen, AM
- Kathleen Fagerland, AM
- Linda Herrick, AM
- Catherine Jave, M2
- Jennifer Peters, AM
- Mary Rowan, M2
- Kay Savik, AM

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

Curriculum—The School of Nursing prepares advanced practice nurses, leaders, and scholars in nursing, and provides coursework to prepare postbaccalaureate students from other disciplines to become licensed nurses. The M.S. program includes the following areas of study: adult health clinical nurse specialist, children with special health care needs, family nurse practitioner, generalist, gerontological clinical nurse specialist, gerontological nurse practitioner, nurse midwifery, nursing and health care systems administration, nursing education, pediatric clinical nurse specialist, pediatric nurse practitioner, pediatric nurse practitioner/children with special health care needs, psychiatric-mental health clinical nurse specialist, public health nursing, public health nursing/adolescent nursing, and women’s health care nurse practitioner. The area of study the student chooses in the Plan B option is identified as a subprogram on the official transcript.

The Ph.D. program prepares creative and productive scholars in nursing. The postbaccalaureate certificate program is designed for students who wish to become registered nurses and currently hold a baccalaureate (or higher) degree in a field other than nursing. After successful completion of the certificate program, graduates will be eligible to sit for the registered nurse licensure examination. Completion of the graduate coursework included in the certificate program positions students for entry into a graduate degree program in nursing.

Prerequisites for Admission—Applicants must meet the stated requirements of the Graduate School. A successful applicant typically has an undergraduate GPA of 3.00 and a TOEFL score of 586 (240 for computer-based TOEFL). In the M.S. program, licensure as a registered nurse is required. Registered nurses who do not have a bachelor’s degree with a major in nursing are considered if there is sufficient evidence of ability in health promotion, community health nursing, leadership/management, and teaching/counseling. For the Ph.D. program, a master’s degree with a strong background in the physical and/or behavioral sciences or a bachelor’s degree with an exceptionally strong background are required. For the postbaccalaureate certificate program, a bachelor’s degree in a field other than nursing is required. Seven of the Prerequisites for Admission must be completed by December 31, with the ability to complete the remaining prerequisites by the time the program starts the following fall. Prerequisite course information is available online at [www.nursing.umn.edu](http://www.nursing.umn.edu).

Special Application Requirements—For the postbaccalaureate certificate program, two letters of recommendation are required. Selected applicants will be invited for an interview. Admission to the program is competitive and class size is limited to 40 students. The application deadline for the postbaccalaureate program is December 15. Students may apply to the M.S. or Ph.D after successful completion of the postbaccalaureate certificate and the registered nurse licensure examination. Acceptance to the postbaccalaureate certificate program does not guarantee admittance to the M.S. or Ph.D programs in nursing.
For the M.S. degree, two letters of reference and a goal statement are required. GRE General Test scores are required for applicants with narrative transcripts from previous college work. The application deadlines for the M.S. program are August 1, November 1, and January 3. A complete application includes a School of Nursing application and a Graduate School application. For competitive nurse practitioner, clinical nurse specialist, and nurse midwifery areas of study, priority is given to applicants who submit application materials by the November 1 deadline.

For the Ph.D. degree, GRE General Test scores (must have been taken after fall 2002 that include the computer-scored analytical writing test), two letters of reference, and a profile essay are required. The application deadline for the Ph.D. program is October 1 for the following fall semester.

Courses—Please refer to Nursing (Nurs) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses are not routinely accepted on degree program forms. 

Postbaccalaureate Certificate Requirements

This is a 16-month full-time program with no options for part-time study. The curriculum includes 5 courses (14 credits) that can be applied to the master’s degree in nursing and 6 courses specifically designed for the postbaccalaureate program. After completion of the certificate program, students are eligible to take the National Council Licensing Examinations (NCLEX) for registered nurses. Graduates of the program are encouraged to apply for the M.S. in nursing (RN licensure is a requirement for entry in to the M.S. degree program). Please note that some areas of study in the M.S. program require one or more years of clinical experience prior to admission.

Language Requirements—None

M.S. Degree Requirements

The M.S. program prepares students for advanced practice roles that address complex health and illness issues. The program is offered under Plan A and Plan B. Plan A emphasizes research; Plan B prepares students to integrate research into advanced practice roles or leadership positions.

