This is the Duluth Degree Programs and Related Fields, maps, index, and course designator listing sections of the 2005-2007 Graduate School Catalog for the University of Minnesota.
Duluth Degree Programs

General Information
At the University of Minnesota Duluth, the Graduate School offers programs for the master of arts in communication sciences and disorders, criminology, and English (emphases in literary studies for concentrated study of literature, English studies, and publishing and print culture). Programs for the master of science are offered in applied and computational mathematics, biology, chemistry, computer science, geological sciences, and physics. In addition, master of business administration, master of fine arts in art (emphasis in graphic design), master of electrical and computer engineering, master of engineering management, master of liberal studies, master of music, and master of social work are offered.

All-University M.S./Ph.D. programs in toxicology and water resources science are offered jointly with the Twin Cities campus. In addition, several graduate programs operate at the University of Minnesota Duluth under the aegis of graduate programs on the Twin Cities campus. Cooperative programs offered at both the master’s and doctoral levels include biochemistry, molecular biology, and biophysics; microbiology, immunology and cancer biology; pharmacology; and cellular and integrative physiology. Students interested in these programs should see Degree Programs in this catalog.

All programs are under the jurisdiction of the Graduate School dean and have admission, candidacy, and degree requirements comparable to their counterpart programs on the Twin Cities campus. General Graduate School regulations, including those for minimum degree requirements, apply to programs offered on the Duluth campus (see General Information at the beginning of this catalog).

Financial Aid and Other Assistance
Assistantships are normally granted through individual departments subject to stipulations described in General Information at the beginning of this catalog. Information about these assistantships can be obtained by writing to the department director of graduate studies. With an assistantship appointment of 25 percent or more, hospitalization and medical insurance coverage is provided at reduced cost.

Some residence counseling positions may be available. For information, write to the Housing Office, 149 Lake Superior Hall, University of Minnesota Duluth, MN 55812.

Inquiries regarding loan funds, living accommodations, employment, and placement should be addressed to the Vice Chancellor for Academic Support and Student Life, 297 Darland Administration Building, University of Minnesota Duluth, MN 55812.

Program Descriptions
Brief descriptions of the various degree programs are listed on the following pages. Course offerings are listed in the University of Minnesota Duluth Catalog. General information concerning graduate work on the Duluth campus may be obtained from the Graduate School Office—Duluth, 431 Darland Administration Building, University of Minnesota Duluth, MN 55812. Information is also available at www.d.umn.edu/grad.

Key to Abbreviations

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<tr>
<th>Faculty</th>
<th>Membership Categories</th>
<th>Key to Abbreviations</th>
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<tr>
<td>Graduate faculty are listed at the beginning of each degree program. After the faculty name, the home department will be listed (unless the department is the same as the program name), followed by the graduate faculty status in the program. Professors emeriti are identified by &quot;(emeritus).&quot;</td>
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<td>Senior Member (SM)—Authorization to advise students at all levels, including the doctorate; to serve as a thesis reviewer and as an examiner on student examining committees, including service as chair of doctoral committees; to teach courses for graduate credit; and to participate in governance. In fields that also offer a professional doctorate, some senior member appointments may be restricted to the supervision of students seeking the professional degree.</td>
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<td>Affiliate Senior Member (ASM)—Authorization to assume the same responsibilities as senior member, but not to participate in governance. In fields that also offer a professional doctorate, some affiliate senior member appointments may be restricted to the supervision of students seeking the professional degree.</td>
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<td>Member/Advising (M2)—Authorization to advise students at the master’s level; to serve as a thesis reviewer at the master’s level and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to co-advise doctoral students with a senior member or affiliate senior member of the graduate faculty, and to serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.</td>
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<td>Affiliate Member/Advising (AM2)—Authorization to assume the same responsibilities as member/advising, but not to participate in governance.</td>
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<td>Member (M)—Authorization to serve as a thesis reviewer at the master’s level and as an examiner on student examining committees at the master’s and postbaccalaureate certificate levels; to teach courses for graduate credit; and to participate in governance. At the discretion of the appointing program, may also include authorization to serve as a thesis reviewer and examining committee member for doctoral students, but not as chair.</td>
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<td>Affiliate Member (AM)—Authorization to assume the same responsibilities as member, but not to participate in governance.</td>
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<td>Examining Status (E)—Authorization to serve as a thesis reviewer and as an examiner on student examining committees at all levels, but not as chair, and to teach courses for graduate credit. Examining status does not include membership on the graduate faculty and does not confer governance privileges.</td>
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<td>Tests</td>
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<td>The following test abbreviations appear throughout graduate program listings.</td>
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<td>ECFMG—Educational Commission for Foreign Medical Graduates</td>
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<td>GMAT—Graduate Management Admission Test</td>
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<td>GRE—Graduate Record Examination</td>
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<td>IELTS—International English Language Testing System</td>
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<td>MELAB—Michigan English Language Assessment Battery</td>
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<td>SPEAK—Speaking Proficiency English Assessment Kit</td>
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<td>TOEFL—Test of English as a Foreign Language</td>
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<td>TSE—Test of Spoken English</td>
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<tr>
<td>USMLE—United States Medical Licensing Examination</td>
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For more information about these individual tests, see page 9 in the General Information section.
Applied and Computational Mathematics

Contact Information — Department of Mathematics and Statistics, University of Minnesota Duluth, 140 Solon Campus Center, 1117 University Drive, Duluth, MN 55812 (218-726-8747; fax 218-726-8399; math@d.umn.edu www.d.umn.edu/math).

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

Professor
Richard A. Davis, Chemical Engineering, M2
Douglas J. Dunham, Computer Science, M2
Joseph A. Gallian, M2
Richard F. Green, M2
Abu Rashid-Hasan, Chemical Engineering, M2
Barry R. James, M2
Kang Ling James, M2
Zhuangyi Liu, M2
John Pastor, Biology, M2
Ronald R. Regal, M2
Marian S. Stachowicz, Electrical and Computer Engineering, M2
Robert L. McFarland, M2
Kathryn E. Lenz, M2
Janice D. Kmetz, M2
Catherine Jo Ishino, M2
Robert Appleton, M2
Joseph A. Gallian, M2
Richard A. Davis, Chemical Engineering, M2

Associate Professor
Linda L. Denneen, Computer Science, M2
Dalibor Froncek, M2
John R. Greene, M2
Kathryn E. Lenz, M2
Robert L. McFarland, M2
Bruce B. L. Peckham, M2
James W. Rowell, M2
Gary M. Shute, Computer Science, M2
Steven P. Sternberg, Chemical Engineering, M2
Steven A. Trodogl, M2

Assistant Professor
Guihua Fei, M2
Carmen M. Latereall, M2
Yongcheng Qi, M2

Curriculum — This program is for those wishing to pursue careers that use applied mathematics and statistics in science, industry, business, and teaching, and for those wishing to go on for Ph.D. degrees in mathematics or statistics. It emphasizes the use of modern modeling techniques and computational methods, with areas of concentration available in continuous modeling, probability/statistics, and discrete mathematics. The faculty is drawn largely from the Department of Mathematics and Statistics, but includes members from the Departments of Computer Science, Electrical and Computer Engineering, Chemical Engineering, and Biology.

