Degree Programs and Faculty

Infrastructure Systems Engineering

Contact Information—Center for the Development of Technological Leadership, University of Minnesota, 1300 Second Street, Suite 510, Minneapolis, MN 55454 (612-624-5474; fax 612-624-7510; degrees@cdtl.umn.edu; <www.cdtl.umn.edu>). For up-to-date graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/step1.asp>.

Professor
Andrew Dresscher, M2
Catherine E. French, M2
John S. Guilliver, M2
Joseph F. Labuz, M2
Panos G. Michalopoulos, M2
Michael J. Semmens, M2
Heinz G. Stefan, M2
Vaughn R. Voller, M2

Associate Professor
Randall J. Barnes, M2
Gary A. Davis, M2
Robert J. Dexter, M2
Raymond M. Hozaslki, M2
Arturo E. Schick, M2
Carol K. Shield, M2
Karl A. Smith, M2

Lecturer
Charles Hathaway, AM2
Bradford Haney, AM2
Peter Hilger, AM2
Patrick Hirl, 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 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.

Interdisciplinary Archaeological Studies
Admissions have been suspended for this program.

International Education Minor Only

Contact Information—Director of Graduate Studies, International Education Minor, R. Michael Paige, Comparative and International Development Education, Educational Policy and Administration, University of Minnesota, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-626-7456 or 612-624-1006; r-paige@umn.edu). 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. Burt, 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, Community, and Family 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
Robert C. Serfass, Kinesiology, M

Assistant Professor
Kay A. Thomas, Educational Psychology, M

Assistant Professor
Deanne L. Magnusson, Educational Policy and Administration, M
Kyla L. Wahlstrom, Applied Research and Educational Improvement, M
Degree Programs and Faculty

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; Work, Community, and Family Education; School of Kinesiology; and 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. Admission to the minor program is limited and only by permission of the International Education Committee and the director of graduate studies. Students interested in this option are welcome to consult with the director of graduate studies.

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 and Educational Exchange (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: AFEE 5351, CI 5055, 5747, EdHD 5001, EdPA 5032, 5048, 5080, 5101, 5102, 5104, 5121, 5132, EPsy 5101, 5112, 5113, 5401, 5431, 5432, 5461, 8403, HRD 5408, 5496, HRD/WCFE 5821, Kin 5371, 8607, WCFE 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 612-624-6733; wcollins@umn.edu).

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

Regents Professor
Eileen S. Bershcheid, Psychology, M

Professor
W. Andrew Collins, Child Development, M
Nicki R. Crick, Child Development, M
Byron Egeland, Child Development, M
Patricia A. Frazier, Psychology, M
Harold D. Groveman, Family Social Science, M
Dean E. Hewes, Communication Studies, M
James W. Maddock, Family Social Science, M
Anthony D. Pellegrini, Educational Psychology, M
Mark Snyder, Psychology, M
L. Alan Sroufe, Child Development, M
Ruth G. Thomas, Work, Community, and Family Education, M

Assistant Professor
Terry A. Kinney, Communication Studies, M
Ascan F. Koerner, Communication Studies, M
Richard M. Lee, Communication Studies, M
Shigehiro Oishi, Communication Studies, M

Curriculum—The minor in interpersonal relationships research provides doctoral students with a broad theoretical and methodological foundation for research on behavioral interaction patterns between two persons and the impact of these interactions. A recently recognized and rapidly advancing interdisciplinary field of scientific inquiry, interpersonal relationships research has its roots in psychology, sociology, family studies, communication, and nursing. The program brings together faculty and students from eight University departments and schools.

Prerequisites for Admission—Admission to the interpersonal relationships research graduate minor is contingent upon prior admission to the Graduate School and to a doctoral program in a degree-granting department. Admission to the minor program is limited and only by permission of the director of graduate studies in interpersonal relationships research.

Courses—Please refer to Interpersonal Relationships Research (IRel) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—4xxx courses, other than those required by the program, are permitted based on director of graduate studies approval.

Minor Only Requirements
The doctoral minor requires at least 14 graduate credits, including three required core courses and additional elective courses selected from an approved list. The required courses are IRel 8001 (2 credits), 8021 (2 credits), and Psy 5204 (3 credits).

Italian
See French and Italian.

Japanese
See Asian Languages and Literatures.

Journalism
See Mass Communication.

Kinesiology
Contact Information—Suzannah Mork, Coordinator of Graduate Studies, School of Kinesiology, University of Minnesota, 219 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-6719, 612-625-5300; fax 612-626-7700; kin@umn.edu; <http://education.umn.edu/kine>.

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

Professor
Fred S. Apple, Laboratory Medicine and Pathology, AM.
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
Michael Wade, SM
Albert Yonas, Child Development, AM2

Associate Professor
Bruce D. Anderson, SM
James R. Carey, Physical Medicine and Rehabilitation, AM2
Donald Dengel, SM
Juergen Konczak, SM
Virgil G. Mathiowetz, AM2
Robert C. Serfass, SM
Thomas Stoffregen, SM
Diane M. Wiese-Bjornstal, SM

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

Assistant Professor
Down A. Lowe, Biochemistry, AM2
Kathryn Schmitz, Epidemiology, AM2

Lecturer
JoAnn Buysse, M2
Christopher Draheim, M2
Stacy Ingraham, M2
James Larson, M2
Ayndley Smith, AM2
Thomas J. Smith, M2

Senior Fellow
Victor S. Koshcheev, M2

Research Associate
Carol Leitschuh, M2

Other
Anthony Brown, Recreational Sports, AM2
Paul E. Cassily, AM2
Carol Gruber, Athletics, 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 to all major fields.

The master’s and doctoral programs are adapted to all major fields.

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

99
Degree Programs and Faculty

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 kinesiology application form; a 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; a scholarly paper; and copies of official transcripts. Students may apply at any time; however, submission of all application materials by January 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 Sensorimotor Control Laboratory; Gait and Posture Laboratory; Laboratory of Physiological Hygiene and Exercise Science; 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.

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

The M.A. is offered under Plan A and Plan B. Plan A requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field, and 10 thesis credits (8777). Plan B also requires 30 credits, including at least 14 course credits in kinesiology, 6 course credits in a minor or related field, 4 credits of a research project (8995), and 6 additional credits in any of these areas. For both Plan A and Plan B, students must take Kin 5981 (3 credits), Kin 8980 (1 credit), and in the related field or minor, EPsy 5261 (3 credits) or EPsy 8261 (3 credits) or equivalent. A 3.00 GPA of at least 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/neural control, exercise physiology, human factors/ergonomics, motor learning/development, sport management, sport psychology, or sport sociology.

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

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires at least 12 credits of graduate-level kinesiology courses, including 5171 (3 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 (612-625-6860; fax 612-625-0710; gsland@umn.edu; www.cala.umn.edu /landscape_architecture). 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
Clinton Hewitt, M2
John A. Koepke, M2
Robert D. Sykes, M2

Assistant Professor
Rebecca J. Krinke, M2
Kristine F. Miller, M2

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

Lecturer
Dean F. Abbott, M2
Jim Gordon Hagstrom, AM
L. Peter Macdonagh, AM
Aaron A. Mikonowicz, AM

Senior Research Fellow
M. Christine Carlson, 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 proficient 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.).

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 15 for entry the following fall. In addition to submitting the standard application form to the Graduate School, the following additional materials must be sent directly to the department: a copy of the applicant’s completed standard 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 encouraged. 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 in their letter of intent an interest in being evaluated for advanced standing. The GRE is not required for entry but can be helpful to applicants seeking fellowships and assistantships. Students are admitted only for the fall term.

M.S. prospective students may apply at anytime, however application by January 15 is strongly encouraged to ensure priority consideration for fellowships and assistantships awarded for the next academic year. The department requires GRE scores, with the essay option for the analytical portion preferred; a statement of intent outlining research objectives that also indicates whether the applicant is interested in financial aid; 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 faculty advisers. Students can be admitted any term.

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

Use of 4xxx Courses—Inclusion of 4xxx courses in degree programs is subject to approval by 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, 89 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 a design portfolio.

M.L.A./M.U.R.P. Plan B Dual Degree Requirements
This option allows students to earn both a master of landscape architecture (M.L.A.) and a master of urban and regional planning (M.U.R.P.) by careful coordination of coursework. Typically, students will be able to achieve both professional degrees in three and a half to four years by cross-counting specified courses. The specific M.U.R.P. specializations for which this option is most appropriate are land use/urban design, housing and community development, and environmental planning.

Students may elect the Plan A option as part of the dual degree, but doing so will require slightly more time to complete both degrees. Consult with the director of graduate studies for details.

To meet the LAAB standards, 88 graduate credits are required to earn an M.L.A., including 36 credits of landscape architecture studio courses, 3 credits of research issues and methods, 9 elective credits (which may be chosen from a list of selected M.U.R.P. program courses), and 40 credits of history, theory, and technology courses. A maximum of 18 credits taken to fulfill M.U.R.P. degree requirements may also be counted toward fulfillment of the M.L.A. degree requirements. Please refer to the urban and regional planning program for M.U.R.P. degree requirements.

M.S. Plan A Degree Requirements
The M.S. is for students with a clear focus in research related to landscape architecture. M.S. students build expertise related to the practice of landscape architecture as they learn how to conduct research. Students specialize within areas of faculty expertise, which may include art and landscape architecture, landscape ecology, landscape architectural history and theory, park and recreation design, rural and suburban landscape planning, transportation, planning of world heritage sites, and urban design.

The M.S. requires 30 credits, including at least 6 credits within landscape architecture, 10 thesis credits, and at least 6 credits in an area of focus outside of landscape architecture.

Language Requirements—None.

Final Exam—The final exam is oral.

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

Law

Minor Only
Contact Information—Meredith M. McQuaid, Associate Dean of Students and Director of International and Graduate Programs, 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
David P. Bryden (emeritus), M
Dan Burk, M
Ann Burkhart, AM
Jim Chen, AM
Carol Chomsky, E
Laura Cooper, AM
John J. Couid (emeritus), M
Donald Dripps, AM
Daniel A. Farber, AM
Barry C. Feld, AM
Mary L. Fellows, AM
Richard S. Frase, AM
Daniel J. Gifford, AM
Joan S. Howland, AM
Robert J. Levy (emeritus), AM
Donald G. Marshall, AM
John H. Matheson, AM
C. Robert Morris (emeritus), M
Fred L. Morrison, AM
Michael S. Paulsen, AM
Ferdinand P. Schoettle, Jr., AM
Robert A. Stein, AM
Michael Tonry, AM
David Weissbrodt, AM
Susan Wolf, M
Judith T. Younger, AM

Other
Beverly Balos, AM
Maury S. Landsman, AM
Meredith M. McQuaid, M
Kathryn J. Sedo, AM
Stephen M. Simon, AM
Carl M. Warren, AM

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

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

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

Minor Only Requirements
A master’s minor requires at least 6 graduate credits; a doctoral minor requires at least 12 graduate credits.

Latin
See Classical and Near Eastern Studies.
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—In addition to a bachelor’s degree, students must indicate an ability to succeed in graduate study.

Special Application Requirements—A statement of purpose, letters of support, an undergraduate transcript, 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, 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; LILES@umn.edu).

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

Professor
Genevieve J. Escure, English, AM2
Jeanette K. Gundel, SM
Michael B. Kac, Philosophy, SM
Michael P. Maratos, Child Development, AM2
John D. Nichols, American Indian Studies, AM2
Amy L. Sheldon, Communication Studies, SM

Associate Professor
Bruce T. Downing, SM
Charles R. Fletcher, Psychology, AM2
G. Lee Fullerton, German, Scandinavian, and Dutch, AM
Betsy K. Kerr, French and Italian, AM2
Carol A. Klee, Spanish and Portuguese Studies, AM2
Maria D. Sera, Child Development, AM2
Nancy J. Stenson, SM
Polly E. Szatrowski, AM2

Assistant Professor
Hooi 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 interpretation of human language and the parameters that determine degree and manner of variation across languages. These core areas of language structure constitute the foundation for other subfields of linguistics, including psycholinguistics, sociolinguistics, historical linguistics, and computational linguistics.

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 (phonetics, 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 5301 (4 cr). Students who have had these courses or their equivalents as undergraduates can substitute other linguistics courses. The M.A. minor requires at least 9 credits.

Ph.D. Degree Requirements

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

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 complete 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 4xxx 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 5301. 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 Interdisciplinary Studies of Writing, University of Minnesota, 227 Lind Hall, 207 Church Street S.E., Minneapolis, MN 55455 (612-626-7579; fax 612-626-7580; cisw@umn.edu; <http://cisw.cla.umn.edu/minor/index.html>).

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

Professor

Josef L. Altholz, History, M
Richard W. Beach, Curriculum and Instruction, M
Lilian S. Bridwell-Bowles, English, M
Karylin 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
Mary M. Lay, Rhetoric, M
Earl E. McDowell, Rhetoric, M
Nancy L. Roberts, Journalism and Mass Communication, M
Donald J. Ross, Jr., English, M
Edward Schiappa, Communication Studies, M
Amy L. Sheldon, Communication Studies, 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. Wahlsstrom, Rhetoric, M
Arthur E. Walzer, Rhetoric, M

Associate Professor

Lisa Albrecht, General College, M
Daniel Brewer, French and Italian, M
Robert L. Brown, Jr., Cultural Studies and Comparative Literature, M
Patricia L. Cleaves, English, M
Rebecca L. Krug, English, M
Amy M. Lee, General College, M
Carole A. Miller, American Studies, M
Rosemarie J. Park, Rhetoric, Work, Community, and Family Education, M
Geoffrey Sirc, General College, M
Diane J. Tedick, Curriculum and Instruction, M
Constance L. Walker, Curriculum and Instruction, M
Susan M. Watts-Taffe, Curriculum and Instruction, M
Kirt H. Wilson, Communication Studies, M

Assistant Professor

Thomas E. Augst, English, M
Lee-Amm Kastan Breach, Rhetoric, M
Patrick Bruce, General College, M
Richard J. Graff, Rhetoric, M
Julie Kalnin, Curriculum and Instruction, M
John Logue, Rhetoric, M
Gwendolyn Pough, Women’s Studies, M
Thomas J. Reynolds, General College, M
Thomas Wolfe, History, 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—Admission is competitive and restricted to a number that will allow for a quality experience. Entrance to the minor is granted only 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 post-secondary transcripts, and two letters of recommendation. Deadlines for application materials are October 15 and March 15, although applications will be reviewed on a rolling basis.