Plan A requires 30 credits: 14 credits in the major, including Nurs 8170—Research in Nursing (3 cr); Nurs 8190—The Discipline of Nursing (3 cr); Nurs 8140—Moral and Ethical Positions in Nursing (3 cr); 6 credits in a minor or related fields; and 10 thesis credits.

Plan B requires a minimum of 30 credits with at least 9 credits of disciplinary core courses; 9 credits of advanced nursing core courses, including Nurse 8194—Problems in Nursing (3 cr); 6 credits of specialty core courses; and 6 credits in related fields. Individual areas of study vary in the number of credits required. See individual area of study information at www.nursing.umn.edu for specific course and credit requirements.

Language Requirements—None.

Final Exam—The final exam is oral.

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.

Nutrition

Contact Information—Nutrition Graduate Program, Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Avenue, St. Paul, MN 55108 (612-624-1290; fax 612-625-5272; nutritiongrad@umn.edu, http://fsn.umn.edu/grad_students/nutri_grad_students.html).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

Linda J. Brady, Food Science and Nutrition, SM
Frank B. Cerra, Surgery, ASM
Agnes S. Csallany, Food Science and Nutrition, SM
Daniel D. Gallagher, Food Science and Nutrition, SM
John H. Himes, Epidemiology, SM
Joseph M. Keenan, Family Medicine and Community Health, ASM
Mindy S. Kurzer, Food Science and Nutrition, SM
Theodore P. Labuza, Food Science and Nutrition, M2
Arthur S. Leon, Kinesiology, SM
Allen S. Levine, Food Science and Nutrition, SM
Mark Lyte, Surgery, ASM
Diane R. Neumark-Sztainer, Epidemiology, SM
Joseph R. Prohaska, Biochemistry and Molecular Biology, Duluth, SM
Marla M. Reicks, Food Science and Nutrition, SM
Mary T. Story, Epidemiology, SM

Adjunct Professor

Mary C. Gannon, Food Science and Nutrition, SM
Julie M. Jones, Food Science and Nutrition, AM

Associate Professor

Margot P. Cleary, Hormel Institute, ASM
Myron D. Gross, Department of Laboratory Medicine and Pathology, SM
Lisa J. Harnack, Epidemiology, SM
Craig A. Hassel, Food Science and Nutrition, SM

Daniel J. O’Sullivan, Food Science and Nutrition, SM
Elizabeth J. Parks, Food Science and Nutrition, SM
Kathryn H. Schnitz, Epidemiology, SM
Cheryl F. Smith, Food Science and Nutrition, SM

Adjunct Associate Professor

Duane Cranksaw, Food Science and Nutrition, AM2
Darlene G. Kelly, Food Science and Nutrition, ASM
Catherine M. Kotz, Food Science and Nutrition, SM
Patricia L. Splett, Food Science and Nutrition, AM2

Assistant Professor

Carrie P. Earthman, Food Science and Nutrition, SM
Andrew P. Flood, Epidemiology, M2
Leonard F. Marquart, Food Science and Nutrition, SM
Mark A. Pereira, Epidemiology, M2
Susan K. Raatz, Medical School, SM
Shalamar Sibley, Endocrine, M2
Lyn M. Steffen, Epidemiology, SM

Adjunct Assistant Professor

Mary K. Schmidl, Food Science and Nutrition, SM
Alice C. Shapiro, Epidemiology, M2

Other

Jamie S. Stang, Epidemiology, AM

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

Curriculum—Nutrition is the study of how nutrients, both essential and non-essential, affect health and all life processes. Consequently, nutrition is an extremely broad field that encompasses physiology, biochemistry, education, public health, and public policy. The nutrition graduate program is interdisciplinary. Advisers and financial support may come from any of the departments or schools in which nutrition graduate faculty reside, including the Department of Food Science and Nutrition (Colleges of Human Ecology and Agricultural, Food and Environmental Sciences), Division of Epidemiology (School of Public Health), Departments of Pediatrics, Surgery, Psychiatry, and Family Medicine and Community Health (Medical School), Department of Kinesiology and Leisure Studies, Department of Biochemistry and Molecular Biology (University of Minnesota, Duluth), Hormel Institute (Austin), V.A. Medical Center (Minneapolis), Mayo Clinic (Rochester), Hennepin County Medical Center (Minneapolis), and Park Nicollet Institute (Minneapolis).