Admission Requirements — Applicants should have completed an undergraduate degree in mathematics or statistics. However, a student with a degree in another major, and with a substantial background in mathematics or statistics (e.g., computer science or engineering), may also qualify; students lacking certain prerequisites may make up deficiencies concurrently with graduate work.

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 applications materials by January 15 for fall semester is strongly encouraged to ensure priority consideration for university fellowships. The deadline for applying for assistantships awarded for the next academic year is March 1. Students can be admitted any term. Students whose native language is not English must submit their TOEFL scores.

Use of 4xxx Courses — Inclusion of 4xxx courses (maximum of 8 credits) on degree program forms is subject to program approval.

M.S. Degree Requirements
The M.S. is offered under both Plan A (with thesis) and Plan B (without thesis). All students must complete at least 33 credits, of which at least 17 must be from approved mathematics or statistics courses or seminars (including a graduate seminar and two of the three core courses) and 6 must be from a minor or related field (statistics is a related field). As part of these 33 credits Plan A requires 10 thesis credits and Plan B requires a 2-credit project and an additional 8 credits from approved graduate-level mathematics, statistics, or related-field courses.

Language Requirements — None.

Final Exam — There is a written comprehensive exam and an oral final exam.

Minor Requirements for Students Majoring in Other Fields — A master’s minor requires 6 credits in approved Math or Stat courses.

Art—Graphic Design

Contact Information — Department of Art and Design, University of Minnesota Duluth, 317 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8225; fax 218-726-6532; art@umn.edu www.d.umn.edu/art/). Please download and read this handbook before submitting a final application.

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

Professor
Gloria Brush, M2
James C. Klueg, M2
Dean Lettenstrom (emeritus), M2

Associate Professor
Robert Appleton, M2
Alyce L. Coker (emeritus), M2
Catherine Jo Ishino, M2
Janice D. Kmetz, M2
Robert A. Repinski, M2
Robyn S. Roslak, Art History, M2

Assistant Professor
Alison J. Aune-Hinkel, M2
Sarah Bauer, M2
Philip Choo, M2
Jennifer L. Dietrich, AM2
Victoria D. Lehman, M2
Marina M. Waisman, M2

Curriculum — The master of fine arts: emphasis in graphic design at UMD may be earned full or part-time, in three years of graduate study in design. Within a liberal arts setting, the program explores individual’s educational, artistic, and professional strengths. Expanding the boundaries of conventional design education, it includes the following areas of study: new media, motion graphics, sound art, book arts, design in the public realm, experience design, typographic design, design theory, and preparation for college teaching. There is equal commitment to academic study and studio practice. The program draws on a national and international faculty of designers and artists recognized for the quality of their work and experience.

Admission Requirements — Applicants must have adequate undergraduate education and experience in the area of emphasis, and a B.A., B.S., or B.F.A. in graphic design or art. Individuals with undergraduate degrees in other disciplines who have completed a substantial number of design courses also may be considered for admission. A portfolio of the applicant’s design work submitted on slides and/or videotape, Mac-formatted zip, CD, or DVD, a letter of intent, a sample of the applicant’s writing (written in or translated into English), and three letters of recommendation are required as part of the application. A minimum GPA of 3.00 is required for admission. A TOEFL score of 550 is required for students whose second language is English (see section 2.1E in the MFA Student Handbook). All additional program details, including complete application requirements, are described fully in the Student Handbook, which may be downloaded in PDF format from www.d.umn.edu/art/program/mfa.html. Please download and read this handbook before submitting a final application.

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

M.F.A. Plan B Degree Requirements
The M.F.A. is offered under Plan B and requires at least two years in residence and 60 credits. The program may be completed on a part-time basis by first taking all requirements other than Art 8901 — Graduate Seminar, Art 8900 — Graduate Studio series, and Art 8990 — M.F.A. Creative Thesis. The 8901/8902 series must be taken within a two-year period. A final project and minimum 15-page supporting paper are required. Although a gallery exhibition is typical, the project may also take other forms such as a book, video, Web site, or interactive project.

Language Requirements — None.
Final Exam—An oral exam based on the project and a supporting thesis are required.

Biology

Contact Information—Department of Biology, University of Minnesota Duluth, 221 Life Science Building, 1110 Kirby Drive, Duluth, MN 55812 (218-726-6258; fax 218-726-8142; biol@d.umn.edu; http://www.d.umn.edu/biology/graduate/index.htm).

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

Professor
Matthew Andrews, M2
Lester R. Drewes, Biochemistry and Molecular Biology, M2
Stephen C. Hedman, M2
Randall E. Hicks, M2
Muhammad R. Ul Karim, M2
Andrew R. Klemer, M2
Gerald J. Niemi, M2
John Pastor, M2
Arlen R. Severson, Anatomy and Cell Biology, M2
George J. Trachte, Pharmacology, M2

Associate Professor
Benjamin L. Clarke, Medical Microbiology and Immunology, M2
Timothy P. Craig, M2
Stephen W. Downing, Anatomy and Cell Biology, M2
Donna J. Forbes, Anatomy and Cell Biology, M2
Kent M. Froberg, Pathology and Laboratory Medicine, M2
Linda L. Holmstrøm, M2
Jon M. Holy, Anatomy and Cell Biology, M2
Robert L. Lloyd, Psychology, M2
David J. Schimpf, M2

Assistant Professor
Lucia P. Barker, Medical Microbiology and Immunology, M2
Donn K. Braam, M2
Julie R. Etterson, M2
Thomas R. Hrabik, M2
Allen Mensinger, M2
Anna Rachinsky, M2