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

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 (12 credits minimum) and one course from each of the following categories: 1) literacy theory or practice, including pedagogy; 2) research methods and practices in one of the areas of the minor; and 3) a historical topic, e.g., history of the book, 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, after those three courses have been completed, students must take either a capstone writing seminar specifically offered for the minor, or a seminar that involves a substantial term paper or a completed dissertation chapter on a topic related to the minor.

In order to make the minor interdisciplinary, no more than one of the three courses at the master’s level, or one of the four courses at the doctoral level may be from the student’s home department.

Language Requirements—None.

103
Degree Programs and Faculty

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—Please 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 required. 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) in the course section of this catalog for courses pertaining to the program.

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

M.A. Degree Requirements

The M.A. is offered under both Plan A and Plan B. Plan A requires at least 33 credits, including 15 credits in the major field taken from among designated 5xxx core courses, 6 credits outside the program, and 12 thesis credits. 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 English and at least one foreign language in addition to Spanish and 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 55454-1082 (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
Norman Bowie, Strategic Management, AM2
Phil Bromley, Strategic Management, AM2
Norman L. Chervany, Information and Decision Sciences, M2
William K. Darfee, 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
Francis A. Kalacki, Mechanical Engineering, M2
Ian H. Mainland, Strategic Management, M2
Mary Nichols, Strategic Management, AM2
Dennis L. Polla, Electrical Engineering, M2
Kenneth J. Roering, Marketing and Logistics Management, M2
Rias J. van Wyk, M2

Associate Professor

Douglas Erne, Electrical and Computer Engineering, M2
Karl A. Smith, Civil Engineering, M2

Other

Lockwood Carlson, M2
Kenneth A. Kriz, AM2
James Lenz, 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 in partnership with the Carlson School of Management. 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 manufacturing, pivotal technologies, technology forecasting, project management, quality engineering, management of innovation, 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 enter the program in the fall 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 several off-campus residencies, including one in the Asia-Pacific region; 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 engineering or in a natural science discipline 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, a statement of purpose, and GRE or Graduate Management Admission Test scores (if the applicant already holds a master’s or Ph.D. degree, this test requirement is waived). The professional track record of the applicant weighs heavily in the admissions process. A personal interview with the director of graduate studies 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—Manufacturing Technology Graduate Program, Center for the Development of Technological Leadership, University of Minnesota, 510 West Bank Office Building, 1300 S. Second Street, Minneapolis, MN 55454-1082 (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.
Degree Programs and Faculty

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

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
Graduate Studies Office, School of Journalism and Mass Communication, University of Minnesota, 110 Murphy Hall, 206 Church Street S.E., Minneapolis, MN 55455; 612-625-4054; fax 612-626-8251; sjmcgrad@tc.umn.edu.

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

Professor
Hazel Dicken-Garcia, SM
Ronald J. Faber, SM
Kathleen A. Hansen, SM
Jane E. Kirtley, SM
Chin-Chuan Lee, SM
Nancy L. Roberts, SM
Daniel J. Sullivan, SM
Daniel B. Wackman, SM

Associate Professor
William A. Babcock, SM
Tsang-Kuo Chang, SM
Kenneth O. Doyle, Jr., SM
Donna B. Schwartz, SM
Albert R. Tims, Jr., SM

Assistant Professor
Linus Abraham, M2
Colette Gaiter, M2
Jsun Huh, M2
Linda Jean Kensicki, M2
Shelly L. Rodgers, M2
Gary Schwitzer, M2
Brian Southwell, M2

Instructor
Donald Brazeal, 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. The degree is intended primarily for those who wish to pursue Ph.D. degrees or teaching and research careers, as well as those who wish to enter the communication industry. 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 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 (strategic 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), but not from the GRE. In addition, such students seeking teaching assistantships are required to pass the SPEAK test of spoken-English proficiency prior to appointment. Admission is considered for fall semester only; the application deadline is December 30.

Special Facilities—Special facilities include the Minnesota Journalism Center for Professional Studies, 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—For the master’s program, foreign language study is recommended for students 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, 24 credits in dissertation area courses, and a minimum of 18 credits in other departments.

Language Requirements—Doctoral students pursuing international study are expected to have high language proficiency, or obtain it, in the appropriate area. Doctoral students in other areas are encouraged to consult advisers regarding the appropriateness of language study for their chosen specialization.

Minor Requirements for Students

Majoring in Other Fields—A Ph.D. minor program consists of a minimum of 14 credits in a coherent disciplinary area. Students completing a minor in mass communication are required to take a preliminary written exam covering their coursework.

Materials Science and Engineering
See Chemical Engineering and Materials Science and Engineering.

Mathematics
Contact Information—School of Mathematics, University of Minnesota, 127 Vincent Hall, 206 Church Street S.E., Minneapolis, MN 55455 (612-625-1306; fax 612-624-6702; gradprog@math.umn.edu).

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

Professor
Scott Adams, SM
Stephen B. Agard, SM
Greg W. Anderson, SM
Douglas Arnold, SM
John R. Baxter, SM
Sergei Bobkov, SM
Maury D. Bramson, SM
Maria-Carme Calderer, SM
J. 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 II, SM
Morton E. Harris, SM
Dennis A. Hejhal, SM
Naresh C. Jain, SM
Max A. Jodeit, Jr, SM
Donald W. Kahn, SM
Harvey B. Keynes, SM
Nicola V. Krylov, SM
Walter Littman, SM
John S. Lowengrub, SM
Mitchell B. Luskin, SM
Gennady Lyubeznik, SM
Albert Marden, SM
Richard P. McGehee, SM
William Messing, SM
Norman G. Meyers, SM
Willard Miller, Jr, SM
Richard B. Moeckel, SM
Claudia Neuhauser, Ecology, Evolution, and Behavior, SM
Wei-Ming Ni, SM
Andrew Odlyzko, SM
Peter J. Olver, SM
Hans Othmer, SM
Peter Polacik, SM
Karel L. Prityk, SM
Vicent Reiner, SM
Fernando Reitich, SM
Peter A. Rejto, SM
Joel L. Roberts, SM
Mikhail Safonov, SM
Padil Santos, SM
George R. Sell, SM
Steven I. Sperber, SM
Dennis W. Stanton, SM
David A. Storvick, SM
Vladimir Sverak, SM
Peter J. Webb, SM
Dennis E. White, SM
Ofer Zeitouni, SM

Associate Professor
Jack F. Conn, SM
David L. Frank, SM
Hillel H. Gershenson, SM
Dihua Jiang, SM
Rachel A. Kaske, SM
Nai-Chung Leung, SM
Chester L. Miracle, SM
Wayne H. Richter, SM
Arnd Scheel, SM
Alexander A. Voronov, SM
Jiapang Wang, SM

Assistant Professor
Wojciech Chacholski, SM
Ionut Ciocan-Fontaine, SM
Marcus Keel, SM
Tian-Jun Li, SM
Ezra Miller, SM
Jianhong Jackie Shen, SM
Carlos Tolmasky, 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—Special areas of research include ordinary and partial differential equations; probability; real, complex, harmonic, functional and numerical analysis; differential and algebraic geometry; topology; number theory; commutative algebra; group theory; logic; combinatorics; mathematical physics; and applied and industrial mathematics. The M.S. Plan A includes an emphasis in applied and industrial mathematics. The M.S. Plan B includes an emphasis in mathematics education and an emphasis in actuarial science.

See also control science and dynamical systems, and fluid mechanics, in this catalog for Ph.D. programs that rely heavily on mathematics.

Prerequisites for Admission—A solid background in undergraduate-level mathematics is expected. For students whose goal is the Ph.D. degree, background should include full-year courses in analysis, abstract algebra, and a semester of topology (roughly equivalent to Math 5615H-5616H, 5285H-5286H, and 5345).

Entering students are ordinarily admitted to the master’s degree program. Transfer to the Ph.D. program is made when the Ph.D. preliminary written examination is passed (and does not require earning a master’s degree).

Special Application Requirements—All applicants are expected to submit three letters of recommendation, a score from the GRE Subject (Advanced) Test in mathematics, and a supplementary application form available from the mathematics department. Applicants 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.

Mathematics Education
See Education, Curriculum, and Instruction.

Mechanical Engineering

Contact Information—Mechanical Engineering and Industrial Engineering Graduate Programs, University of Minnesota, 1120 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-2009; fax 612-624-2010; gradinfo@me.umn.edu; <www.me.umn.edu/9>).

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

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

Professor
Roger E. Arndt, Civil Engineering, ASM
Safaallah Benjaafar, SM
John C. Bischof, SM
Perry L. Blackshear (emeritus), ASM
Thomas R. Chase, SM
Jane H. Davidson, SM
Max Donath, SM
William K. Durfee, SM
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 adviser and the director of graduate studies. No 4xxx ME courses may be applied toward the degree.

M.S.M.E. Degree Requirements
The M.S.M.E. requires at least 30 credits, including at least 14 course credits in the major and 6 course credits in a minor or related field. At least 1 credit of graduate seminar and one mathematics/numerical methods course from an approved list must be included in the 30 credits. Also, of the 30 credits, Plan A (thesis) students must enroll for 10 thesis credits. For Plan B (without thesis), students must either take the Plan B course, ME 8951/8953, or must complete one to three Plan B papers, determined in consultation with the adviser.

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

Minor Requirements for Students Majoring in Other Fields—At least 6 credits in mechanical engineering are required for a master's minor.

Ph.D. Degree Requirements
The Ph.D. requires at least 44 course credits, including at least 12 course credits in a minor field or supporting program and at least 2 credits of graduate seminar, along with at least one mathematical/numerical methods course from an approved list; 24 thesis credits are also required.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—At least 12 credits in mechanical engineering is required for a doctoral minor.

Mechanics
See Aerospace Engineering and Mechanics.
usually are admitted fall semester only and admissions are generally 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
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 course (MedC 5600), 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; cmedst@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
Caesar E. Farah, African American and African Studies, M

Evelyn S. Firchow, German, Scandinavian, and Dutch, M
Donna G. Cardamone Jackson, Music, M
Klaus P. Jankowski, 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. Rayeyson, History, M
Robert P. Sojkowsky, 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. Grimstad, 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 Weisberger, 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 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 Tilson, Ecology, Evolution, and Behavior, M

Professor
Iris D. Charvat, Plant Biology, 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

Associate Professor
Randall E. Hicks, Biology, Duluth, 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) course chosen from the list below. The remaining courses also are chosen from this list with the guidance and approval of the director of graduate studies in microbial ecology. The doctoral minor requires 12 graduate credits, 9 credits of which must come from the core courses listed below (contact the director of graduate studies for potential alternatives to these courses). The remaining credits must come from at least two courses chosen from this list, but may not be in the student’s major.

Core Courses: EEB 5053 (4 cr); MicB 4111 (3 cr); MicB 4121 (3 cr); MIMP 8002 (4 cr), Additional Courses: CE 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 (612-625-0212; fax 612-625-5870; <http://cbs.umn.edu/bti/microbialms.html>).

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

Professor Robert J. Brooker, Genetics and Cell Biology, M2 Peter W. Carr, Chemistry, M2 Paul P. Cleary, Microbiology, M2 Gary M. Dunny, Microbiology, M2 Lynda B. Ellis, Laboratory Medicine and Pathology, M2 Anthony J. Faras, Microbiology, M2 Michael C. Flickinger, Biochemistry, M2 James A. Fuchs, Biochemistry, M2 Richard S. Hanson, Microbiology, M2 Alan B. Hooper, Genetics and Cell Biology, M2 Wei-Shou Hu, Chemical Engineering and Materials Science, M2 R. Scott McIvor, Laboratory Medicine and Pathology, M2 Michael J. Sadowsky, Soil, Water, and Climate, M2 Janet L. Schottel, Biochemistry, M2 David H. Sherman, Microbiology, M2 W. Thomas Shier, Medicinal Chemistry and Pharmacognosy, M2 Friedrich Sirenc, Chemical Engineering and Materials Science, M2 Lawrence P. Wackett, Biochemistry, M2

Associate Professor Daniel J. O’Sullivan, Food Science and Nutrition, M2

Assistant Professor Arkady Khodursky, Biochemistry, M2 Claudia Schmidt-Dannert, Biochemistry, 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.

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, 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 (mailing address) (612-624-5947; 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 Khalid Ahmed, Laboratory Medicine and Pathology, SM

Timothy W. Behrens, Medicine, SM

Judith G. Berman, Genetics, Cell Biology, and Development, SM

Peter B. Bittner, Medicine, SM

Bruce R. Blazar, Pediatrics, SM

Paul P. Cleary, Microbiology, SM

Agustin P. Palmasso, 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

Marc K. Jenkins, Microbiology, SM

Vivek Kapur, Veterinary Pathobiology, SM

Tucker W. LeBren, Laboratory Medicine and Pathology, SM
Along with the program-specific requirements listed below, please read the General Information section of this catalog for Graduate School requirements that apply to all major fields.

Curriculum—Students prepare for careers in biomedical research and teaching by completing broad training in molecular biology or biological sciences, and focused specialization in one of three concentrations (microbiology, immunology, or cancer biology). The program offers exceptional research opportunities for graduate training in autoimmunity, biotechnology, cancer biology and therapy, environmental microbiology, genetic engineering of microorganisms, lymphocyte activation and development, microbial pathogenesis, molecular genetics of disease, superantigens, and vascular biology and inflammation.

Prerequisites for Admission—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; a copy of your 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. Applicants are encouraged to apply for fall semester admission only because the core curriculum begins in fall. Applications should be submitted by December 15; those received after that date are considered only if space in the desired program is available.

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.
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.

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 650 or better will be 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 December 1. Graduate studies typically begin in the fall term.

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 is not permitted toward degree requirements.

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

Contact Information—See Veterinary Medicine.