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 year of general chemistry, one semester of 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.

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 professional-rank faculty. The GRE Writing Assessment Test is recommended.

Courses—Please refer to Nutrition (Nutr) and Food Science and Nutrition (FScN) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx Courses toward degree requirements is subject to adviser and director of graduate studies approval.

M.S. Degree Requirements

The M.S. is offered under both Plan A (thesis) and Plan B (non-thesis). Plan A requires a minimum of 20 course credits and 10 thesis credits; Plan B requires a minimum of 30 course credits, including a Plan B project. General requirements include the graduate nutrition core series (three courses), an orientation and presentation skills class, graduate courses in biochemistry, physiology, and statistics, an advanced topics course, and presentation of the thesis or project work. All students also are expected to obtain teaching experience, subject to the policies of the adviser’s department or division.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 6 course credits in nutrition, including FScN 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 FScN 5621, 5622, 5623, and three additional credits in nutrition, including at least one 8xxx course.

Occupational Therapy

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

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; mpro@umn.edu; www.ot.umn.edu). Program office is in 271 Children’s Rehabilitation Center, 426 Church Street S.E., Minneapolis MN, 55455.

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/stepf.asp

Professor

James R. Carey, AM
Associate Professor

Virgil G. Mathiowitz, M2
Erica B. Stern, M2

Assistant Professor

Cheryl A. Meyers, M2
Michael Potegal, AM
Deborah D. Roman, AM

Assistant Clinical Specialist

Paula Beiswenger, AM
Nancy Jo Callinan, AM
Rebecca B. Catterton, AM
Margaret A. Christenson, AM
Elin Schold Davis, AM
Jean Deming, AM
Katherine (Kay) N. Dole, AM
Beth Franzen, AM
Barbara A. Larson, AM
Susan A. Lasoff, AM
Jeanne Lins, AM
Kathleen M. Matuska, AM
Julie A. Mehr, AM
Denise M. Melander, AM
Peggy Mueller, AM
Virginia H. O’Brien, AM
Janelle Johnson Reierson, AM
Jennifer Rosenstiel, AM
Marcia A. Sitz, AM
Margaret VanEckhout, AM
Deborah J. Voydetich, AM

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

Curriculum—The program provides a combination of academic and clinical education that prepares students to be occupational therapy clinicians and researchers. Emphasis is on application of the critical thinking model to diverse areas of practice and to diagnostic groups in both clinic and community settings. Clinical education includes fieldwork in such areas as physical, psychosocial, and developmental disabilities. Research and scholarly projects emphasize investigation of treatment effectiveness. Applications for 2005 admissions were suspended in Fall semester 2004. Please check the Occupational Therapy Web site at www.ot.umn.edu for current status of admissions.

The program is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (PO. Box 31220, Bethesda, MD, 20824-1220; 301-652-AOTA). Graduates of the program may sit for the examination to attain state licensure. Most states require licensure in order to practice; however, state licenses are usually based on the results of this certification exam.

Prerequisites for Admission—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 unusual circumstances, an individual may be admitted who does not meet all of the admissions requirements.

Special Application Requirements—Applicants must submit a program application, including one to three references, and evidence of work or volunteer experience in occupational therapy. Prerequisite coursework in statistics, the biological sciences, developmental and abnormal psychology, and related areas is required. International students must submit evidence of English proficiency; TOEFL scores (550 minimum paper version, 213 minimum computer version), MELAB score of 80, or IELTS score of 6.5. Applications are accepted and reviewed beginning September 15th, and continue until the class is filled (rolling admissions).

Courses—Please refer to Occupational Therapy (OT) and Physical Medicine and Rehabilitation (PMed) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses cannot be used toward degree requirements.
M.S. Plan B Degree Requirements
Students take 57 credits of predetermined academic coursework, 6 project credits (Plan B), and a minimum of 12 credits of fieldwork education. Optional fieldwork education is available in several specialty areas. Required fieldwork must be completed within 24 months of finishing academic coursework. Plan B projects must be completed within three months following fieldwork. There is no minor or related field requirement.

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

Oral Biology

Contact Information—Oral Biology Graduate Program, University of Minnesota, 17-252 Moos Health Sciences Tower, 515 Delaware Street S.E., Minneapolis, MN 55455 (612-624-9123).
For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/stepl.asp.