Instructor
Lyle J. Shannon, M

Research Fellow
JoAnn M. Hanowski, Natural Resources Research Institute, M

Research Associate
Richard P. Axler, Natural Resources Research Institute, M2
Valerie J. Brady, Natural Resources Research Institute, M
John C. Brazner, Natural Resources Research Institute, M2
Sigmond J. Degitz, Jr., Natural Resources Research Institute, M2
Philip A. Fay, Natural Resources Research Institute, M2
Darba Ghosal, M
Glenn R. Guntenispergen, Natural Resources Research Institute, M2
Brian H. Hill, Natural Resources Research Institute, M2
George E. Host, Natural Resources Research Institute, M2
Lucinda B. Johnson, Natural Resources Research Institute, M2
Rodney D. Johnson, Natural Resources Research Institute, M2
John R. Kelly, Natural Resources Research Institute, M2
Richard L. Leino, Anatomy and Cell Biology, M2
Joseph M. Mayasich, Natural Resources Research Institute, M2
Ron Moen, Natural Resources Research Institute, M2
David R. Mount, Natural Resources Research Institute, M2
Patrick K. Schaff, Natural Resources Research Institute, M2

Program Director
Thomas Malterer, Natural Resources Research Institute, M2
Neil D. Nelson, Natural Resources Research Institute, M
Carl R. Richards, Sea Grant, M2

Curriculum—The program offers study toward the M.S. under either Plan A or Plan B. Plan A students must select an area of concentration from among botany, cellular and physiological biology, environmental biology, or zoology.

Admission Requirements—A bachelor’s degree or equivalent from an accredited department in the life sciences or a related degree field, or one year of general biology and a one year course sequence in the physical/mathematical sciences is required. Students with deficiencies may be admitted with the provision that equivalent coursework or approved substitutions be completed during the first year of graduate study.

As part of the their application materials, applicants must also submit recent GRE General Test scores. Prior coursework and/or GRE scores are used to assess proficiency in the areas of general biology, genetics, cell biology, and ecology. Such proficiency is considered in the admission decision.

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

M.S. Degree Requirements
Plan A students must complete at least 14 course credits in the major, including at least 10 credits in courses approved for the selected area of concentration and Biol 8099 — The Biological Practitioner; at least 6 credits of approved coursework in one or more related fields or a minor; and at least 10 thesis credits. Plan B students must complete Biol 8099 — The Biological Practitioner, at least 13 other course credits in the major, at least 6 credits of approved coursework in one or more related fields or a minor, and at least 10 credits of other approved coursework. Plan A requires a thesis; Plan B requires one to three Plan B projects.

Language Requirements—None.

Final Exam—Students must present a department seminar and pass a final oral exam.

Minor Requirements for Students Majoring in Other Fields—Any course that may be used as credit for the major may be used as credit toward the minor to give a minimum total of 6 credits.

Business Administration

Contact Information—M.B.A. Department, Lopovitz School of Business and Economics, University of Minnesota Duluth, 21 School of Business and Economics Building, 412 Library Drive, Duluth, MN 55812 (218-726-8986; fax 218-726-6789; sbe@d.umn.edu; www.d.umn.edu/sbe/degreeprogs/mba/).

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

Professor
Curt L. Anderson, Economics, AM
Stephen B. Castleberry, Management Studies, M2
Ehsan H. Feroz, Accounting, M2
Richard W. Lichty, Economics, M2
Rodrigo J. Lievano, Finance and Management Information Sciences, M2
Patricia A. Merrier, Finance and Management Information Sciences, M2
Jerold M. Peterson, Economics, AM
Jon L. Pierce, Management Studies, M2
Raymond L. Raab, Economics, M2
Stephen A. Rubenfeld, Management Studies, M2
Donald N. Steinnes, Economics, M2
Shee Q. Wong, Finance and Management Information Sciences, AM

Associate Professor
Praveen Aggarwal, Management Studies, M2
Rodger L. Brannan, Accounting, AM
Anne Cummings, Management Studies, M2
Manjeet Dhatt, Finance and Management Information Sciences, M2
Kjell R. Knudsen, Management Studies, M2
June F. Li, Accounting, M2
Jerry W. Lin, Accounting, M2
A. Maureen O’Brien, Economics, M2
Linda Rochford, Management Studies, M2
Alan C. Roline, Accounting, M2
Rajiv Vaidyathanan, Management Studies, M2

Assistant Professor
Geoffrey G. Bell, Management Studies, M2
Jennifer G. David, Management Studies, M2
David Doorn, Economics, M2
Sanjay Goel, Management Studies, M2
Nik R. Hassan, Finance and Management Information Sciences, AM
Seung C. Lee, Finance and Management Information Sciences, M2
Dahui Li, Finance and Management Information Sciences, AM
Jennifer Mencel, Management Studies, M2
Sebastien Oleas, Economics, M2
Jennifer Schultz, Economics, M2
Randall K. Skalberg, Accounting, AM
Bedassa Tadesse, Economics, M2
Instructor
John L. Kratz, Management Studies, AM
Peter J. Stark, Management Studies, AM
Shannon Studden, Management Studies, AM

Curriculum—The M.B.A. program meets the needs of those who are currently employed full-time in professional managerial careers and would like to pursue a graduate management education primarily on a part-time basis. The program offers courses in both Duluth and Rochester, Minnesota. Most courses offered in Duluth meet one evening per week from 6:00 to 9:00 p.m. during the 15 weeks of the semester. Most courses offered in Rochester meet from 3:00 to 9:30 p.m. on Fridays and 8:00 a.m. to 12:30 p.m. on Saturdays every other week over a period of seven weeks. It is possible to enroll in the program on a full-time basis by registering for 6 or more credits per semester. However, only a relatively small number of domestic and international students are enrolled full-time.

Admission Requirements—Applicants must have a bachelor’s degree from an accredited college or university; completed foundation courses in accounting, economics, finance, production/operations, marketing, organizational management, and human resource management or be able to demonstrate knowledge and proficiency in each of these areas; and have an acceptable score on the GMAT, passed the Certified Professional Accountant (CPA) examination, or completed a graduate degree from an accredited college or university. In addition, international students must have an acceptable score on the TOEFL.

The bachelor’s degree may be in any field. However, students who have had little or no undergraduate or other education in business administration must complete foundation courses in the areas identified above before admission to the M.B.A. program. No graduate credit or credit toward M.B.A. program requirements is granted for prerequisite courses.

Use of 4xxx Courses—M.B.A. students may include 4xxx courses for electives in their degree programs subject to M.B.A. director approval.