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

Professor

Trevor R. Ames, Clinical and Population Sciences, SM
Alvin J. Beitz, Veterinary Pathobiology, SM
Russell F. Bey, Veterinary Pathobiology, SM
David R. Brown, Veterinary Pathobiology, SM
Agustin P. Dalmasso, Medicine, SM
Mohamed El Halawani, Animal Science, SM
James R. Mickelson, Veterinary Pathobiology, SM
Samuel K. Maheswaran, Veterinary Pathobiology, SM
Vivek Kapur, Veterinary Pathobiology, SM
Alice A. Larson, Veterinary Pathobiology, SM
Samuel K. Maheswaran, Veterinary Pathobiology, SM
James R. Mickelson, Veterinary Pathobiology, SM
Thomas W. Molitor, Clinical and Population Sciences, SM
Michael P. Murtagh, Veterinary Pathobiology, SM
Scott M. O’Grady, Animal Science, SM
John W. Osborne, Animal Science, SM
Students complete 20 course credits and 10 thesis credits; the thesis is based on original laboratory research.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements

The Ph.D. requires a core curriculum of fundamental coursework and laboratory experiences followed by one or more courses in areas of special interest. Considerable flexibility is available for students to construct a program around their own interests. Students also take 12 credits in a minor or supporting program and 24 thesis credits. All students are expected to participate in two continuing series of seminars: one involving reports on current literature and research and the other involving seminars by prominent national and international scientists.

Language Requirements—None.

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).

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
Gayle Graham Yates, AM

Associate Professor

Margaret K. DiBlasio, M

Assistant Professor

David J. Rhee, AM

Lecturer

Anita F. Cholewa, AM

Other

Robert D. Jacobsen, AM
Lyndel L. King, M
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—A bachelor’s degree in biological sciences is required.

Courses—Please refer to Molecular Veterinary Biosciences (MVB) 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 an introductory seminar (MSt 5011, 3 credits) and the museum practices course (MSt 5012, 3 credits). An internship (MSt 5020) is also required. 1 credit for the master’s minor, 6 credits for the doctoral minor.

Music

Contact Information—School of Music, University of Minnesota, 100 Ferguson Hall, 2106 4th Street S., Minneapolis, MN 55455 (phone 612-624-0071; fax 612-624-8001; mus-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 Artyomov, SM
Thomas J. Ashworth, SM
David B. Baldwin, SM
Alexander Braginsky, SM
Michael Cherlin, SM
Margo Garrett, SM
David A. Grayson, SM
Paul A. Haack, SM
Donna C. Jackson, SM
Jeffrey Kimpton, SM
Craig J. Kirchoff, SM
Korey B. Konkol, SM
Thomas S. Lancaster, SM
Alex J. Lubet, SM
Glenda Maurice, SM
Sally O’Reilly, SM
Tanya Remenikova, SM
Rebecca P. Shockley, SM
Everett L. Sutton, SM
D. Clifton Ware, Jr., SM
Lawrence Weller, SM
Judith L. Zaimont, SM

Associate Professor

Dean W. Billmeyer, SM
Mark P. Bjork, SM
David A. Damschroder, SM
Jean Del Santo, SM
Charles E. Furman, 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

Aksosa Addo, M2
Matthew Britzler-Stull, M2
Immanuel Davis, SM
Doug Geers, M2
Keith Lucas Hamann, SM
Mirjana Lausevic, M2
Akira Mori, SM
Kathy S. Romey, M2
David Teachout, M2
David Walsh, M2

Instructor

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

Lecturer

James L. Clute, AM
Jorja Fleezanis, AM
Diagnostic Exams—Music Theory and Music History Placement Exams are administered to students who live more than 200 miles from the Twin Cities. However, you are encouraged to submit GRE scores in order to be eligible for University fellowships. Applicants to other programs are required to submit GRE General Test scores; applicants to other programs are encouraged to submit GRE scores in order to be eligible for University fellowships.

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.

The various degree programs also require the following additional application materials:

<table>
<thead>
<tr>
<th>Degree Objective</th>
<th>Additional Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory (M.A., Ph.D.)</td>
<td>Original papers (tonal and post-tonal analysis)</td>
</tr>
<tr>
<td>Composition (M.A., Ph.D)</td>
<td>Original scores and recordings</td>
</tr>
<tr>
<td>Musicology/Ethnomusicology (M.A., Ph.D.)</td>
<td>Original papers</td>
</tr>
<tr>
<td>Music Education/Therapy (Ph.D.)</td>
<td>Original papers (e.g., research or professional papers). Documentation of at least 3 years of teaching experience, or at least 3500 hours of clinical experience</td>
</tr>
<tr>
<td>Accompanying/Coaching (M.M., D.M.A.)</td>
<td>Audition/Repertoire list</td>
</tr>
<tr>
<td>Conducting (D.M.A.)</td>
<td>Audition/Interview</td>
</tr>
<tr>
<td>Choral Conducting (M.M.)</td>
<td>Audition/Interview</td>
</tr>
<tr>
<td>Church Music (M.M.)</td>
<td>Audition/Interview</td>
</tr>
<tr>
<td>Orchestral Conducting (M.M.)</td>
<td>Audition/Interview</td>
</tr>
<tr>
<td>Wind Ensemble/ Band Conducting (M.M.)</td>
<td>Audition/Interview</td>
</tr>
<tr>
<td>Piano Pedagogy (M.M)</td>
<td>Audition/Interview</td>
</tr>
<tr>
<td>Performance (M.M., D.M.A.)</td>
<td>Audition/Repertoire list</td>
</tr>
</tbody>
</table>

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, you 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.

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 or ethnomusicology (Plan A or Plan B), theory (Plan B only), and composition (Plan B only).

The M.A. in music with emphasis in musicology or ethnomusicology requires 34 credits (24 course credits and 10 thesis credits) for Plan A and 30 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 and ethnomusicology, the final exams are written and oral. For the emphases in theory and composition, the final exam is 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, choral conducting, and church music (choral and organ concentrations).

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. At least one recital is required.

The minimum credit requirement for each emphasis is as follows: 30 credits are required for piano, instrumental performance, harp, guitar, piano pedagogy, orchestral conducting, wind ensemble/band conducting, and choral conducting; 31 credits for church music (choral concentration); 40 credits for church music (organ concentration); 33 credits for organ and voice; 41 credits for accompanying and coaching (two recitals are required); and 37 credits for violin performance and Suzuki pedagogy.

Language Requirements—None.
**Final Exam**—A final oral exam is required that covers coursework and the final project and/or recital.

**D.M.A. Degree Requirements**

For the doctor of musical arts, minimum credit requirements are as follows: 89 credits for piano; 85 credits for instrumental performance, guitar, and conducting; 87 credits for organ and woodwinds; 89 credits for voice; and 93 credits for accompanying and coaching.

The School of Music offers two options for D.M.A. degrees.

The first option requires the minimum credits as outlined above, specifically divided as follows: 32 credits of applied study; 12 credits in musicology/ethnomusicology and theory/composition, with at least one 3-credit course in each area; a minimum of 8 credits directly related to the emphasis (literature, pedagogy, performance practice, conducting, secondary instrument, chamber music, etc.); 9 credits in a supporting program outside of music; 20 recital credits for five recitals; and 4 thesis credits for the D.M.A. project document.

The second option allows students to choose a secondary area of concentration to become professionally prepared in an area that complements the performance major. The secondary area option requires the approval of the student’s adviser and of the director of graduate studies, and is limited to secondary areas approved by the Graduate Committee of the School of Music. Under this option, students perform three doctoral recitals instead of five (12 credits total, at 4 credits each). 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 five 3-credit courses, at least two of which must be 8xxx courses. Students choosing this option apply the 8 credits that result from reducing the number of doctoral recitals from five to three towards 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, or choral conducting—or on an interrelated body of courses—e.g., technology and music, or pedagogy. All 15 credits of a secondary area must be 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 and 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](http://www.grad.umn.edu/faculty_rosters/step1.asp).

**Professor**

Paul A. Haack, M2
Jeffrey Kimpton, M2

**Associate Professor**

Charles E. Furman, M2

**Assistant Professor**

Akosua Addo, M2
Keitha Lucas Hamann, M2
David J. Teachout, 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 education (Plan B only) offers two emphases: music education and music therapy. The music education emphasis involves planning, teaching, learning, and evaluating processes with musical content applied across educational settings. While knowledge of acculturation phenomena is included, applications generally are directed toward structured educational settings. The music therapy emphasis furthers the preparation of professionals who use music to accomplish therapeutic aims. The two emphases are highly compatible and mutually enhancing.

The M.A. is a research-oriented degree with coursework fairly evenly divided between scholarly skill development, musical knowledge and skills, theoretical music education and music therapy content, and applications. 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.

**Prerequisites for Admission**—See Music.

**Special Application Requirements**—See Music.

**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 towards degree requirements is subject to adviser and/or director of graduate studies approval.

**M.A. Degree Requirements**

The M.A. requires 30 course credits: 12 credits in music education/therapy for the major; 10 credits in music; 3 credits of electives from professional education, music, and music education/therapy; and a 5-credit research project.

**Language Requirements**—None.

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

**Nanoparticle Science and Engineering**

**Minor Only**

**Contact Information**—Graduate Minor Program in Nanoparticle Science and Engineering. Integrative Graduate Education and Research Traineeship Program, University of Minnesota, 2101 Mechanical Engineering, 111 Church Street S.E., Minneapolis, MN 55455 (612-625-4028; fax 612-625-4344; nanoigert@me.umn.edu; <www.nanoigert.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**

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
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
Alon McCormick, Chemical Engineering and Materials Science, M
Peter H. McMurry, Mechanical Engineering, M
For up-to-date graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/step1.asp>.

Professor
Dorothy H. Anderson, SM
Mark E. Ascerno, Jr., Entomology, SM
Marvin E. Bauer, SM
Melvin J. Baughman, SM
Robert A. Blanchette, Plant Pathology, SM
Charles R. Blinn, SM
James L. Bowyer, SM
Kenneth N. Brooks, SM
Thomas E. Burk, SM
Stephan P. Carlson, M2
John J. Cogan, Curriculum and Instruction, AM
Edward J. Cushing, Ecology, Evolution, and Behavior, SM
Alan R. Ek, SM
David T. Grinsrud, ASM
Gary R. Johnson, M2
Joseph G. Massey, SM
Leo H. McAvoy, Jr., Kinesiology, SM
Carl A. Mohn (emeritus), ASM
John L. Nieber, Biosystems and Agricultural Engineering, SM
James A. Perez, SM
Alan Stephen Polasky, Applied Economics, SM
Peter B. Reich, SM
C. Ford Runge, Applied Economics, ASM
Simo Sarkarinen, M2
Elmer L. Schmidt, SM
J. L. David Smith, Fisheries, Wildlife, and Conservation Biology, AM2
Susan G. Stafford, SM
Alfred D. Sullivan, M2
Karen Yin, SM

Adjunct Professor
William A. Befort, AM2
Robert G. Haight, AM
Randall K. Kocian, SM
Ronald E. McRoberts, AM
Elon S. Verry, ASM
Jerold E. Winandy, AM
Gary Worry, AM
John C. Zasada, ASM

Associate Professor
Paul V. Bolstad, SM
Fred N. Finley, Curriculum and Instruction, AM
Howard M. Hoganson, SM
Patrick H. Hufnagle, SM
Michael E. Ostry, AM
Shri Ramaswamy, ASM
Steven J. Severtson, AM
Ulrike W. Tschirner, SM

Adjunct Associate Professor
Erwin R. Berglund, AM2
Stephen M. Bratkovich, ASM
Pamela J. Jakes, AM2
Joseph G. O’Brien, AM
Brian J. Palik, AM
Don E. Riemenschneider, AM
Thomas L. Schmidt, ASM

Assistant Professor
David N. Bengston, ASM
Eileen V. Carey, SM
Andrew J. David, SM
Michael C. Demchik, M2
Karyn Eckman, Institute for Global Studies, AM2
Daniel W. Gilmore, M2
Mark H. Hansen, AM2
Sarah E. Hobbs, Ecology, Evolution, and Behavior, AM
Michael A. Kilgore, SM
Veronica H. Long, Extension Teaching Assistant, AM
Kristine F. Miller, Landscape Architecture, AM
Kristen C. Nelson, AM
Harlan D. Petersen, M
Michael R. Reichenbach, Cloquet Forestry Center, M
Robin Shmulsky, M2
Timothy M. Smith, M2
Eric K. Zenner, Forest Resources, M2

Adjunct Assistant Professor
David C. Fulton, Fisheries, Wildlife, and Conservation Biology, ASM
Michael J. Phillips, AM

Research Associate
Allen L. Lunger (emeritus), AM

Research Associate
Dean A. Current, M2
Lee E. Frelich, SM
Jacek Oleksyn, SM
Ingrid E. Schneider, SM
Robert T. Seavey, M
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 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 7 (for fall admission) is encouraged to ensure consideration for fellowships and assistantships. General GRE scores are required. Letters of recommendation are highly recommended. 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), Natural Resources and Environmental Studies (NRES), and Wood and Paper Science (WPS) in the course section of this catalog.

Use of 4xxx Courses—Inclusion of 4xxx Forest Resources (FR), Natural Resources and Environmental Studies (NRES), and Wood and Paper Science (WPS) 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. Plan B students design a program, in consultation with faculty members, 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, not including 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; neurosci@umn.edu; <www.neuroscience.umn.edu>). For up-to-date graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/step1.asp>.