Professor
Alvin J. Beitz, Veterinary and Biomedical Sciences, SM
Edward C. Combe, Oral Sciences, SM
Ralph DeLong, Oral Sciences, SM
William H. Douglas, Oral Sciences, SM
Robert J. Feigal, Preventive Sciences, SM
James R. Fricon, Diagnostic/Surgical Sciences, M2
Greg R. Germaine, Oral Sciences, SM
Mark C. Herzberg, Oral Sciences, SM
William F. Liljemark, Diagnostic/Surgical Sciences, SM
Patrick W. Mantyh, Preventive Sciences, SM
Nelson L. Rhodus, Diagnostic/Surgical Sciences, SM
Joel D. Rudney, Oral Sciences, SM
Charles F. Schachtele, Oral Sciences, SM
Burton L. Shapiro, Oral Sciences, SM
Donald A. Simone, Oral Sciences, SM
Larry W. Wolff, Preventive Sciences, SM

Associate Professor
Pamela R. Erickson, Preventive Sciences, SM
Robert H. Ophaug, Oral Sciences, SM

Assistant Professor
Mansur Ahmad, Diagnostic/Surgical Sciences, M
Patrick M. Gaffney, Medicine, SM
Rajaram Gopalakrishnan, Oral Sciences, SM
Darryl T. Hamamamoto, Diagnostic/Surgical Sciences, M2
Kim Mansky, Diagnostic/Surgical Sciences, SM
Kathy Moser, Medicine, SM
Kylie J. Walters, Biochemistry, Molecular Biology, and Biophysics, SM

Research Assistant
Ching-Chang Ko, Oral Sciences, SM
Antheus Versluis, Oral Sciences, SM

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

Curriculum—This program is offered by the Department of Oral Sciences in the School of Dentistry and gives students a broad understanding of the development, structure, function, and pathology of the orofacial region. Advanced coursework and research emphasize specialized areas of interest, including salivary glands and secretions, oral microbial ecology and physiology, immunobiology, neurobiology, mineral metabolism and nutrition, pathobiology of oral structures, physical biology of the masticatory system, and development and evaluation of dental materials. Considerable flexibility is encouraged in planning individual programs to accommodate the student’s specific areas of interest, and courses from other disciplines may be included as part of the major.

Prerequisites for Admission—Applicants should have completed requirements for graduation with high standing from dental or medical schools and have a desire to undertake advanced studies in oral biology. In some cases, those who have not obtained the D.D.S. (D.M.D.) or M.D. degree, but who have demonstrated exceptional potential for graduate study, may be admitted for a combined program. Individuals with a bachelor’s or master's degree who can demonstrate an appropriate background and an interest in oral biology are considered.

Special Application Requirements—Applicants must submit three letters of recommendation from persons familiar with their academic and research experience and a statement describing how training in oral biology will help them attain their professional objectives. Students may enter the program in any semester, but fall semester is recommended.

Courses—Please refer to Oral Biology (OBio) in the course section of this catalog for courses pertaining to the program.

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

M.S. Degree Requirements
The M.S. generally requires a minimum of two years, and may be taken as Plan A (with thesis) or Plan B (without thesis); both plans require a total of 30 credits. Students in both plans must complete a minimum of 14 credits in the major, including 4 credits of oral biology topics courses (8021-8028). Courses in the major may be taken from other disciplines with the approval of the adviser and 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 related field program in a related nonclinical discipline (minimum 6 credits). Plan A requires 10 thesis credits and Plan B requires 10 credits of additional coursework and three Plan B papers. The Plan B papers consist primarily of critical reviews of the literature, but at least one must include a laboratory study. Students must maintain a GPA of at least 3.00 in both the major and minor. Only grades of A or B are acceptable in the core courses.

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
Coursework for the Ph.D. is selected to give students a broad background in oral biology plus advanced coursework directly related to students' research interests. Although there is no Graduate School minimum credit requirement for the degree, most 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. The remaining coursework is tailored to the student’s research interests and may be selected from departments and programs outside the oral biology program with the approval of the advisor and director of graduate studies. A minor (minimum 12 credits) in a nonclinical discipline is 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. The preliminary written exam consists of two research proposals, one representing the student’s anticipated thesis research and the other on a topic assigned by the graduate faculty. The preliminary oral exam consists primarily of a defense of the two research proposals described above. Students must also present a seminar describing their thesis research (which is attended by the final oral exam committee) no later than six months before defense of the thesis.