M.B.A. Plan B and Coursework Only Degree Requirements
The M.B.A. requires 32 credits. All students must complete six core and three support area courses, which provide exposure to financial reporting, analysis, and markets; the domestic and global environments of business and organizations; the creation and distribution of goods and services; and human behavior in organizations. Also required are a capstone strategic management course and a minimum of 2 credits of cross-functional experience selected from special topics, workshops, projects, or field study. Students then choose one of two options for completing an additional 6 credits of elective coursework: coursework only or field research (Plan B).

Language Requirements—None.
Final Exam—For Plan B, students meet with their faculty committee for a final review of their completed project. For coursework only, no final exam is required.

Chemistry

Contact Information—Department of Chemistry, 246 Chemistry Building, 1039 University Drive, Duluth, MN 55812 (218-726-7212; fax 218-726-7394; chem@d.umn.edu; www.d.umn.edu/chem/graduate/index.html).

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

Professor
Ronald Caple, M2
Robert M. Carlson, M2
Lester R. Drewes, Biochemistry and Molecular Biology, M2
John F. Evans, M2
Vincent R. Magnuson, M2
Donald P. Poe, M2
Joseph R. Prohaska, Biochemistry and Molecular Biology, M2
James P. Reihl, M2
Blini P. Tsai, M2
Kendall B. Wallace, Biochemistry and Molecular Biology, M2
Viktor Zhdkanik, M2

Associate Professor
Benjamin L. Clarke, Medical Microbiology and Immunology, M2
Thomas E. Huntsley, Biochemistry and Molecular Biology, M2
Paul Kiprof, M2
Keith B. Lodge, Chemical Engineering, M2
Paul D. Siders, M2

Assistant Professor
Grant W. Anderson, Pharmacy, M2
Leng Chee Chang, M2
Robert T. Cormier, Biochemistry and Molecular Biology, M2
Venkatram R. Mereddy, M2
Viktor N. Nemynkin, M2
Edward L. Perkins, Biochemistry and Molecular Biology, M2
Jon N. Rumbley, M2
Josef Werne, M2

Senior Research Associate
Subhash C. Basak, Natural Resources Research Institute, M2

Research Fellow
Pavel A. Krasutsky, Natural Resources Research Institute, M2

Curriculum—The M.S. program offers a broad-based education in chemistry that is well suited to students going on to Ph.D. programs, careers in industry, or professional schools. Both Plan A (with thesis) and Plan B (without thesis) are available. For Plan A, emphases include analytical, biological, inorganic, organic, and physical chemistry. The faculty includes members from the Departments of Chemistry and Chemical Engineering in the College of Science and Engineering, the Departments of Biochemistry and Molecular Biology and Medical Microbiology & Immunology in the School of Medicine, the College of Pharmacy, and the Natural Resources Research Institute.

Admission Requirements—Applicants must have completed an undergraduate chemistry major, including an upper division course in inorganic chemistry, one year of physical chemistry, mathematics through calculus, and one year of college physics, preferably taught using calculus. Students lacking some of these prerequisites may make up deficiencies concurrently with graduate work.

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

M.S. Degree Requirements
All students must complete 30 credits, including a minimum of 14 credits in the major (including four core courses) and 6 credits in a related field or minor. Plan A students must also register for 10 thesis credits; Plan B students must complete an additional 10 course credits and prepare three papers. Attendance and presentation at the chemistry seminar is required. Individual programs are designed to best serve the interests of the student

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

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

Communication Sciences and Disorders

Contact Information—Department of Communication Sciences and Disorders, University of Minnesota Duluth, 221 Bohannon Hall, 1207 Ordean Court, Duluth, MN 55812 (218-726-7974; fax 218-726-8693; kcl@umn.edu; www.d.umn.edu/csd/general/csdgrad.htm).

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

Professor
Paul N. Deput, M2
Mark I. Mizuko, M2

Associate Professor
Faith C. Loven, M2
Joseph R. Prohaska, Biochemistry and Molecular Biology, M2

Assistant Professor
Kent R. Brorson, M2

Instructor
La Vonne Levar, M2

Curriculum—The graduate program in communication sciences and disorders effectively combines academic and clinical endeavors to prepare students to become
speech-language pathologists. The program places a major emphasis on the development of clinical skills, although students have the opportunity to engage in a wide variety of academic and research activities as well. The curriculum, which is based on five semesters of study, is accredited by the Council of Academic Accreditation (CAA) in speech-language pathology and also by the American Speech-Language Hearing Association (ASHA).

Admission Requirements — Applicants must have a bachelor’s degree in communication sciences and disorders. Three letters of recommendation evaluating the applicant’s scholarship and clinical potential are required. At least two letters should be from academic faculty familiar with the applicant. A personal statement of the applicant’s short- and long-term goals is also required.

M.A. Plan B Degree Requirements
The M.A. is offered under Plan B only. At least 43 credits are required, including 31 credits of required CSD courses, 2 credits of Plan B project (CSD 8099), 4 credits of internship, and at least 6 credits of approved courses (4xxx and higher) from related fields. All Plan B projects must be pre-approved by the student’s examining committee, which also must give final approval.

Language Requirements — None.

Final Exam — The final exam is oral.

Computer Science

Contact Information — Department of Computer Science, University of Minnesota Duluth, 320 Heller Hall, 1114 Kirby Drive, Duluth, MN 55812 (218-726-7678; fax 218-726-8246; cs@d.umn.edu; www.d.umn.edu/cs/degr/grad). For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Donald B. Crouch, M2
Douglas J. Dunham, M2
Marian Stachowicz, Electrical and Computer Engineering, AM2

Associate Professor
Carolyn C. Crouch, M2
Richard F. Maclin, M2
Theodore D. Pedersen, M2
Gary M. Shute, M2
Masha Sosonkina, M2
C. Hudson Turner, M2

Assistant Professor
Baek Young Choi, AM
Christopher G. Prince, M2

Curriculum — Computer science is a discipline that involves understanding the design of computers and computational processes. The discipline ranges from the theoretical study of algorithms to the design and implementation of software at the systems and applications levels.

The M.S. is a two-year program that provides the necessary foundational studies for graduates planning to pursue either a Ph.D. in computer science or a career as a computer scientist in business or industry.