Professor
Karen Hsiao Ashe, Neurology, SM
Alvin J. Beitz, Veterinary Pathobiology, SM
David R. Brown, Veterinary Pathobiology, SM
Dwight A. Burkhardt, Psychology, SM
Martyn 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. Ebner, Neuroscience, SM
S. Mbuu Ngata Ernest, Radiology, SM
Robert P. Elde, Biological Sciences, SM
Exam E. El-Fakahany, Psychiatry, SM
William C. Engelhard, Surgery, SM
Martha Pander, 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. Gomeez, Neurology, SM
Rolf Gruetter, Radiology, SM
Boyd K. Hartman, Psychiatry, SM
William G. Iacono, Neurology, SM
Paul A. Iaizoo, Anesthesiology, SM
William R. Kennedy, Neurology, SM
Daniel J. Kersten, Psychology, SM
Alice A. Larson, Veterinary Pathobiology, SM
Ping-Yee Law, Pharmacology, 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. Mese, Entomology, SM
Robert F. Miller, Neuroscience, SM
Charles A. Nelson, Child Development, SM
Eric A. Newman, Neurology, 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. Othmer, Mathematics, SM
J. Bruce Overmier, Psychology, SM
Richard E. Poppele, Neuroscience, SM
Philip S. Portoghese, 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
Scott Selleck, Pediatrics, Genetics, Cell Biology, and Development, SM
Virginia S. Seybold, Neuroscience, SM
John F. Sockehting, Neuroscience, SM
Peter W. Sorensen, Fisheries and Wildlife, SM
Sheldon B. Sparer, Pharmacology, SM
Stanley A. Thayer, Pharmacology, SM
David D. Thomas, Biochemistry, SM
Kamil Ugurul, Radiology, SM
Catherine Verfaillie, Medicine, SM
Neal F. Viemeister, Neurology, SM
George L. Wilcox, Pharmacology, SM

Associate Professor
John H. Anderson, Otolaryngology, SM
James Ashe, Neuroscience, SM
W. Dale Branton, Neuroscience, M2
Patricia L. Furis, Psychiatry, SM
S. Hossein Fatemi, Psychiatry, SM
Janet L. Fitzzakerley, Pharmacology Duluth, SM
Jurgen F. Fohlmeister, Physiology, SM
Sheng He, Psychology, SM
Christopher N. Honda, Neuroscience, SM
Eric Javel, Otolaryngology, SM
Jurgen Konczak, Kinesiology, SM
Linda K. McLoon, Ophthalmology, SM
Moses K. Njenga, Veterinary Pathobiology, SM
Jose V. Pardo, Psychiatry, SM
Giuseppe Pellizier, Neuroscience, SM
Donald A. Simone, Oral Sciences, SM
Govind T. Vattassery, Psychiatry, SM
Martin W. Wessendorf, Neuroscience, SM

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

Assistant Professor
Bagrat Amrinnan, Neuroscience, M2
Vincent A. Barnert, Physiology, SM
Linda M. Boland, Neuroscience, SM
Frank H. Burton, Pharmacology, SM
Jean M. Ding, Medicine, SM
Carolyne Fairbanks, Pharmaceutics, Pharmacology, and Neuroscience, SM
Rod M. Federsten, Veterinary Pathobiology, SM
Jonathan Gewertz, Psychology, SM
Dae-Shik Kim, Radiology, SM
Paulo Kofuji, Neuroscience, SM
Michael Koob, Neurology, SM
Lorenne Lamers, Neuroscience, SM
Scott M. Lewis, Neurology, M2
Dzezi Liao, Neuroscience, SM
Paul G. Mermelstein, Neuroscience, SM
A. David Redish, Neuroscience, SM
Kevin D. Wickman, Pharmacology, SM
Lance Zirpel, Neuroscience, SM

Research Associate
Jon Gottesman, Neuroscience, 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—Neuroscience is an interdisciplinary field of inquiry. The objects of this inquiry, the brain and nervous system, are sufficiently complex and unique among biological systems to require experimental and analytical approaches that cross the traditional boundaries of molecular and cellular biology, behavioral biology, biochemistry, genetics, pharmacology, physiology, and psychology. In some instances, neuroscience inquiry may also encompass computer science, information processing, engineering, physics, and mathematics. The neuroscience Ph.D. curriculum begins in the summer session with the intensive laboratory course in cellular and molecular neurobiology (NSc 5551), held at the Lake Itasca Biological Station. The core curriculum continues on the Twin Cities campus with NSc 5461, 5481, 5561, 5661, and 8211. While taking these courses, students explore research opportunities in the faculty’s laboratories (NSc 8334) and thereby select a thesis adviser. Most students take a course in cell biology (such as Biol 4004) in the first semester because the coursework is expected to include statistical analysis of data, a course in statistics (such as Stat 5021) is required.

Elective courses and at least 12 credits in a minor or supporting program are selected in consultation with the adviser (typical minors include cell biology, physiology, statistics, psychology, and medicine; medicine is primarily for students in the M.D./Ph.D. program). Students with sufficient background and previous course experience may apply for a waiver of specific requirements. Proficiency in at least one computer programming language is highly recommended.

Students are also encouraged to participate in teaching neuroscience and to attend the weekly colloquium as well as neuroscience seminars and sessions devoted to professional development. Students are strongly encouraged to attend seminars in other areas and departments that may interest them.
Prerequisites for Admission—Applicants to the Ph.D. program must have a bachelor’s degree or its foreign equivalent from a recognized college or university. Undergraduate coursework should include instruction in several of the following disciplines: biology, neuroscience, mathematics, physics, chemistry, and psychology.

Special Application Requirements—Applicants are required to take the GRE General Test. The Subject Test appropriate to their field of emphasis is optional. Foreign students must take the TOEFL and obtain a minimum score of 550.

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

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

M.S. Plan A Degree Requirements
The course requirements for a master’s are the same as those for a Ph.D. degree. They are described under Curriculum (above).

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

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor program is developed in consultation with the director of graduate studies for neuroscience. Students must take one of NSc 5461, 5561, or 6111 and elective courses in neuroscience, for a minimum of 12 credits (including core courses).

Nursing
Contact Information—Jennifer Rosand, 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; urseo@umn.edu)

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

Professor
Lyn Bearinger, SM
Joanne Disch, AM
Sandra Edwardson, SM
Cynthia Gross, SM
Felicia Hodge, SM
Barbara Leonard, SM
Mariah Snyder (emeritus), ASM
Jean Wyman, SM

Associate Professor
Melissa Avery, SM
Donna Bliss, SM
Laura Duckett, SM
Karen Feldt, SM
Ann Garwick, SM
Helen Hansen, SM
Susan Henly, SM
Ann Jones, AM
Merrie Kaas, SM
Madeleine Kerr, SM
Kathie Krishbaum, SM
Marsha Lewis, SM
Betty Lia-Hoagberg, SM
Joan Liaschenko, SM
Linda Lindke, SM
Ruth Lindquist, AM
Marilee Miller, AM
Christine Mueller, SM
Cynthia J. Pedersen-Alpine, SM
Janice Post-White, SM

Assistant Professor
Diane Bohn, M2
Linda Chlan, M2
Kathleen Fagerlund, AM
Linda Gerdner, M2
Laila Gulzar, M2
Linda Halcon, SM
Elizabeth Kraatz, M2
Mary Jo Kreitzer, AM
Martha Kubik, AM
Margaret Moss, M2
Carol O’Boyle, M2
Cheryl Robertson, M2
Elizabeth Saewyc, M2
Renee Sieving, AM
Roxanne Struthers, M2
Diane Treat-Jacobson, M2
Gretchen Zunkel, M2
Karen Alaniz, AM
Linda Herrick, AM
Catherine Jave, M2
Jennifer Peters, AM
Mary Rowan, M2
Kay Savik, AM
Lynn Sprayberry, 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 healthcare systems administration, nursing education, oncology nursing, 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, public health nursing/school 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, including a minimum undergraduate GPA of 3.00 and a minimum TOEFL score of 586 (240 for computer-based TOEFL). In the M.S. program, licensure as a registered nurse and a bachelor’s degree with a major in nursing is required. Applications from students with a bachelor’s degree in another field will be considered if there is sufficient evidence of ability in health promotion, community health nursing, leadership/management, teaching/counseling, and systematic investigation. 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.

Ph.D. program course information is available online at <www.nursing.umn.edu>.

Special Application Requirements—For the postbaccalaureate certificate program, two letters of recommendation are required. The GRE is not required. Selected applicants will be invited for an interview. Admission to the program is competitive and class size is limited to 24 students. The application deadline for the postbaccalaureate program is December 15. Students may apply to the M.S. 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. program 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 15 (spring semester), December 15 (summer), and February 15 (fall semester). 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 December 15 deadline.

For the Ph.D. degree, GRE General scores, two letters of reference, and a statement of goals, objectives, and research interest are required. The application deadline for the Ph.D. program is December 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. However, CPsy 4303—Adolescent Psychology is used on M.S. programs for public health/adolescent nursing.

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 into 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 nursing 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 8100—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; 12 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. 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 37 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; nutgrad@umn.edu; <http://fscn.che.umn.edu/nutgrad/>).

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

Professor
Paul B. Addis, Food Science and Nutrition, SM
Linda J. Brady, Food Science and Nutrition, SM
Judith E. Brown, Epidemiology, SM
Frank B. Cerra, Surgery, ASM
Agnes S. Csalany, Food Science and Nutrition, SM
Daniel D. Gallagher, Food Science and Nutrition, SM
John H. Himes, Epidemiology, SM
Joseph M. Keenan, Family Practice and Community Health, ASM
Mary C. Gannon, SM
Mindy S. Kurzer, Food Science and Nutrition, SM
Theodore P. Labuza, Food Science and Nutrition, M2
Arthur S. Leon, Kinesiology, SM
Gerald R. Schilling, Food Science and Nutrition, SM
Joanne L. Slavin, Food Science and Nutrition, SM
Mark Lyte, Surgery, SM
Joseph R. Prohaska, Biochemistry and Molecular Biology, Duluth, SM
Marla M. Reicks, Food Science and Nutrition, SM
Joanne L. Slavin, Food Science and Nutrition, SM
Mary T. Story, Epidemiology, SM

Adjunct Professor
Mary C. Gannon, SM
Julie M. Jones, AM

Associate Professor
Margot P. Cleary, Hormel Institute, ASM
Lisa J. Harnack, Epidemiology, SM
Craig A. Hassel, Food Science and Nutrition, SM
Diane R. Neumark-Sztainer, Epidemiology, SM
Daniel J. O’Sullivan, Food Science and Nutrition, SM
Cheryl F. Smith, Food Science and Nutrition, SM

Adjunct Associate Professor
Darlene G. Kelly, Food Science and Nutrition, ASM
Catherine M. Kott, Food Science and Nutrition, SM
Patricia L. Spett, Food Science and Nutrition, AM2

Assistant Professor
Leonard F. Marquart, Food Science and Nutrition, SM
Elizabeth J. Parks, Food Science and Nutrition, SM
M. Kathryn Schmitz, Epidemiology, SM
Lyn M. Steffen, Epidemiology, SM

Adjunct Assistant Professor
Mary K. Schmidl, Food Science and Nutrition, AM2
Alice C. Shapiro, Epidemiology, M2

Senior Research Associate
Susan K. Raatz, Medical School, SM

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), Department of Family Practice and Community Health and the Department of Surgery (Medical School), School of Kinesiology (College of Education and Human Development), Hormel Institute (Austin, MN), and Veterans Administration Hospital (Minneapolis, MN).

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 professorial-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, 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, 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 advisor'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
Contact Information—Program in Occupational Therapy, University of Minnesota, 388 MMC, 420 Delaware St. S.E., Minneapolis, MN 55455 (612-624-5887; fax 612-624-7192; otprog@umn.edu; <http://www.ot.umn.edu>). Program office is in 271 Children’s Rehabilitation Center, 426 Church St. S.E., Minneapolis, MN, 55455.

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

Associate Professor
James R. Carey, AM
Virgil G. Mathiowetz, M2
Erica B. Stern, M2

Assistant Professor
Diane R. Anderson, M2
Cheryl A. Meyers, M2
Michael Potegal, AM
Deborah D. Roman, AM

Assistant Clinical Specialist
Nancy Jo Callinam, AM
Rebecca B. Catterton, AM
Margaret A. Christenson, AM
Elin Schold Davis, AM
Katherine (Kay) N. Dole, AM
Vickie I. Lange, AM
Barbara A. Larson, AM
Susan A. Lasoff, AM
Kathleen M. Matuska, AM
Julie A. Mehr, AM
Denise M. Melander, AM
Peggy Mueller, AM
Virginia H. O’Brien, AM
Jennifer Rosenstiel, AM
Marci A. Sitz, AM
Margaret VanEckhout, AM
Deborah J. Voydetch, AM

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

Curriculum—The program provides a combination of academic and clinical education that prepares students to be occupational therapy clinicians and researchers. Emphasis is on application of the critical thinking model to diverse areas of practice and to diagnostic groups in both clinic and community settings. Clinical education includes fieldwork in such areas as physical, psychosocial, and developmental disabilities. Research and scholarly projects emphasize investigation of treatment effectiveness.

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

Prerequisites for Admission—Individuals with a bachelor’s degree in any field other than occupational therapy, or those who will have completed their bachelor’s degree before entering the program, may apply. Students may be admitted pending successful completion of outstanding prerequisite coursework with the understanding that the missing course(s) will be completed before beginning the program. Occasionally, under extenuating circumstances, an individual may be admitted who does not meet all of the admissions requirements.

Special Application Requirements—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 pertain to the program.

Use of 4xxx Courses—4xxx courses cannot be used toward degree requirements.

M.S. Plan B Degree Requirements
Students take 56 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/step1.asp>.

Professor
Alvin J. Beitz, Veterinary Pathobiology, SM
Edward C. Combe, Oral Sciences, SM
Ralph DeLong, Oral Sciences, SM
William H. Douglas, Oral Sciences, SM
James Ryan Friction, Diagnostic/Surgical Science, M2
Gregory R. Germaine, Oral Sciences, SM
Mark C. Herzberg, Oral Sciences, SM
William F. Lilienmark, Diagnostic/Surgical Sciences, SM
Patrick W. Mantyh, Preventive Sciences, SM
Joel D. Rudney, Oral Sciences, SM
Charles F. Schachtele, Oral Sciences, SM
Burton L. Shapiro, Oral Sciences, SM
Larry F. Wolff, Preventive Sciences, SM

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

Assistant Professor
Darryl T. Hamammoto, Diagnostic/Surgical Science, M2
Lois Jean Kehl, Anesthesiology, SM
Ching-Chang Ko, Oral Sciences, SM
Kathy Moser, Medicine, SM
Antheunis 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 Science 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
Degree Programs and Faculty

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 the director of graduate studies. Registration and participation in the oral biology student seminar series (8030) is required each semester. Students must also complete a minor or related field program in a related nonclinical discipline (minimum 6 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.