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.

Otologyngology

Contact Information—Department of Otologyngology, 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 up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/stepl.asp.

Professor
George L. Adams, SM
Khalil Ahmed, ASM
Steven K. Juhn, SM
Frank M. Lassman, ASM
Degree Programs and Faculty

Robert H. Maisel, SM
Robert H. Margolis, SM
David A. Nelson, SM
Peter A. Santi, SM

Clinical Professor
Michael M. Paparella, ASM

Adjunct Professor
Stephen L. Liston, AM

Associate Professor
John H. Anderson, SM
Kathleen Ann Daly, M2
Markus Gapany, M2
George S. Goding, Jr., M2
Peter A. Hilger, M2
David B. Hom, M2
Samuel C. Levine, M2
Franklin L. Rinell, M2

Clinical Associate Professor
Barry P. Kimberely, AM2
James D. Sidman, AM2

Assistant Professor
Holly C. Boyer, M2
David D. Hamlar, M2
Jizhen Lin, M2
Rick M. Olland, M2
Frank G. Ondrey, SM
Samuel C. Levine, M2

Graduate School requirements that apply to all major fields.

Curriculum—This program prepares students in both clinical and experimental aspects of otolaryngology. The M.S., M.S.Otol., and Ph.D. degrees require a publishable thesis. Rotations at Fairview-University Medical Center, Minneapolis Veterans Administration Medical Center, Regions Hospital, 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 research laboratories of audiology, auditory electrophysiology, auditory neurophysiology, biochemistry, cancer biology, cell biology and genetics, electronmicroscopy, 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—Please refer to Otolaryngology (Otol) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Otolaryngology does not offer 4xxx courses. Use of 4xxx Courses from other departments is permitted toward degree requirements with the permission of the director of graduate studies.

M.S. Plan A Degree Requirements
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 45 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. 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 required will vary depending on preparation and the research undertaken. Most students take a total of 90 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, 9-177 Weaverdensford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-5151; fax 612-626-2125; pceu@umn.edu; www.pharmacy.umn.edu/pharmaceutics

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
Janet M. Dubinsky, ASM
David J. W. Grant, SM
Ronald J. Sawchuk, SM
Ronald A. Siegel, SM
Raj G. Suryanarayanan, SM
Timothy Tracy, ASM
Timothy S. Wiedmann, SM
Cheryl L. Zimmerman, SM

Adjunct Professor
Rene A. Braeckman, ASM
Keith K. Chan, ASM
William H. Frey II, ASM
Aldo Rescigno, ASM

Associate Professor
William F. Elmqquist, SM

Adjunct Associate Professor
Walid M. Awni, ASM
Michael D. Karol, ASM
Evgenyi Y. Shalaev, ASM
Ray Skwierczynski, ASM
Lian Yu, ASM

Assistant Professor
Belinda Cheung, ASM
Carolyn A. Fairbanks, SM
Timothy S. Wiedmann, SM

Adjunct Associate Professor
Belinda Cheung, ASM
Carolyn A. Fairbanks, SM
Chun Wang, ASM

Pharmaceutics

Use of 4xxx Courses

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, 9-177 Weaverdensford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-5151; fax 612-626-2125; pceu@umn.edu; www.pharmacy.umn.edu/pharmaceutics

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
Janet M. Dubinsky, ASM
David J. W. Grant, SM
Ronald J. Sawchuk, SM
Ronald A. Siegel, SM
Raj G. Suryanarayanan, SM
Timothy Tracy, ASM
Timothy S. Wiedmann, SM
Cheryl L. Zimmerman, SM

Adjunct Professor
Rene A. Braeckman, ASM
Keith K. Chan, ASM
William H. Frey II, ASM
Aldo Rescigno, ASM

Associate Professor
William F. Elmqquist, SM

Adjunct Associate Professor
Walid M. Awni, ASM
Michael D. Karol, ASM
Evgenyi Y. Shalaev, ASM
Ray Skwierczynski, ASM
Lian Yu, ASM

Assistant Professor
Belinda Cheung, ASM
Carolyn A. Fairbanks, SM
Timothy S. Wiedmann, SM
Chun Wang, ASM

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

The Ph.D. requires a minimum of 29 course credits in upper division or 5xxx or 8xxx courses, including 12 credits in a minor or supporting program, and language requirement (or alternatively a collateral field with a minimum of 6 credits). Students must take advanced courses in pharmacognosy, 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 foreign language or a collateral field of knowledge chosen with the consent of the director of graduate studies is required. The choice of option must have the approval of the major adviser.