Admission Requirements — The program is designed for students with undergraduate degrees in computer science or computer engineering. These students should be able to enroll immediately in 8xxx computer science courses. Students with other backgrounds may be considered if they have completed the following courses or their equivalents: CS 1511-1521 — Computer Science I-II; CS 2511 — Software Analysis and Design; CS 2521 — Computer Organization and Architecture; CS 3511 — Computer Science Theory or both CS 4511 — Computability and Complexity and CS 4521 — Algorithms and Data Structures; CS 5621 — Computer Architecture or CS 5651 — Computer Networks; and CS 5631 — Operating Systems. Appropriate math prerequisites, namely Math 1296-1297 — Calculus I-II, and Statistics 3611 — Introduction to Probability and Statistics, are also required. Students who lack only a small number of these required courses may be admitted provisionally and must complete them before proceeding with their graduate work. The GRE General Test is required of all applicants; the TOEFL is also required of international students.

Use of 4xxx Courses — 4xxx computer science courses may not be included in degree programs.

M.S. Degree Requirements
The M.S. is offered under Plan A (thesis) and Plan B (without thesis). At least 33 credits are required, including 16 credits from 8xxx courses in computer science, 1 credit of CS 8993, (seminar) and at least 6 credits from a minor or related field outside computer science. Plan A requires 10 thesis credits and Plan B requires a minimum of 10 credits in computer science at 5xxx or above. All courses are chosen in consultation with the student’s adviser, subject to approval by the director of graduate studies.

Language Requirements — None.

Final Exam — Students present a department colloquium, followed by an oral exam.

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

Criminology

Contact Information — Department of Sociology Anthropology, University of Minnesota Duluth, 228 Cina Hall, 1123 University Drive, Duluth, MN 55812 (218-726-7551; fax 218-726-6386; crimmia@d.umn.edu; www.d.umn.edu/socanth/CrimMIA). For up-to-date graduate faculty listings, see: www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
John A. Arthur, M2
William A. Fleischman, M2
J. Clark Laundergan, M2

Associate Professor
Sheryl J. Grana, M2
John E. Hamlin, M2
Janelle L. Wilson, M2

Assistant Professor
Jeffrey R. Maahs, M2
Deborah M. Plechner, M2
Robert R. Weidner, M2

Instructor
Gary Gasele, M2
Bruce Mork, M2

Curriculum — The core courses for the M.A. in criminology feature relevant theoretical perspectives in understanding criminal behavior, methods of research and data analysis, and critical analysis of the criminal justice system. The curriculum is based on the premise that a liberal education in the social sciences includes the development of a student’s ability to a) define problems effectively by asking appropriate questions, b) understand and respect people with diverse opinions, backgrounds, characteristics, and lifestyles, c) respect the right of freedom of inquiry, to willingly challenge conventional wisdom, and to be intellectually flexible when challenged by factual information, and d) understand the significance of inequality in the way that criminal justice is administered. The departmental theme of inequality is incorporated into the graduate program as it is in the undergraduate program. In particular, structural forms of oppression are examined, and emphasis is placed on issues of social justice, human rights, and treatment/rehabilitation.

The framework of the program provides students with opportunities to develop a knowledge base that enhances understanding of criminal behavior and the workings of the criminal justice system. Core requirements give students experience in utilizing various methods of research, analyzing and interpreting data, understanding and critiquing the main theoretical traditions in the field, and examining the organization of the criminal justice system. Furthermore, course electives enable students to focus on more specific interests (e.g., policing, courts, youth justice).

The M.A. in criminology provides an opportunity for both intellectual and professional development. The program serves those students with undergraduate degrees in criminology (or a related social science) who are interested in pursuing advanced study in the study of crime and the administration of criminal justice. The program also serves those who have been employed in organizations and agencies in the criminal justice system (and related organizations) who wish to expand their knowledge and understanding that may result in career advancement and/or career shifts.
Admission Requirements—Applicants must have a baccalaureate degree from an accredited U.S. institution or a foreign equivalent for admission to the M.A. Program.

Preference will be given to applicants with undergraduate degrees with majors in criminology, criminal justice, corrections, sociology, law enforcement or a major in a related field may also be considered. Undergraduate degrees in criminology, criminal justice, corrections, sociology or a related field from foreign universities may also be considered, as long as those degrees are equivalent to a four-year American university baccalaureate degree.

Applicants are expected to have successfully completed an introduction to criminology or criminal justice course, the equivalent of one semester of research methods and/or statistics beyond the introductory level, and a course devoted primarily to social/behavioral theory. The minimum GPA for regular admissions is 3.00 on a 4-point scale. Students with a GPA less than 3.00 are considered on an individual basis and may be admitted conditionally. Students admitted with a conditional status are reviewed after completing six credit hours of graduate work and are expected to have received grades of B or better and have successfully completed remedial work with grade(s) of B or better to receive full admission to the M.A. Program.

Applicants must supply: official transcripts from all colleges and universities attended and three letters of recommendation evaluating the applicant’s scholarship and potential for graduate study. At least two letters should be from academic faculty familiar with the applicant. An essay explaining why an advanced degree in criminology is of interest and why the applicant merits serious consideration must also be submitted. The essay should include a personal statement of the applicant’s short and long-term professional goals and commitment and preparation for graduate study in criminology (1-2 pages). International students whose native language is not English are required to submit scores from the TOEFL examination (550 minimum score, 213 minimum computer-based score). Admission to the M.A. program is competitive.

Use of 4xxx Courses—Upon the advice and approval of the director of graduate studies, students may use 4xxx courses in related fields as appropriate. Sociology 4xxx courses may not be included in the degree programs.

M.A. Degree Requirements

The M.A. is offered under both Plan A and Plan B and each requires 38 credits.

The Plan A option involves thesis work; the Plan B option involves a special project based upon a student’s practicum work. The Plan B paper combines theories, concepts, and principles from at least one course in the student’s program of study with work being done in a practicum. All students must take both Soc 8200 (4 credits) and Soc 8300 (3 credits). Plan A students must enroll in Soc 8777 (Thesis Credits: Master’s; minimum of 10 credits required). Plan B students must enroll in Soc 8600 (Criminology Practicum; minimum of 10 credits required). In addition to the listed credits, all students must choose at least one course in each of department elective categories (Systems, Methods and Statistics, and Theory). Additional credits may be taken from any of the three categories and/or directed readings for a total of 15 credits.

Students are expected to include additional elective courses (6 credits) outside the major (in a minor or related field) as part of their program of study. The choice and approval of related field courses is done in consultation with and approval of the student’s advising/examining committee. Upon the advice and approval of the director of graduate studies, students may use 4xxx courses in related fields as appropriate. Sociology 4xxx courses may not be included in the degree programs for the M.A. in criminology.

Language Requirements—None.

Final Exam—Students present a department colloquium, followed by an oral examination.