Minor Requirements for Students Majoring in Other Fields—A Ph.D. minor in oral biology consists of 12 credits, at least two advanced courses in oral biology, and other coursework in consultation with the director of graduate studies.

Otolaryngology
Contact Information—Department of Otolaryngology, University of Minnesota, MMC 396, 420 Delaware Street S.E., Minneapolis, MN 55455 (mailing address) (612-625-3200; fax 612-625-2101; <www.med.umn.edu/otol/>)

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

Professor
George L. Adams, SM
Khalil Ahmed, ASM
G. Scott Giebink, AM2
Sung K. Juhn, SM
Frank M. Lassman (emeritus), ASM
Robert H. Maisel, SM
Robert H. Margolis, SM
David A. Nelson, SM
Peter A. Santi, SM

Clinical Professor
Michael M. Paparella, ASM

Associate Professor
John H. Anderson, SM
Lawrence R. Boies, Jr., AM2
Kathleen Ann Daly, M2
Markus Gapany, M2
George S. Godin, Jr., M2
Peter A. Halper, M2
David B. Hom, M2
Eric Javel, SM
Samuel C. Levine, M2

Clinical Associate Professor
Barry P. Kimberley, AM2
Stephen L. Lipton, AM1
James D. Sidman, AM2

Assistant Professor
Gail S. Donaldson, M2
David D. Hamlar, M2
Jizhen Lin, M2
Rick M. Oolland, M2
Frank G. Ondrey, SM
Franklin L. Rimell, M2

Assistant Clinical Specialist
Deirdre Michaelenchke, M2

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

Curriculum—This program prepares students in both clinical and experimental aspects of otolaryngology. The M.S., M.S.Otol., and Ph.D. degrees require a publishable thesis. Rotations at Fairview-University Medical Center, Minneapolis Veterans Administration Medical Center, Regions Hospital, and Hemepin 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, electromicroscopy, 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 35 credits, including 25 course credits (19 in the major and 6 in the minor or related fields) and 10 thesis credits. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies. Some courses for the M.S.Otol. are more clinical than those for the M.S., and four years of academic preparation are expected. Students are expected to complete and publish a research paper in a peer-reviewed journal or a presentation/poster at a national scientific meeting.

Language Requirements—None.

Final Exam—The final exams are both written and oral. A grade of 70 percent or higher is expected on a national written exam.

Ph.D.Otol. Degree Requirements
The number of credits required will vary depending on preparation and the research undertaken. Most students take a total of about 55 credits. A minimum of 12 credits in the minor or supporting program, plus 24 doctoral thesis credits, are required. An advisory committee including the student, the adviser, and the director of graduate studies determines coursework in the major. At least one seminar is selected from seminars such as Otol 8247, 8248, 8249, and 8250. Understanding and application of basic statistics and experimental methodology are expected. Statistics coursework is usually necessary. Choice of statistics courses is made with the guidance of the director of graduate studies. All students are expected to publish a research paper in a peer-reviewed journal. Students concurrently in an otolaryngology residency usually take five to six years to complete research, course, and dissertation requirements.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A minor is not available, but otolaryngology courses may be taken for related fields or supporting program credits.

Pharmaceutics

Contact Information—Department of Pharmaceutics, College of Pharmacy, University of Minnesota, 9-177 Weaver-Densford Hall, 308 Harvard Street S.E., Minneapolis, MN 55455 (612-624-5151; fax 612-626-2125; pceuifs@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. Jawchuk, SM
Ronald A. Siegel, SM
Raj G. Suryanarayan, SM
Cheryl L. Zimmerman, SM

Adjunct Professor
Rene A. Braeckman, ASM
William H. Frey II, Pharmacy, ASM
Aldo Rescigno, Pharmacy, ASM

Associate Professor
William F. Elmquist, SM
Timothy S. Wiedmann, SM

Adjunct Associate Professor
Wald M. Awini, ASM
Keith K. Chan, ASM
Michael D. Karol, ASM
Evgeny I. Shalaev, ASM
Ray Skowrondzynski, ASM
Lin Yu, ASM

Assistant Professor
Belinda Cheung, ASM
Carolyn A. Fairbanks, 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—Emphases are available in physical pharmacy, biopharmaceutics and pharmacokinetics. Minor fields of particular value include biochemistry, biometry, chemistry, biomedical engineering, chemical engineering, mechanical engineering, pharmacology, and statistics.

Prerequisites for Admission—The pharmaceutics program considers students who possess a B.S. degree and an exceptional scholastic record from recognized colleges of pharmacy as well as from a relatively wide range of academic fields. For those individuals with a degree other than pharmacy, the program adviser may recommend additional coursework to provide the necessary background in pharmacy.

Special Application Requirements—In addition to undergraduate scholastic records, recent GRE scores, a statement of career goals, and three letters of recommendation are used to determine each candidate’s admissibility. Minimum GRE scores of 80 percentile are required for the quantitative and analytical sections, as well as a minimum GPA of 3.20 from U.S. schools, and “First Class” or the equivalent on transcripts from foreign institutions. A TOEFL score of 600 or higher is required for applicants whose native language is not English. Fall admission is preferred, although admission in the spring semester may be considered. The deadline to apply for fall admission is December 31. (Students who want to know their chances for admission before paying the application fee can use a pre-evaluation feature on the pharmaceutics Web site at <www.pharmacy.umn.edu/pharmaceutics> to determine if their credentials are competitive.)

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

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

M.S. Degree Requirements
Students are not admitted directly into the M.S. program. Ph.D. pharmaceutics students may pursue an M.S. through a change of status request. Students take core courses in pharmaceutics and chemistry. In addition to the coursework, a preliminary written exam and preparation of a thesis and its defense are required. Coursework for the M.S. (Plan A only) includes 14 credits in 5xxx or 8xxx courses in the major and 6 credits in one or more related fields outside the major to comprise a minimum of 20 credits for the degree. A complete list of degree program requirements can be obtained from the director of graduate studies. Additional courses are selected in consultation with the major adviser.

Language Requirements—None.

Final Exam—The final exam is oral.

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 29 course credits in upper division 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 pharmaceutics, chemistry, mathematics, statistics, and pharmacology. A complete list of degree program requirements may be obtained from the director of graduate studies. In addition, students complete a preliminary written exam, a written research proposal based on thesis research, a preliminary oral exam, and finally a thesis and its defense.

Language Requirements—One 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@lenti.med.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
Exum E. El-Fakahany, SM
Patrick E. Hanna, SM
Stephen S. Hecht, SM
Jordan L. Holtzman, SM
Donald B. Hunninghake, SM
Degree Programs and Faculty

Ping-Yee Law, SM
Hon Cheung Lee, SM
Horace H. Loh, SM
Paul R. Pentel, SM
Philip S. Portoghes, SM
Jean P. Regal, Duluth, SM
Virginia S. Seybold, SM
Alan R. Sinaiko, M2
Norman E. Sladek, SM
Sheldon A. Shaber, Duluth, SM
Sundaram Ramakrishnan, SM
Stanley A. Thayer, SM
George J. Trachte, Duluth, SM
Kendall B. Wale, Duluth, SM
Timothy F. Walseth, SM
Li-Na Wei, SM
George L. Wilcox, SM
Wellingo G. Wood III, SM
Douglas Yee, SM

Associate Professor
Colin R. Campbell, SM
Gregory J. Connell, SM
Earl W. Dunham, SM
Janet Lyn Fitzhakerley, SM
Edward T. Knych, Duluth, M2
Rita B. Messing, M2
Duanqing Pse, SM
Daniel P. Rommer, SM
Sabita Roy, SM
Ronald John Shebuski, SM
Elizabeth V. Wattenberg, 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—Pharmacology is the study of the interactions of chemicals with biological systems. Courses and research training in biochemistry, biophysics, genetics, and molecular biology provide a solid foundation for performing original research in pharmacology, neuropharmacology, and cancer chemotherapy.

Prerequisites for Admission—A four-year B.A. or B.S. degree (or its equivalent) in a basic science program is generally required. Candidates for admission are evaluated on the basis of undergraduate record, GRE score, previous research experience, and letters of recommendation.

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

Research Facilities—Graduate faculty members in the pharmacology program have state-of-the-art laboratories located in 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—Further details about the program are on the department’s Web site at <www.philosophy.umn.edu>, and in two publications: Graduate Studies: Philosophy and Department Degree Programs; M.A. and Ph.D., available from the Department of Philosophy, University of Minnesota, 831 Walter Heller Hall, 271 19th Avenue South, Minneapolis, MN 55455-0310 (612-625-6563; fax 612-626-8380; umphil@umn.edu).

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

Professor
John H. Beatty, Ecology, Evolution, and Behavior, ASM
Elizabeth S. Beli fro, Classical and Near Eastern Studies, ASM
Brian Bix, Law, SM
Norman B. Bowie, Strategic Management and Organization, SM
Norman O. Dahl, SM
Marcia M. Eaton, SM
Eugene Garver, ASM
Ronald N. Greer, SM
Jeanette K. Gundel, Linguistics, ESL, and Slavic Languages and Literatures, AM2
Keith Gunderson, MS
William H. Hanson, SM
Geoffrey Hellman, SM
Jasper S. Hopkins, SM
Michael B. Kac, SM
Jeffrey P. Kahn, Public Health, ASM
Douglas E. Lewis, SM
Helen E. Longino, Women’s Studies, SM
H. E. Mason (emeritus), ASM
Joseph L. Owens, SM
Sandia L. Peterson, SM
C. Wade Savage, SM
Naoma B. Sherman, SM
John R. Wallace, SM

Associate Professor
John M. Dolan, SM
Carl Elliott, Public Health, ASM
Sarah W. Holtman, SM
Michael D. Root, SM
C. Kenneth Waters, SM

Assistant Professor
David Martinez, American Indian Studies, AM2
Michelle Mason, M2
Valerie Tiberius, M2
Ryeong-Uk Yi, M2

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

Curriculum—The Department of Philosophy offers both Ph.D. and M.A. degrees. Students are generally admitted to the Ph.D. program, while admission to the M.A. is generally intended for those with professional goals in other fields.

Philosophy is noteworthy for its emphasis on the individual student’s research interests. With the help of an adviser, students design their own program of study, which consists of the philosophy major and either a supporting program or a minor. The minor or supporting program, drawn at least in part from a department or departments other than philosophy, complements the student’s research focus. Students gain a broad base of knowledge through required coursework. Ph.D. students take courses in four main areas: history of philosophy, logic, ELMS (epistemology, philosophy of language, metaphysics, philosophy of science), and value theory. These areas provide a firm foundation for research and teaching beyond the Ph.D. program.
Prerequisites for Admission—Recognizing that evidence of ability to pursue graduate study in philosophy is diverse, the department does not specify prerequisites for admission. Normally, those admitted have a broad undergraduate background that includes some courses in philosophy.

Special Application Requirements—Students must apply to both the Graduate School and the Department of Philosophy. The Graduate School application is available online from the Graduate School Web site. The departmental application for admissions and aid is available from the Committee on Admissions and Aid at the address listed above or may be downloaded from the philosophy Web site.

Department applications should include a completed application form, personal statement, transcripts, scores from the GRE General Test, three letters of recommendation, and a writing sample. 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.

Language Requirements—None.

Final Exam—The final exam 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. After a student has satisfied the logic and history course requirements and passed the three-paper exam, the student’s entire record is reviewed by the faculty. Successful review represents passing the preliminary written exam. Students then write a dissertation proposal, successful defense of which constitutes passing the preliminary oral exam.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires 12 course credits in philosophy approved by the director of graduate studies in philosophy. Programs are tailored to meet the interests and needs of the student.

Physical Education and Recreation

See Kinesiology.

Physical Therapy

Contact Information—Physical Therapy Program Office, MMC 388, University of Minnesota, Minneapolis, MN 55455 (612-624-2262; fax 612-625-7192; ptquest@umn.edu; www.physther.med.umn.edu). For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor

Richard P. DiFabio, SM

Associate Professor

James R. Carey, SM

Glenn N. Scudder, SM

LaDora V. Thompson, SM

Assistant Professor

Paula M. Ludewig, SM

Adjunct Faculty

Scott M. Lewis, AM

Dawn A. Lowe, AM

Robert P. Patterson, AM

Fred A. Wentorf, 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 physical therapy program, a division within the Department of Physical Medicine and Rehabilitation, offers a professional doctoral degree in physical therapy (D.P.T.). Physical therapy is a healthcare discipline involved with the study and rehabilitation of movement impairments such as muscular weakness, joint stiffness, and pain, which can lead to functional problems affecting self care, employment, ambulation, etc. Graduates are prepared to promote proper health care and quality of living by maximizing human movement following disease or injury or by preventing its loss. The program requires three years of year-round graduate study. Academic coursework and research activity are completed during the first seven semesters. The final two semesters are devoted to clinical internships.

Didactic Curriculum—During the first year of the program the curriculum involves the basic sciences, physical agents, biomechanical principles, and clerkship clinical experiences. The second year advances and integrates first-year coursework into evaluation skills, treatment techniques, and critical thinking. These tools are utilized during second-year clerkships in orthopedics, rehabilitation, and wellness.

Clinical Curriculum—Students complete up to 40 weeks of clinical internships in addition to clinical clerkships imbedded in the academic curriculum. The full-time internships occur during the third year of the program. Each student completes clinical affiliations in the following areas: acute hospital, outpatient, rehabilitation, and specialty area. These are under direct supervision of experienced clinical faculty and give each student the opportunity to combine theoretical skills with practical experience. Beyond direct patient care, students also develop skills and knowledge related to administration, management and supervision, education, and consultation. Graduates of the program are eligible to apply for state registration or licensure according to the laws of individual states.

Prerequisites for Admission—To be considered for admission, the student must complete a baccalaureate degree by June 1 of the year of application (no preferred major) and have a minimum overall GPA of 3.00 as well as a GPA of 3.00 in all physical therapy prerequisite coursework. Applications received after June 1 will be considered for the following year. Information and applications, including a list of prerequisite coursework, are available at www.physther.med.umn.edu.

Special Application Requirements—Submission of GRE scores is required. For international students, a TOEFL score of at least 550 is required and the TSE is highly recommended (score of at least 50). The D.P.T. program accepts only applications completed online at www.physther.med.umn.edu.