Pharmacology

Contact Information—Graduate Program in Pharmacology, University of Minnesota, 6-120 Jackson Hall, 321 Church Street, S.E., Minneapolis, MN 55455 (612-625-9997; fax 612-625-8408; Fider@ahc.umn.edu; www.pharmacology.med.umn.edu).

For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

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
Ping-Yee Law, SM
Hon Cheung Lee, SM
Horace H. Loh, SM
Paul R. Pentel, SM
Philip S. Portoghese, SM
Jean F. Regal, Duluth, SM
Virginia S. Seybold, SM
Alan R. Sainio, M2
Sheldon B. Sparber, SM
Sundaram Ramakrishnan, SM
Stanley A. Thayer, SM
George J. Trachte, Duluth, SM
Kendall B. Wallace, Duluth, SM
Timothy F. Walsh, SM
Li-Na Wei, SM
George W. Wilcox, SM
Wellington G. Wood III, SM
Douglas Yee, SM

Associate Professor

Colin R. Campbell, SM
Gregory J. Connell, SM
Earl W. Dunham, SM
Janet Lyn Fitzakerley, SM
Earl W. Dunham, SM
Hiroshi Hsia, SM
Edward T. Knych, Duluth, M2
Carol A. Lange, SM
Rita B. Messing, M2
Duanqing Pei, SM
Lincoln Potter, ASM
Daniel P. Romero, SM
Sabita Roy, SM
Ronald John Shebuski, SM
Elizabeth V. Wattenberg, AM
Kevin D. Wickman, SM

Assistant Professor

Frank H. Burton, SM
Carolyn Ann Fairbanks, SM
Jonathan C. Gewirtz, SM
Jonathan S. Marchant, SM

Along with the program-specific requirements listed below, please review 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 biochemical 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 at any term.

Research Facilities—Graduate faculty members in the pharmacology program have state-of-the-art laboratories located in the Basic Sciences and Biomedical Engineering Building, 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—Please refer to Pharmacology (PhCl) in the course section of this catalog for courses pertaining to this program.

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

M.S. Degree Requirements

Plan A requires a minimum of 20 course credits (14 in pharmacology, and 6 in biochemistry and physiology) and 10 thesis credits. Plan B requires a minimum of 30 course credits (14 in pharmacology, and 16 in...
biochemistry, physiology, and/or other related areas) and a Plan B project.

Students are expected to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.

For more detailed information, contact the director of graduate studies in pharmacology.

Language Requirements—None.

Final Exam—The final exam is oral.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 9 credits in pharmacology approved by the director of graduate studies in pharmacology.

Ph.D. Degree Requirements

The Ph.D. requires a minimum of 21 course credits in the major (excluding the required 24 thesis credits).

Students are expected to maintain a GPA of 3.00. Students who fail to maintain this standard must petition the director of graduate studies for permission to remain in the program.

For more detailed information, contact the director of graduate studies in pharmacology.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits in pharmacology approved by the director of graduate studies in pharmacology. There are no special requirements (e.g., specific courses, written examination).

Philosophy

Contact Information—Department of Philosophy, University of Minnesota, 831 Walter Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455-0310 (612-625-6563; fax 612-625-8380; umphil@umn.edu, Walter Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455-0310). 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—Please refer to Philosophy (Phil) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—All philosophy 4xxx courses are available for graduate credit. Philosophy students may use any 4xxx philosophy course on their graduate degree program, but must register concurrently for a related 1 credit 8xxx workshop to receive graduate credit for the 4xxx course. Students from other majors may register for the related workshop with the permission of the instructor of the 4xxx course.

M.A. Degree Requirements

The M.A. is offered under two plans. Plan A requires 14 course credits in philosophy, 6 course credits outside the department, and 10 thesis credits. Plan B requires 24 course credits in philosophy, 6 course credits outside the department, and three Plan B papers. For details see Philosophy Department Degree Program: MA, 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 departmental review represents passing the preliminary written examination. Successful third-year departmental 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.