Minor Requirements for Students Majoring in Other Fields—A master’s minor requires 4 credits in methods/statistics, 3 credits in theory, and 3 elective credits.

Electrical and Computer Engineering

Contact Information—Department of Electrical and Computer Engineering, University of Minnesota Duluth, 271 Marshall W. Alworth Hall, 1023 University Drive, Duluth, MN 55812 (218-726-6147; fax 218-726-7267; ece@d.umn.edu; www.d.umn.edu/ece).

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

Professor

Stanley G. Burns, M2
Taeck Mu Kwon, M2
Marian Stachowicz, M2
Jiann-Shiou Yang, M2

Associate Professor

Christopher R. Carroll, M2
Mohammed Hasan, M2
M. Imran Hayee, M2

Assistant Professor

Rocio Alba-Flores, M2
Fernando Rios-Gutierrez, M2
Bassam Shaer, M2

Curriculum—The master of science in electrical and computer engineering (M.S.E.C.E.) combines scholarship and research in a program oriented towards students and engineering practitioners in the private and public sectors who are interested in advanced coursework and applied research. The program requires 31 credits of graduate coursework and research and focuses on core departmental streams of design and implementation of computer hardware/software including digital circuits and VLSI, embedded controllers, computer networks, distributed computing, analog and digital circuit design and application, instrumentation, communication systems, soft computing, robotics, and control systems.

Admission Requirements—Applicants should have a bachelor’s degree in electrical and/or computer engineering or related field by time of enrollment. Applicants should meet the general admission requirements of the Graduate School of the University of Minnesota. Preferred performance level is 3.0/4.0 GPA from an accredited U.S. institution or foreign equivalent. Two letters of recommendation concerning the student’s readiness for graduate education and academic abilities are required. Minimum performance on the TOEFL is 550 or 213 on the computerized test. GRE scores are recommended but not required. Industrial experience and professional licensure will be considered for admittance. Previous graduate-level coursework completed after receiving a baccalaureate degree may qualify for transfer credit upon recommendation and approval by the M.S.E.C.E. director of graduate studies.

M.S.E.C.E. Degree Requirements

M.S.E.C.E. Degree Requirements—The M.S.E.C.E. is offered under Plan A (thesis) and Plan B (non-thesis). The director of graduate studies must approve all programs.

Plan A is primarily for those students wishing to prepare themselves for Ph.D. studies and careers in research and academia. Students must complete a minimum of 31 semester credits in graduate courses. At least 15 credits must be electrical and computer engineering courses with at least 6 credits in courses numbered 4xxx or higher, 6 credits in courses numbered 5xxx or higher, and at least 3 credits in courses at 8xxx. An additional 6 credits must be in a related field or minor. A minimum of 10 credits must be taken in ECE 8777.

Plan B is primarily for new engineering graduates and practicing engineers who want and need more technical education than would be provided by courses and an applied research-oriented project component. Students must complete a minimum of 31 credits in graduate courses. At least 9 credits must be ECE courses numbered 5xxx and higher with at least 3 of those credits numbered 8xxx, excluding colloquium and Plan B project credits. At least 12 of the remaining credits must be in ECE courses numbered 4xxx or higher and at least 6 credits must be outside of electrical and computer engineering. The program cannot include more than 4 credits from projects.
Duluth Degree Programs

Language Requirements — None.

Final Exam — A formal defense of the thesis is required for Plan A students. The final exam for Plan B is a formal report and oral presentation.

Minor Requirements for Students Majoring in Other Fields — A master’s minor requires 6 ECE courses. Individual programs must be approved by the director of graduate studies in electrical and computer engineering.

Engineering Management

Contact Information — Department of Mechanical and Industrial Engineering, University of Minnesota Duluth, 229 Voss-Kovach Hall, 1305 Ordean Court, Duluth, MN 55812 (218-726-8117; fax 218-726-8581; gseme@d.umn.edu; http://ie.d.umn.edu/Grad); For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.aspx

Professor
Mark A. Fugelso, M2
Abu Kashid Hasan, Chemical Engineering, M2
Thys B. Johnson (emeritus), AM2
L. Alden Kendall (emeritus), M2
Richard R. Lindeke, AM2
David A. Wyrick, M2

Associate Professor
Hamid Fonooni, M2
Dale A. Krageschmidt, M2
Ryan G. Rosandich, M2

Assistant Professor
Emmanuel Enemuoh, M2
Bill Pedersen, M2
John Voss, M2

Adjunct Professor
Richard Hansen, AM

Curriculum — The master of science in engineering management (M.S.E.M.) program provides engineers with tools to more effectively manage people, projects, technology, and information in their careers to promote economic growth, competitiveness, ethical decision-making, and environmental responsibility. As people in engineering positions often manage technical projects of varying size and complexity, the M.S.E.M. provides an excellent foundation. To meet the needs of practitioners, courses are offered in the evening and are available to remote sites by interactive television. Full-time enrollment is possible and the course structure allows for unique research opportunities.

Admission Requirements — All applicants must meet the general admission requirements of the Graduate School. Applicants should have completed an undergraduate degree in an engineering discipline. However, an applicant with a degree in another technical major and with a substantial background in engineering may qualify. Such students may be admitted on a case-by-case basis and are asked to submit documentation that substantiates their engineering and technology experience and responsibilities.

Applicants must provide two letters of recommendation concerning their academic ability and readiness for graduate education. A minimum 3.00 GPA from an accredited U.S. institution or foreign equivalent is required. International students must submit a score of at least 550 on the paper-based or 213 on the computer-based TOEFL.

Use of 4xxx Courses — Upon the advice and approval of the director of graduate studies, students may use 4xxx courses in related fields as appropriate.

M.S.E.M. Degree Requirements
Plan A students must complete at least 31 credits, including a minimum of 15 credits in the major, 6 credits from a related program, and 10 thesis credits. Individual programs are designed to best serve the interests of the student. The director of graduate studies must approve all programs.

Plan B students must complete 30 credits, including a minimum of 15 credits in the major, a 3-credit capstone project course, and 6 credits in a related field or minor (business administration). Students must complete an additional 6 credits in engineering management or other electives, whichever best fits the needs of the student. The capstone project course requires a formal report and oral presentation. Individual programs are designed to best serve the interest of the student. The director of graduate studies must approve all programs.

Language Requirements — None.

Final Exam — A formal defense of the thesis is required for Plan A students. The final exam is a formal report and oral presentation in EMgt 8310 for Plan B students.

Minor Requirements for Students Majoring in Other Fields — A master’s minor requires 6 credits in engineering management courses. Individual programs must be approved by the director of graduate studies in engineering management.