Courses—Please refer to Physical Therapy (PT) in the course section of this catalog for courses pertaining to the program.

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

D.P.T. Degree Requirements

The program requires 140 major field credits, of which 94 are core academic credits and 46 are clinical internship credits; 9 credits of research are included and an oral presentation based on this research culminates the project. No minor or related field is required. Students must maintain a cumulative GPA of 2.80 while in the program.

Language Requirements—None.
Physicists

Contact Information—Physicists Program, School of Physics and Astronomy, University of Minnesota, 145 Tate Laboratory of Physics, 116 Church Street S.E., Minneapolis, MN 55455 612-624-6366; fax 612-624-4578; grad@physics.umn.edu; <www.physics.umn.edu>.

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

Professor
Benjamin F. Bayman (emeritus), ASM
John H. Broadhurst, SM
Charles E. Campbell, SM
Cynthia A. Catell, SM
James R. Chelikowsky, Chemical Engineering and Materials Science, SM
Hans W. Courant (emeritus), ASM
Priscilla B. Cushman, SM
D. Dan Dahlberg, SM
Kris Davidson, Astronomy, SM
Dietrich K. Dehnhard (emeritus), ASM
Paul J. Ellis, SM
Robert D. Gehrz, Astronomy, SM
Clayton F. Giese (emeritus), ASM
Leonid Glazman, SM
Allen M. Goldman, SM
Anand Gopinath, Electrical and Computer Engineering, ASM
Alexander Grosberg, SM
J. Woods Halley, SM
Keneth Heller, SM
Cheng-Cher Huang, SM
Robert Humphreys, Astronomy, ASM
Thomas W. Jones, Astronomy, SM
James Kakalios, SM
Joseph Kapusta, SM
Uwe R. Kortshagen, Mechanical Engineering, ASM
Yuichi Kubota, SM
Anatoly Larkin, SM
Robert L. Lysak, SM
Marvin Marshak, SM
Keith A. Olive, SM
Robert O. Pepin, SM
Earl A. Peterson, SM
Ronald A. Poling, SM
Serge Rudaz, SM
Keith Rudick, SM
Roger W. Rusack, SM
Mikhail Shifman, SM
Boris Shklovskii, SM
Roger H. Stuewer (emeritus), AM
Arkady Vainshtein, SM
Oriol T. Valls, SM
Randall H. Victoria, Electrical and Computer Engineering, ASM
Mikhail Voloshin, SM
Thomas F. Walsh, SM
Walter Weymann (emeritus), ASM
William Zimmermann, Jr. (emeritus), ASM

Associate Professor
Paul A. Crowell, SM
Eric Ganz, SM
Shaul Hanany, SM
Alex Kamenev, SM
Yong-Zhong Qian, SM
John R. Wygant, SM

Adjunct Associate Professor
Daniel M. Kroll, Medicinal Chemistry, M

Assistant Professor
Michael DuVernois, SM
Tony Gherghetta, SM
Joachim Mueller, SM
Jon Urheim, 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—Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemical engineering and materials science, electrical and computer engineering, mechanical engineering and the history of science and technology.

Prerequisites for Admission—For major work, an undergraduate major in physics or a strong undergraduate minor in physics is required.

Special Application Requirements—Teaching assistantships and a few fellowships are available on application to the School of Physics and Astronomy; three letters of recommendation are required. Submission of GRE scores is strongly recommended. Fall semester entry is strongly recommended for all students.

Special Examination—During the two weeks before the beginning of fall semester, new graduate students are expected to participate in the department orientation program.

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

Use of 4xxx Courses—Use of 4xxx physics courses is permitted for either major or minor degree requirements.

M.S. Degree Requirements
The M.S. requires a minimum of 20 course credits (Plan A) or 30 course credits (Plan B), including classical physics (Phys 5011-5012) or quantum mechanics (Phys 5001-5002) and a minimum of 6 credits in a minor or related field; Plan A also requires 10 thesis credits. The minor or related field requirement may be satisfied by completion of courses in one or two areas outside the specialization; some or all of these courses may be in physics.

Language Requirements—There is no language requirement. However, in some instances the thesis adviser may require a reading knowledge of one or more foreign languages if justified by the nature of the topic.

Minor Requirements for Students

Majoring in Other Fields—A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics. For the doctoral minor, students must complete a minimum of 12 credits in physics, including either the classical physics sequence (Phys 5011-5012) or the quantum mechanics sequence (Phys 5001-5002).

Ph.D. Degree Requirements
The Ph.D. requires a minimum of 40 credits, including classical physics (Phys 5011-5012), quantum mechanics (Phys 5001-5002), and two semesters of a seminar in the student’s research area. The minor or supporting program requirement may be satisfied by completion of courses in one or two areas outside the specialization; some or all of these courses may be in physics.

Language Requirements—There is no language requirement. However, in some instances the thesis adviser may require a reading knowledge of one or more foreign languages if justified by the nature of the topic.

Minor Requirements for Students

Majoring in Other Fields—A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics. For the doctoral minor, students must complete a minimum of 12 credits in physics, including either the classical physics sequence (Phys 5011-5012) or the quantum mechanics sequence (Phys 5001-5002).

Physiology

See Cellular and Integrative Physiology.

Planning

See Urban and Regional Planning.

Plant Biological Sciences

Contact Information—Plant Biological Sciences Graduate Program, University of Minnesota, 250 Biological Sciences Center, 1445 Gortner Avenue, St. Paul, MN 55108-1095 (612-625-4222; fax 612-625-1738; pbson@bios.umn.edu; <www.umn.edu/plantbio/gradprog>).

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

Regents Professor
Ronald L. Phillips, Agronomy and Plant Genetics, SM

Professor
Deborah L. Allan, Soil, Water, and Climate, SM
Bridge E. Barry, Biochemistry, Molecular Biology, and Biophysics, SM
Judith G. Berman, Genetics, Cell Biology, and Development, SM
David D. Bresheer, Plant Biology, SM
Robert M. Brambl, Soil, Water, and Climate, SM
Walter E. Brinkman, Plant Biology, SM
David G. Byers, Horticultural Science, SM
Keith A. Olive, SM
Marvin Marshak, SM
Walter Weymann (emeritus), ASM

Associate Professor
Paul A. Crowell, SM
Eric Ganz, SM
Shaul Hanany, SM
Alex Kamenev, SM
Yong-Zhong Qian, SM
John R. Wygant, SM

Adjunct Associate Professor
Daniel M. Kroll, Medicinal Chemistry, M

Assistant Professor
Michael DuVernois, SM
Tony Gherghetta, SM
Joachim Mueller, SM
Jon Urheim, 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—Physics is the study of the fundamental structure and interactions of matter. Research areas in the program include experimental and theoretical studies in astrophysics and cosmology, biological physics, condensed matter physics, elementary particle physics, nuclear physics, space and planetary physics, and physics education research. Interdisciplinary study is also available with the programs in astrophysics, biological sciences, chemical engineering and materials science, electrical and computer engineering, mechanical engineering and the history of science and technology.

Prerequisites for Admission—For major work, an undergraduate major in physics or a strong undergraduate minor in physics is required.

Special Application Requirements—Teaching assistantships and a few fellowships are available on application to the School of Physics and Astronomy; three letters of recommendation are required. Submission of GRE scores is strongly recommended. Fall semester entry is strongly recommended for all students.

Special Examination—During the two weeks before the beginning of fall semester, new graduate students are expected to participate in the department orientation program.

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

Use of 4xxx Courses—Use of 4xxx physics courses is permitted for either major or minor degree requirements.

M.S. Degree Requirements
The M.S. requires a minimum of 20 course credits (Plan A) or 30 course credits (Plan B), including classical physics (Phys 5011-5012) or quantum mechanics (Phys 5001-5002) and a minimum of 6 credits in a minor or related field; Plan A also requires 10 thesis credits. The minor or related field requirement may be satisfied by completion of courses in one or two areas outside the specialization; some or all of these courses may be in physics.

Language Requirements—There is no language requirement. However, in some instances the thesis adviser may require a reading knowledge of one or more foreign languages if justified by the nature of the topic.

Minor Requirements for Students

Majoring in Other Fields—A physics minor requires a background in differential and integral calculus and one year of calculus-level college physics. For the doctoral minor, students must complete a minimum of 12 credits in physics, including either the classical physics sequence (Phys 5011-5012) or the quantum mechanics sequence (Phys 5001-5002).
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 teaching and research assistantships awarded for the next academic year. Students can be admitted any semester. Courses—Please refer to Plant Biology (PBio) in the course section of this catalog for courses pertaining to the program.

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

M.S. Degree Requirements
Course programs are planned in consultation with an advisory committee. Students are expected to take a minimum of four courses in the major in addition to the two 1-credit current topics courses taken during their first year.

Students participate in a teacher-training program and then serve as a teaching assistant for one semester. Regular attendance at the weekly Plant Biological Sciences Colloquium seminars is expected. Plan A students write a thesis proposal and present the results of their research at a colloquium seminar. Plan B students develop a thesis proposal.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Final Exam—The final exam is oral.

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

Ph.D. Degree Requirements
Doctoral requirements are the same as those for a master’s degree. In addition, a dissertation proposal and the presentation of two noncredit seminars are required.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Minor Requirements for Students
Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits approved by the director of graduate studies.

Plant Pathology

Contact Information—Department of Plant Pathology, University of Minnesota, 495 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108 (612-625-8200; anna@umn.edu; <www.plpa.agri.umn.edu> ).

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

Professor
Robert A. Blanchette, SM
Robert Morgan Brambli, SM
William R. Bushnell, SM
James V. Groth, SM
Roger K. Jones, SM
Linda L. Kinkel, SM
Sagar V. Kropa, SM
Philip O. Larson, SM
Benham E. L. Lockhart, SM
David H. MacDonald, SM
James A. Percich, SM
Francis L. Pfleger, SM
Brian J. Steffenson, SM
Carol E. Windels, SM
Nevin D. Young, SM
Richard J. Zeyen, SM

Adjunct Professor
Martyn Carson, SM
H. Corby Kistler, SM
Deborah A. Samac, SM

Associate Professor
Senyu Chen, M2
Ruth Dill-Macky, SM

Adjunct Associate Professor
James Kolmer, M2
Les J. Szabo, M2

Assistant Professor
James M. Braden, M2
James E. Kurle, M2
Charla Hollingsworth, M2
Salliana R. Stetina, M2

Adjunct Assistant Professor
Jennifer Juzwik, M2

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

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

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

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

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

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

M.S. Degree Requirements
Course programs are planned in consultation with an advisory committee. Students are expected to take a minimum of four courses in the major in addition to the two 1-credit current topics courses taken during their first year.

Students participate in a teacher-training program and then serve as a teaching assistant for one semester. Regular attendance at the weekly Plant Biological Sciences Colloquium seminars is expected. Plan A students write a thesis proposal and present the results of their research at a colloquium seminar. Plan B students develop a thesis proposal.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Final Exam—The final exam is oral.

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

Ph.D. Degree Requirements
Doctoral requirements are the same as those for a master’s degree. In addition, a dissertation proposal and the presentation of two noncredit seminars are required.

Language Requirements—None, except as specified by a faculty adviser in consultation with the student.

Minor Requirements for Students
Majoring in Other Fields—A doctoral minor requires a minimum of 12 credits approved by the director of graduate studies.

Plant Pathology

Contact Information—Department of Plant Pathology, University of Minnesota, 495 Borlaug Hall, 1991 Buford Circle, St. Paul, MN 55108 (612-625-8200; anna@umn.edu; <www.plpa.agri.umn.edu> ).

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

Professor
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Adjunct Associate Professor
James Kolmer, M2
Les J. Szabo, M2

Assistant Professor
James M. Braden, M2
James E. Kurle, M2
Charla Hollingsworth, M2
Salliana R. Stetina, M2

Adjunct Assistant Professor
Jennifer Juzwik, M2

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

Curriculum—Plant pathology focuses on the biology of plant-microbe interactions, and incorporates research spanning the biochemical, molecular, genetic, physiological, whole organism, population, and community levels of biological organization. Plant pathology interfaces with all plant science disciplines, and with food sciences, veterinary medicine, and ecology. Areas of concentration include molecular plant pathology (offered as a special emphasis), plant disease management, biological control of plant disease, forest pathology and microbial degradation of wood, microbial ecology, population biology, plant-microbe interactions, disease resistance, host-parasite coevolution, environmental pollution and climate change, plant microbe mutualisms, and virology. Students have opportunities for laboratory and field research locally as well as nationally and internationally. The course of study varies with the requirements of the area of concentration and interests of the student.
Students who choose the emphasis in molecular plant pathology enhance their ability to design and use molecular approaches to study plant disease, increase basic knowledge, and develop new strategies for disease control.

**Prerequisites for Admission**—Master’s degree applicants must have a sound college background in the basic biological and physical sciences and mathematics, including 35 semester credits in biology with at least one course in each of the following areas: botany, zoology, genetics, plant physiology, and microbiology. Applicants must also have completed at least one course each in inorganic chemistry, organic chemistry, biochemistry, and physics. If deficiencies exist in the prerequisites, they must be corrected during the first year of the graduate program. All students accepted into the department with a B.S. degree are admitted into the M.S. degree program. After a minimum of two semesters, students who qualify may elect to change their degree status to a Ph.D. program. Criteria for the change include scholastic standing, potential for success in completing a Ph.D., and writing competency. Such a change in status must be approved by the student’s advisory committee and the director of graduate studies after consultation with the Graduate Studies Committee. Ph.D. applicants must satisfy all the prerequisites for the master’s degree program in plant pathology or have a master’s degree in plant pathology or in a field of natural science.

**Special Application Requirements**—GRE scores are required for all students and TOEFL or IELTS scores are required for international students. A clearly written statement of career interests as well as three letters of recommendation are required of all students and must be submitted to the department at the time of application. Students may apply at any time; however, submission of all application materials by January 15 will ensure priority consideration for fellowships and research assistantships for the next academic year. Students can be admitted any semester.

**Courses**—Please refer to Plant Pathology (PlPa) in the course section of this catalog for courses pertaining to the program, or to the department Web site at <www.plpa.agri.umn.edu>.

**Use of 4xxx Courses**—For M.S. Plan A and Ph.D. students, 4xxx courses are not permitted toward degree requirements.

**M.S. Degree Requirements**

Plan A (thesis) and Plan B (without thesis) both require a minimum of 14 course credits in plant pathology and 6 course credits in a minor or related field. In addition, Plan A requires 10 thesis credits and Plan B requires 8 project or elective course credits. Regular attendance at weekly plant pathology seminars is expected. Internships are encouraged as part of the graduate experience; financial support is available on a competitive basis for international or domestic internships. A detailed overview of course offerings and requirements, including additional details on the molecular plant pathology emphasis, is available at <www.plpa.agri.umn.edu>.

**Language Requirements**—A foreign language is generally not required. However, knowledge of a foreign language may be necessary for students doing research in non-English-speaking countries.

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

**Minor Requirements for Students Majoring in Other Fields**—A minimum of 6 credits in PlPa 5xxx or 8xxx courses is required for a master’s minor.

**Ph.D. Degree Requirements**

The Ph.D. requires a minimum of 17 course credits in plant pathology, which may include 5xxx and 8xxx courses taken before admission to the program (with approval of the director of graduate studies), and to complete 12 credits in a minor or supporting program, and 24 thesis credits. Course requirements include enrollment in a supervised teaching or extension teaching experience. Degree programs are determined by the student and the student’s advisory committee, with approval of the director of graduate studies. Regular attendance at weekly plant pathology seminars is expected. Internships are encouraged as part of the graduate experience; financial support is available on a competitive basis for international or domestic internships. A detailed overview of course offerings and requirements, including additional details on the molecular plant pathology emphasis, is available at <www.plpa.agri.umn.edu>.

**Language Requirements**—A foreign language is generally not required. However, knowledge of a foreign language may be necessary for students doing research in non-English-speaking countries.

**Minor Requirements for Students Majoring in Other Fields**—A minimum of 12 credits in PlPa 5xxx or 8xxx is required for a doctoral minor.

**Policy Issues on Work and Pay**

**Postbaccalaureate Certificate**

**Contact Information**—Policy Issues on Work and Pay, 101 Westbrook Hall, 77 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-4000; adv@cce.umn.edu; <www.cce.umn.edu/tdm/bmcmain.shtml>), For up-to-date faculty listings, see <www.grad.umn.edu/faculty_rosters/step1.asp>.

**Professor**

John Budd, Human Resources and Industrial Relations, M
Morris Kleiner, Public Affairs, M
James Griffin Scoville, Human Resources and Industrial Relations, M

**Associate Professor**

Maria Hannarty, Public Affairs, M

**Curriculum**—This certificate provides an understanding of and the ability to evaluate federal, state, and local policies that affect the employment relationship. Students learn about the role of government in the employment relationship including statutes and how employers, unions, and the government interpret policies. Courses are drawn from the Humphrey Institute of Public Affairs as well as the Industrial Relations Center in the Carlson School of Management, with auxiliary courses in law, history, and sociology.

**Prerequisites for Admission**—Students must have a bachelor’s degree from an accredited U.S. university or its foreign equivalent. Applicants should have mathematics courses at least up through algebra and a course in microeconomics (Econ 1101 is offered via distance education at the University). A GPA of 3.00 is required and, for international students, a TOEFL score consistent with the Graduate School’s requirements.

**Courses**—Core courses (5 credits): PA 5431 (3 cr); HRIR 5053 (2 cr). Elective courses: HRIR 5021 (4 cr); HRIR 5023 (2 cr); HRIR 8071 (4 cr); HRIR 8021 (3 cr); HRIR 8024 (2 cr); PA 8386 (3 cr); PA 5401 (3 cr); Hist 5844 (3 cr); Law 6203 (3 cr); Law 6231 (3 cr).

**Use of 4xxx Courses**—4xxx courses may not be used to meet certificate requirements.

**Postbaccalaureate Certificate Requirements**

The certificate consists of at least 15 credits: 5 credits in the core (required courses), and 10 credits of supporting electives. Courses are drawn primarily from the Humphrey Institute of Public Affairs and the Industrial Relations Center in the Carlson School of Management, with additional courses from the College of Liberal Arts and the Law School. Students complete 10 elective credits that allows them to focus on the area of public policy that is most relevant to their professional and educational goals and needs. Note that some elective courses require prerequisites which do not count toward the certificate.

**Completion Requirements**—Early in the program, each student should file a certificate program plan with the College of Continuing Education indicating the courses that will be taken, subject to change with faculty approval. Completion of the certificate program requires completion of the indicated courses with core courses requiring a grade of B or better and with an overall GPA in certificate coursework of 3.00 or higher.

**Political Psychology**

**Minor Only**

**Contact Information**—Doctoral Minor in Political Psychology, Center for the Study of Political Psychology, University of Minnesota, 1227 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN.
For up-to-date graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/step1.asp>.

**Regents Professor**
John L. Sullivan, Political Science, M

**Professor**
Patricia G. Avery, Curriculum and Instruction, M
Eugene Borgida, Psychology, M
Karlyn K. Campbell, Communication Studies, M
Ronald J. Faber, Journalism and Mass Communication, M
William H. Flanagan, Political Science, M
David W. Johnson, Educational Psychology, M
Paul E. Johnson, Information and Decision Sciences, M
Geoffrey M. Maruyama, Educational Psychology, M
R. Michael Paige, Educational Policy and Administration, M
W. Phillips Shively, Political Science, M
Mark Snyder, Psychology, M
Daniel B. Wackman, Journalism and Mass Communication, M

**Associate Professor**
Guy Charles, Law, M
Martha H. Gonzales, Psychology, M
Wendy M. Rahn, SM
Alexander J. Rothman, Psychology, M
Martin W. Sampson III, Political Science, M
Albert R. Tims, Jr., Journalism and Mass Communication, M

**Assistant Professor**
James N. Druckman, Political Science, M
Christopher Federico, Psychology, Political Science, M
Samantha C. Lusks, Political Science, M
Joanne Miller, Political Science, M

**Curriculum**—This minor is available to doctoral students only. Political psychology is a rapidly advancing field of scientific inquiry concerned with psychological aspects of political behavior. It encompasses a variety of interdisciplinary research perspectives, drawing on the theories and methods of core disciplines such as psychology, political science, law, and sociology, as well as interdisciplinary fields such as mass communication and decision sciences. The minor’s structured curriculum provides a foundation in basic areas in political psychology: social attitudes and cognition, judgment and decision making, group relations, personality and leadership, mass communication, public opinion, mass political behavior, and political socialization. In addition to providing a background in political psychology, the program trains students in the theory and methods useful to this field, such as content analysis, survey analysis, and experimental design. The faculty is drawn from ten programs within the Graduate School and Law School.

**Prerequisites for Admission**—Admission is contingent upon prior admission to the Graduate School and a doctoral program in a degree-granting department. Applicants are required to demonstrate knowledge of research methods useful in the study of political psychology by successfully completing (grade of B or better) two or more of the following courses: EPsy 8261, 8262, or 8266; Pol 8101, 8123, or 8131; Psy 5862 or 8884; Soc 8811; or Stat 5021 or 5302. The director of graduate studies in political psychology must approve admission.

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

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

**Minor Only Requirements**
The doctoral minor requires a minimum of 14 graduate credits, including 8 credits in required courses and 6 credits in at least two electives from outside the student’s department or program and from a minimum of two of the following four modules: 1) psychological aspects of political behavior; 2) political socialization and human development; 3) politics in sociocultural context; and 4) psychological approaches to political decision making; public policy and international relations. Students are able to tailor the minor to complement their major programs. The required courses are the Proseminar in Political Psychology (Pol 8307, 8308 or Psy 8211, 8212; 2 credits), Political Psychology and Socialization (Pol 8311; 3 credits), and Social Cognition (Psy 8201; 3 credits).

**Political Science**

Contact Information—Department of Political Science, University of Minnesota, 1414 Social Sciences Building, 267 19th Avenue S., Minneapolis, MN 55455 (612-624-4144; fax 612-626-7599; office@polisci.umn.edu; <www.polisci.umn.edu/graduate>).

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

**Regents Professor**
John L. Sullivan, SM

**Professor**
Mary G. Dietz, SM
Raymond D. Duvall, SM
James Farr, SM
William H. Flanagan, SM
Edwin Fogelman, SM
John R. Freeman, SM
Robert T. Holt (emeritus), ASM
Lawrence R. Jacobs, SM
Ethan B. Kapstein, SM
Robert B. Keckav, SM
August H. Nintz, Jr., SM
Steven J. Rosenstone, SM
William Scheuerman, SM
Thomas M. Scott, SM
W. Phillips Shively, SM
Kathryn A. Sikkink, SM
David E. Wilkins, ASM

**Adjunct Professor**
Timothy R. Johnson, M2

**Associate Professor**
Lisa J. Disch, SM
Daniel Killibar, SM
Wendy M. Rahn, SM
Diana E. Richards, SM
Martin W. Sampson III, SM
David J. Samuels, SM

**Assistant Professor**
Jamie Druckman, M2
Christopher Frederico, M2
Samantha C. Luks, M2
Timothy R. Johnson, M2
Colin H. Kahl, M2
Jeffrey D. Lononaco, M2
Joanne Miller, 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 curriculum is divided into five subfields: formal models and methodology, political theory, American politics, international relations, and comparative politics.

**Prerequisites for Admission**—The department’s graduate admissions committee selects the strongest applicants based upon consideration of all useful components of the application file. The committee accepts students who have or are completing B.A. or B.S. degrees and students who have or are completing M.A. degrees.

**Special Application Requirements**—All students, except those in the special master’s program, are admitted directly into the Ph.D. program. The following should be sent directly to the department: department application form; GRE scores; a complete set of transcripts in addition to that required by the Graduate School; a brief statement expressing the applicant’s purpose and goals in pursuing graduate work (in addition to and separate from the statement required as part of the Graduate School application form); three letters of recommendation from professors who know the applicant’s academic work, particularly in political science; and samples of the applicant’s written work (papers written for political science courses preferred). Send photocopies of written work; the department cannot guarantee that materials will be returned.

Graduate study in the Ph.D. program must begin in fall semester; the application deadline is January 1. Graduate study in the special M.A. program may begin in any semester; the application deadline for fall semester is May 1; spring semester is October 1.

The department and the Humphrey Institute of Public Affairs jointly offer a program that leads to an M.A. in public affairs and a Ph.D. in political science. To be eligible, students must be admitted separately by political science and public affairs. Normally, students begin their study in public affairs and later apply to the Ph.D. program in political science. However, students may begin in either program, so it is possible to apply initially to either program or both. Students interested in this joint degree program should contact the director of graduate studies.

**Courses**—Please refer to Political Science (Pol) in the course section of this catalog for courses pertaining to the program.
Use of 4xxx Courses—4xxx and 5xxx courses from other departments usually are acceptable for supporting or minor programs with approval of the department that teaches the course. Political science courses at these levels are generally not open to Ph.D. students, who are expected to take 8xxx seminars. They are open to professional M.A. students.

M.A. Degree Requirements Plan B Only
This program is for secondary school teachers, journalists, government employees, political professionals, and others who would like to cover broad areas of study in political science and related disciplines without the depth and extensive research emphasized in the Ph.D. program. Students may choose among several subfields, including political theory, comparative politics, international relations, American politics, and formal models and methodology.

The M.A. degree, Plan B (without thesis), requires 34 credits, distributed between major courses and minor or related field courses; three research papers, usually written in connection with coursework, are also required.

Language Requirements—None.

Final Exam—The final exams are written and oral.

Ph.D. Degree Requirements
The program is divided into five subfields: American politics, comparative politics, political theory, international relations, and formal models and methodology. A joint M.A.-Ph.D. program is also available that leads to an M.A. in public affairs from the Hubert H. Humphrey Institute of Public Affairs and a Ph.D. in political science.

Students concentrate in two of the five subfields and take a minimum of 10 political science seminars, including Pol 8101 and the core seminars in each of their subfields (Pol 8201, 8301, 8401, 8601). In addition, they take three advanced seminars in their first subfield and three in their second, or four advanced seminars in their first subfield and two in their second subfield (formal models and methodology can be used only as a second subfield).

Language Requirements—Students must demonstrate one of the following:

a) high proficiency in one foreign language,

b) high proficiency in research methodology,

b) low proficiency in two foreign languages,

d) low proficiency in one foreign language and low proficiency in research methodology.

Students who concentrate in comparative politics must have appropriate language competence in their area(s) of specialization.

Minor Requirements for Students Majoring in Other Fields—A doctoral minor requires a minimum of 9 credits of graduate-level courses and an exam.

Portuguese
See Hispanic and Luso-Brazilian Literatures and Linguistics.

Program Evaluation Minor Only

Contact Information—Director of Graduate Studies, Program Evaluation Program, University of Minnesota, 330 Wulling Hall, 86 Pleasant Street S.E., Minneapolis, MN 55455 (612-624-1006; fax 612-624-3377; kingly004@umn.edu; <http://education.umn.edu/EdPA/>).

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

Professor
Michael Baizerman, Social Work, Work, Community, and Family Education, Educational Policy and Administration, M
Nancy N. Eustis, Public Affairs, M
Judith Garrard, Health Services Research, Policy, and Administration, M
David R. Johnson, Institute on Community Integration, M
Richard A. Krueger, Work, Community, and Family Education, M
Frances P. Lawrenz, Curriculum and Instruction, M
Darrell R. Lewis, Educational Policy and Administration, M
Phyllis L. Priie, Epidemiology, M
Patricia S. Seppanen, AM

Associate Professor
Jean A. King, Educational Policy and Administration, M

Curriculum—A minor in program evaluation may be pursued at both the doctoral and the master’s levels. The core of the curriculum consists of courses in the foundations of evaluation, evaluation theory, and internship experiences.

Prerequisites for Admission—Prior admission into an established M.A. or Ph.D. is required. Admission to the minor, therefore, will be contingent upon enrollment in good standing within a recognized degree-granting program of the Graduate School.