English

Contact Information — Department of English, University of Minnesota Duluth, 412 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8228; fax 726-6882; engl@d.umn.edu; www.d.umn.edu/eng/englundsgrad/main/index.php).

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

Professor
Stephen J. Adams, M2
Thomas D. Baigc, Sociology-Anthropology, M2
Martin F. Bock, M2
Thomas J. Farrell, Composition, M2
William A. Gibson (emeritus), Composition, AM2
Michael D. Linn, Composition, M2
Joseph C. Maiolo, M2
Linda Miller-Cleary, M2

Associate Professor
Katherine L. Basham, M2
Carol A. Bock, M2
Roger C. Lips, M2
Kenneth C. Risdon, Composition, M2

Assistant Professor
Paul D. Cannan, M2
James Hewitson, AM
Richard Hillyer, AM
Jill D. Jenson, Composition, M2
Jo M. Mackiewicz, Composition, M2
Kathleen Maurer, Composition, M2
John D. Schvetman, M2
Carolyn Sigler, M2
Craig Stroupe, Composition, M2
Krista Sue-Lo Twu, M2

Instructor
Rob Wittig, Art and Design, AM

Curriculum — The M.A program offers courses in English, Irish, and American literature; creative writing; linguistics; composition and rhetorical theory; book history; publishing; and English education. The program has three emphases: a literary studies emphasis for concentrated study of literature, an interdisciplinary emphasis in English studies, and an emphasis in publishing and print culture.

Admission Requirements — Students applying to this program must submit GRE General Test scores, two writing samples such as course papers, and three letters of recommendation. International applicants must submit TOEFL scores of at least 600 (written test). Entering students should have completed at least 30 semester credits in English (these may include credits in literature, language, and advanced composition), including 20 credits of upper division English courses that offer broad coverage of English and American literature and at least one course in English language or English linguistics. Any deficiencies are determined by the director of graduate studies in consultation with the graduate committee. Certain course prerequisites may be taken concurrently with graduate work and may be applied toward degree requirements.

Use of 4xxx Courses — Use of 4xxx courses is permitted for courses taken to satisfy requirements in a related field. 4xxx courses in English, composition, and linguistics may not be included on degree program forms in English.

M.A. Plan B Degree Requirements

Literary Studies Emphasis: a minimum of 30 credits, including at least 24 credits in the major, 6-8 credits in a related field, and two Plan B projects.

English Studies Emphasis: a minimum of 31 credits, including at least 25 credits in the major distributed in literature, linguistics, and composition/rhetoric; 6-8 credits in a related field; and two Plan B projects.
Publishing and Print Culture: a minimum of 31 credits, including at least 25 credits in the major distributed in literature, publishing, and print culture; 6-8 credits in a related field; and two Plan B projects.

Language Requirements—The emphases in literary studies and publishing and print culture require a reading knowledge of Latin, Greek, French, Italian, Spanish, Russian, or another approved language.

The English studies emphasis requires certification of a reading knowledge of a foreign language appropriate to the candidate’s area of study and approved by the English graduate committee or completion of at least 6 course credits beyond the 31 required credits. Candidates, whose professional objectives are best served by completing the additional 6 credits, select courses from literature and literary analysis, linguistics, composition/rhetoric, print culture, publishing, or courses closely related to the field of concentration.

Final Exam—The final exams are written and oral. Students must submit two Plan B projects totaling 120 hours of effort before taking the exam. The projects normally are completed in connection with courses in English or in a related field. A completed project must be approved by a graduate faculty member.

Minor Requirements for Students Majoring in Other Fields—At least 8 credits in English, composition, and/or linguistics are required for a master’s minor.

Geological Sciences

Contact Information—Department of Geological Sciences, University of Minnesota Duluth, 229 Heller Hall, 1114 Kirby Drive, Duluth, MN 55812 (218-726-7238; fax 218-726-8275; geol@d.umn.edu; http://www.d.umn.edu/geology/programs/grad.html). For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Steve Colman, M2
John W. Goode, M2
James A. Grant (emeritus), M2
Vicki L. Hansen, M2
Timothy B. Holst, M2
Thomas C. Johnson, M2
Charles L. Matsch (emeritus), AM2
James D. Miller, Jr., AM2
Howard D. Mosers, M2
Ronald L. Morton, M2
Richard W. Ojakangas (emeritus), AM2

Associate Professor
Erik T. Brown, M2
Penelope Morton, M2
Nigel J. Watruss, M2

Assistant Professor
Timothy M. Demko, M2
Christian D. Gallup, M2
George J. Hudak III, AM2
Richard D. Ricketts, AM2
John B. Swenson, M2
Josef P. Werne, Chemistry, AM2

Research Associate
Dean M. Peterson, Natural Resources Research Institute, AM2

Curriculum—The M.S. program in geological sciences includes areas of economic geology, geophysics, glacial geology and geomorphology, hydrogeology, igneous and metamorphic petrology, isotopic and aqueous geochemistry, limnogeology, paleoclimatology, planetary geology, sedimentary and stratigraphy, surface processes, and structure tectonics. See the geology Web site at www.d.umn.edu/geology.

Admission Requirements—Applicants must have completed an undergraduate major in geology, geophysics, or related earth science with one year each of college mathematics (including calculus), chemistry, and physics. Field camp and/or undergraduate research experience is recommended. GRE General Test scores are required.

Research Facilities—Research facilities include those for microscopy, XRD, isotopic and trace element analysis, digital imagery, ground-penetrating radar, and near-surface seismic profiling. There is a departmental computer lab and ready access to the mainframe system. Additional facilities are available at the Large Lakes Observatory (including an 87-foot research vessel) and at the Natural Resources Research Institute (including a GIS system), both affiliated with UMD, and the Department of Geology and Geophysics in Minneapolis (particularly an electron microprobe lab).

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

M.S. Degree Requirements

The M.S. is offered under Plan A (thesis) and Plan B (without thesis). Courses are selected with approval of the student’s adviser and the director of graduate studies; no more than 25 percent of the courses may be 4xxx except by their approval. For both plans, a written candidacy exam during the second semester of residency is required.

Plan A requires 31 credits, including 14 course credits in the major, 6 course credits in a minor or related field, 1 credit course (Geol 8200) and 10 thesis credits. All courses must be 4xxx or 5xxx. Plan B requires 31 credits in approved courses, including 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 a minimum of 6 credits and is decided in consultation with the student’s adviser and the director of graduate studies in geology.