Special Application Requirements—Students apply for admission through the director of graduate studies and faculty. Students must demonstrate relevant academic background, including research methodology, and experience in a field in which program evaluation is practiced (e.g., public health, social work, and education). Students from existing evaluation programs in EdPA and EPsy are not eligible for the minor.

Courses—Please refer to Educational Policy and Administration (EdPA), Educational Psychology (EPsy), Family Social Science (FSoS), Public Health (PubH), and Work, Community, and Family Education (WCFE) in the course section of this catalog for courses pertaining to the program.

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

Minor Only Requirements
Students need a minimum of 15 credits for the doctoral minor and a minimum of 9 credits for the master’s minor. Individual programs are designed through consultation among the student, the major adviser, and the director of graduate studies.

Psychological Foundations of Education
See Educational Psychology.

Psychology

Contact Information—Department of Psychology, University of Minnesota, 249 Elliott Hall, 75 East River Road, Minneapolis, MN 55455 (612-624-4181; fax 612-626-2079; psyapply@umn.edu; <www.psych.umn.edu/>).

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

Regents Professor
Ellen S. Berscheid, SM

Professor
Eugene Borgida, SM
Thomas J. Bouchard, Jr., SM
Dwight A. Burkhartd, SM
James N. Butler, SM
John P. Campbell, SM
Robert A. Cudeck, SM
Patricia A. Frazier, SM
Jo-Ida C. Hansen, SM
William G. Iacono, SM
Daniel J. Kersten, SM
Gordon E. Legge, SM
Gloria R. Leon, SM
Matthew K. McGuie, SM
Stephan J. Motowidlo, SM
J. Bruce Overmier, SM
Christopher J. Patrick, SM
Paul R. Sackett, SM
Mark Snyder, SM
Neal F. Vismeister, SM
David J. Weiss, SM

Associate Professor
Charles R. Fletcher, SM
Martha H. Gonzales, SM
William M. Grove, SM
Sheng He, SM
Robert F. Krueger, SM
Monica Luciana, SM
Chad J. Marsolek, SM
Michael H. Miner, SM
Denz S. Ones, SM
Gail Burton Peterson, SM
Alexander J. Rothman, SM

Assistant Professor
Joyce E. Bono, M2
Christopher M. Federico, M2
Jonathan C. Gewirtz, M2
Richard M. Lee, SM
Shigeiro Oshii, M2
Paul R. Schrater, M2

Adjunct Professor
Richard D. Arvey, Human Resources and Industrial Relations, ASM
Marilyn E. Carroll, Psychiatry, ASM
Mark L. Davison, Educational Psychology, ASM
Byron Egeland, Child Development, ASM
Dorothy K. Hatsukami, Psychiatry, ASM
Paul E. Johnson, Information and Decision Sciences, ASM
scores, the range of scores for those admitted required minimums for GPAs and GRE recommended. Although there are no specific GRE Subject Test in psychology is desirable, but not necessary. An undergraduate major in program, a course in abnormal psychology is required. An undergraduate major in psychology is desirable, but not necessary. Although there are no specific required minimums for GPAs and GRE scores, the range of scores for those admitted in previous years, as well as other specific requirements, are available from the psychology graduate admissions office. To ensure full consideration for fellowships and teaching and research assistantships, send the Graduate School application form, transcripts, and application fee to the Graduate School by December 1.

Courses—Please refer to Psychology (Psy) in the course section of this catalog for courses pertaining to the program. Use of 4xxx Courses—Certain 4xxx courses may be taken for graduate credit. Students should consult the instructor or director of graduate studies.

M.A. Degree Requirements
Each student’s program is planned in consultation with an adviser. Plan A requires a minimum of 14 credits in psychology and 6 credits in a minor/related field, and a research thesis. Plan B requires one to three review papers in lieu of a thesis, and a minimum of 30 course credits, of which 14 credits must be in psychology and 6 credits in one or more related fields. For Plan A, the final exam is oral; for Plan B, it may be written, oral, or both.

Language Requirements—None.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires a minimum of 6 credits, with specific courses determined in consultation with an adviser and other faculty.

Ph.D. Degree Requirements
Students must satisfy the general area distribution requirement using selected courses in four areas outside their specialization. There are no other general departmental course requirements. Each student’s program is individually planned in consultation with an adviser to meet both the individual’s goals and the area requirements. The programs in clinical psychology and counseling psychology include specific requirements for applied coursework and practicum and internship experience. Each specialization also requires completion of a series of Ph.D. seminars covering scholarship and research skills. Students also complete 12-15 credits in a minor or supporting program.

Language Requirement—None.

Minor Requirements for Students Majoring in Other Fields—The doctoral minor requires a minimum of 12 credits and is designed according to student needs.

Public Affairs
Contact Information—Director of Admissions, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455, (612-624-3800; fax 612-626-0002; admissions@hhh.umn.edu; <www.hhh.umn.edu>).

For up-to-date graduate faculty listings, see <www.grad.umn.edu/faculty_rosters/step1.asp>.
Degree Programs and Faculty

Prerequisites for Admission—Ten years or more of career or public affairs experience and a U.S. bachelor’s degree or foreign equivalent is required.

Special Application Requirements—In addition to the materials submitted to the Graduate School, applicants must submit to the Humphrey Institute a photocopy of the Graduate School admission application, a Humphrey Institute Applicant Data form, copies of all transcripts, a statement of purpose, at least three letters of recommendation, and a professional résumé. The deadline for applications is April 1 of the preceding academic year. Entry is for fall semester.

Courses—Please refer to Public Affairs (PA) in the course section of this catalog for courses pertaining to the program.

Use of 4xxx Courses—Use of 4xxx courses on degree program forms is permitted with instructor’s and adviser’s permission.

M.P.A. Degree Requirements
The M.P.A. requires 30 credits, including PA 5941—Leadership for the Common Good (4 cr), PA 8001—Transforming Public Policy (4 cr), and PA 8002—Synthesis Workshop (4 cr): 9 credits in concentration electives; 6 credits in skills courses; and 3 credits of electives. Participants have the option to pursue a minor or related field offered by another college within the University.

Language Requirements—None.

Public Health

Minor Only

Contact Information—Student Services Center, School of Public Health, University of Minnesota, MMC 819, 420 Delaware Street S.E., Minneapolis, MN 55455 (612-626-3500 or 1-800-774-8636; fax 612-626-6931; sph-uofm@gre2.sph.umn.edu: <http://www.sph.umn.edu>.

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

Professor
Michael Baizerman, Social Work, M
Robert W. Blum, Pediatrics, M
Judith E. Brown, M
Judith M. Garrard, M
Susan G. Gerberich, M
Robert W. Jeffery, M
Barbara J. Leonard, Nursing, M
A. Marshall Mclean, M
Michael D. Resnick, Pediatrics, M
Robert L. Veninga, M
Carolyn L. Williams, M

Associate Professor
Lester E. Block, M
Ann W. Garwick, M
Leslie A. Grant, Carlson School of Management, M
Wendy L. Hellerstedt, M
Patricia M. McGovern, M
Joan M. Patterson, M

Other
Lee E. Schacht, M

Curriculum—The public health minor is available to master’s (M.A. and M.S.) and doctoral students.

Prerequisites for Admission—Admission is contingent upon prior admission to a master’s or doctoral degree-granting program within the Graduate School. Students enrolled in graduate programs within the School of Public Health are not eligible for this minor.

Special Application Requirements—Students declaring a minor in public health should contact the director of graduate studies in public health as early as possible. Enrollment is contingent upon approval of the application by the director of graduate studies, after which a minor program adviser(s) is assigned.

Courses—Please refer to Public Health (PubH) in the course section of this catalog for courses pertaining to the program.

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

Minor Only Requirements
The master’s minor requires a minimum of 8 graduate credits; the doctoral minor requires a minimum of 14 graduate credits. Courses for the minor must be selected from those offered by the School of Public Health. In order to meet the minor requirements, students must successfully complete graduate coursework in each of the following disciplines: biostatistics, epidemiology, and environmental health. Suggested courses include PubH 5144—Biostatistical Methods I; PubH 5320—Fundamentals of Epidemiology; and PubH 5200—Environmental Health.

If students have already taken comparable graduate level courses in these disciplines, other public health courses can be used to complete the minor requirement with the approval of the public health adviser and the director of graduate studies. Since public health courses may have prerequisites or enrollment requirements, early planning with an adviser is suggested.

Language Requirements—None.

Public Policy

Contact Information—Director of Admissions, Hubert H. Humphrey Institute of Public Affairs, University of Minnesota, 301 19th Avenue South, Minneapolis, MN 55455 (612-624-3800; fax 612-625-3513; admissions@hhh.umn.edu; <http://www.hhh.umn.edu>.

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

Regents Professor
G. Edward Schub, M

Professor
Dean E. Abrahamson (emeritus), AM
John S. Adams, M
Sandra O. Archbald, M
Raguil A. Assaad, M
J. Brian Atwood, M
Richard S. Bolan (emeritus), AM
John E. Brandl, M
John M. Bryson, M
Nancy N. Eustis, M
Katherine Fenselly, M
Edward G. Goetz, M
Stephen A. Hoenack, M
Leonid Hurwicz (emeritus), AM
Ethan B. Kapstein, M
Kenneth H. Keller, M
Sally J. Kenney, M
Morris M. Kleiner, M
Robert T. Kudlde, M
Ann R. Markussen, M
George W. Morse, Applied Economics, AM
Samuel L. Myers, M
Carlisle R. Runge, Applied Economics, AM
Esther Wattenberg, Social Work, AM

Associate Professor
Robert A. Connor, Healthcare Management, AM
Maria J. Hanratty, M
Deborah Levison, M
Melissa Stone, M

Assistant Professor
Kevin J. Krizek, M

Other
Zbigniew M. Br奇nian, AM
Harry C. Boyte, AM
William Craig, AM
Barbara C. Crosby, AM
Marsha A. Freeman, AM
Ali K. Galayd, AM
Thomas F. Luce, AM
Barbara L. Lankmann, AM
Lee W. Munich, AM
Joseph H. Nathan, AM
Joseph A. Ritter, AM
Jodi R. Sandfort, AM
Paul C. Stone, AM

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

Curriculum—The master of public policy (M.P.P.) curriculum is built upon a core of required theoretical and methodological courses. In remaining courses, students choose either to emphasize more advanced study of analysis or management, or to focus on a particular substantive area of public policy. Structured concentrations include advanced policy analysis methods, economic and community development, foreign policy and international affairs, public and nonprofit leadership and management, science and technology policy, social policy, and women and public policy. Students have multiple opportunities to apply the concepts learned in their coursework to real-life policy problems, including cases presented in courses, their internships, and workshops. Dual degrees include M.P.P./juris doctor; M.P.P./master of science in health services research, policy, and administration; M.P.P./master of social work.

Prerequisites for Admission—Students are expected to have completed the equivalent of an introductory course in microeconomics and have a U.S. bachelor’s degree or foreign equivalent.
Curriculum—The faculty of the graduate minor in quaternary paleoecology hold appointments in several departments. Students in this unique program benefit from the broad range of expertise and experience available at a large research university. From their coursework in the minor, graduate students learn techniques and approaches from other areas that can be applied to their own research.

The minor is available to master’s (M.A. and M.S.) and doctoral students.

Prerequisites for Admission—Admission is contingent on prior admission to a Graduate School degree-granting program.

Special Application Requirements—Students apply by sending a letter of application to the director of graduate studies (qpminor@umn.edu) as well as a letter of recommendation from their current adviser. Application may be made at any time.

Courses—See <http://lrc.geo.umn.edu/QPcourses.pdf> and contact the director of graduate studies at qpminor@umn.edu for information on relevant coursework.

Use of 4xxx Courses—Any 4xxx course included in the published list at <http://lrc.geo.umn.edu/QPcourses.pdf> may be used to satisfy the minor requirement.

Minor Only Requirements

Students develop their curricula in consultation with their major advisers and the director of graduate studies in quaternary paleoecology. Students choose courses from two lists found at <http://lrc.geo.umn.edu/QPcourses.pdf>. Master’s students must take one of the three courses from List A plus one or more courses from List B for a total of 6 credits. Ph.D. students take two of the three courses from List A plus one additional course from List B for a total of 9 credits. Some requirements may be waived depending on the student’s background.

In all cases, the selected courses must be outside the student’s major field for List A and outside the cluster that includes the student’s major field in List B.

Recreation, Park, and Leisure Studies

Contact Information—Director of Graduate Studies, School of Kinesiology, University of Minnesota, 220 Cooke Hall, 1900 University Avenue S.E., Minneapolis, MN 55455 (612-625-5300; fax 612-626-7700; pils@umn.edu; <http://education.umn.edu/klis/>)

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

Professor

Dorothy H. Anderson, Forest Resources, AM2
William C. Gartner, Applied Economics, AM2
Mary Jo Kane, M2
Leo H. McAvoy, Jr., M2
John E. Rynders, Educational Psychology, AM2
Michael G. Wade, M2

Associate Professor

Bruce D. Anderson, M2
Carla E. S. Taboume, M2
Diane M. Wiese-Bjornstal, M2

Assistant Professor

Kenneth Barlett, Work, Community and Family Education, AM2
W. Corliss Outley, M2

Instructor

JoAnn Baysse, M2
Stephan P. Carlson, Forest Resources, AM2
Robert Danforth, AM2
Maurice K. Fahnestock, AM2

Research Associate

Carol A. Leitschuh, M2
Ingrid E. Schneider, Forest Resources, AM2

Senior Research Associate

David W. Lime (emeritus), Forest Resources, AM2

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

Curriculum—Emphasis areas in the master’s program are park and recreation administration, outdoor recreation/education, sport management, and therapeutic recreation.

Prerequisites for Admission—Although prospective students generally have an undergraduate degree in recreation, park, and leisure studies, others with a baccalaureate degree including related preparation and a significant background and interest in the scientific study of recreation, park, and leisure studies may be admitted. Admitted students may be required to complete background preparation in undergraduate and graduate recreation, park, and leisure studies and related coursework.

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

Research Facilities—Research facilities include the Institute on Community Integration and the Tucker Center for Research on Girls and Women in Sport.

Courses—Please refer to Recreation, Park, and Leisure Studies (Rec) in the course section of this catalog for courses pertaining to the program.