Liberal Studies

Contact Information—College of Liberal Arts, M.L.S. Program, University of Minnesota Duluth, 494 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8149; fax 218-726-6386; laker@d.umn.edu; www.d.umn.edu/ce/html/mls.html). For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp.

Professor
Stephen Adams, English, M2
John Arthur, Sociology-Anthropology, M2
Elizabeth Bartlett, Women’s Studies, M2
James H. Fetzer, Philosophy, M2
William Fleischmann, Sociology-Anthropology, M2
Thomas F. Hedlin, Art, M2
Thomas F. Jordan (emeritus), Physics, AM2
Andrew R. Klener, Biology, M2
Lawrence Knopp, Geography, M2
Fred E. Schroeder (emeritus), Humanities, AM2
Richard A. Seybolt, Foreign Languages and Literatures, M2
David M. Smith (emeritus), Sociology-Anthropology, M2
Neil T. Storch, History, M2
Judith Ann Trolander, History, M2

Associate Professor
Stephen P. Chilton, Political Science, M2
Scott Frendschuh, Geography, M2
Tom K. Isbell, Theatre, M2
AnnaMarie E. Roos, History, M2
Robyn S. Roslak, Art, M2
Janelle L. Wilson, Sociology-Anthropology, M2

Assistant Professor
Eleanor Hannah, History, M2
Michael W. Pfau, Communication, M2
Thomas F. Powers, Political Science, M2
Rosemary Stanley-Johnson, History, M2
Steven J. Vanderheiden, Political Science, M2

Curriculum—The interdisciplinary M.L.S. is a community outreach program that provides citizens with the opportunity to return to higher education to broaden their intellectual horizons without having to focus on specific professional goals. Two emphases include the traditional M.L.S. or an ecology, economics, and ethics emphasis. In both emphases, students write one to three papers exploring in depth an interdisciplinary topic.

Admission Requirements—Applicants must have a bachelor’s degree from a recognized college or university with a 3.00 GPA. The application should include three letters of recommendation and a thoughtfully composed letter stating, in narrative form, reasons for wishing to pursue the M.L.S. and describing education and career experiences. This letter should be addressed to the director of graduate studies in the UMD Graduate School Office.

Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.
M.L.S. Plan B Degree Requirements
The M.L.S. is offered under Plan B only. Students in either emphasis must complete 32 credits, including at least 4 credits of IS 8001—Introduction to Liberal Studies. Those students electing the traditional emphasis must also take 4 credits of IS 8501—Seminar: Ethics and the Human Condition and 24 elective credits. Students selecting the ecology, economics, and ethics emphasis must also take 4 credits of IS 8250—Ecological Economics, 4 credits of IS 8502—Ecology, Economics, and Ethics, and an additional 20 credits of electives. One to three Plan B papers are required in both emphases.

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

Linguistics

Minor Only

Contact Information—Program in Linguistics, University of Minnesota Duluth, 457 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8525; fax 218-726-6882; linn@d.umn.edu; www.d.umn.edu/ling)
For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
Michael D. Linn, Composition, M

Associate Professor
Jonathan B. Conant, Foreign Languages and Literatures, M
Milan Kovacovic, Foreign Languages and Literatures, M

Assistant Professor
Jo Mackiewicz, Composition, M

Curriculum—Linguistics, offered interdepartmentally and through the Department of Interdisciplinary Programs, may be elected by graduate students as a related field, or with approval of the director of graduate studies of the major, as a designated minor.

Minor Only Requirements
The minor in linguistics requires a minimum of 6 credits selected from Anth 4628—Language and Culture (3 cr), Engl 5811—Introduction to Modern English (4 cr), Engl 5821—History of the English Language (4 cr), Ling 5195—Special Topcis (3 cr), Ling 5802—Applied Linguistics (4 cr), Ling 5852—Practicum in Teaching Linguistics (3 cr), Ling 8500—Graduate Seminar (3 cr), and Ling 8591—Independent Study (1-3 cr).

Music
Contact Information—Department of Music, University of Minnesota Duluth, 231 Humanities Building, 1201 Ordean Court, Duluth, MN 55812 (218-726-8207; fax 218-726-8210; mu@d.umn.edu; www.d.umn.edu/music/degree/index.html)
For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
Ann C. Anderson, AM
Judith Ann Kritzemire, M2
Thomas J. Wegren, M
Stanley R. Wold, M2

Associate Professor
Justin H. Rubin, M2
David J. Schmalenberger, M2
Mark E. Whitlock, M2

Assistant Professor
Jeanne A. Doty, M2
Ryan J. Fran, M
Rachel L. Inselman, AM
Jean R. Perrault, AM
Theodore A. Schoen, M
Joseph S. Spann, AM
Tina L. Thielen-Gaffey, AM
Ramon F. Vasquez, AM

Lecturer
Maria T. Annoni, AM

Curriculum—The M.M. program offers students an opportunity to acquire advanced understandings and skills in music education theory and practice or in musical performance. A course of study is designed to meet the interests and objectives of the student.
Admission Requirements—Applicants must have an undergraduate degree in music with an undergraduate GPA of 3.00 or higher and must have applied to the University of Minnesota Graduate School. In addition, the following must be submitted for review by the music graduate committee: 1) Department of Music Graduate Study Application; 2) sample of professional writing (a three- to five-page paper addressing current issues in music performance or music education); 3) two letters of reference from professional colleagues and/or supervisors describing the candidate’s potential for success in the graduate music program; and 4) an entrance performance audition on the major instrument or a videotape of classroom teaching or conducting.
Use of 4xxx Courses—Inclusion of 4xxx courses on degree program forms is subject to adviser and director of graduate studies approval.

Music

M.M. Plan B Degree Requirements
The M.M. in music education and performance emphases each requires 30 credits. The music education emphasis requires 14 credits in music education/education, 8 credits in the related field of music, 6 credits for the Plan B paper, and 2 elective credits. The performance emphasis requires 14 credits in performance pedagogy (includes recital credit), 8 credits in music theory and literature, 6 credits in research/foundation courses, 2 elective credits and a solo recital.

Language Requirements—Voice performance majors must demonstrate foreign language proficiency or enroll in remedial courses.
Final Exam—A comprehensive written and oral final are required.

Physics

Contact Information—Department of Physics, University of Minnesota Duluth, 371 Marshall W. Alworth Hall, 1023 University Drive, Duluth, MN 55812 (218-726-7124; fax 218-726-6942; phys@d.umn.edu; www.d.umn.edu/~jmaps/gradpgm.htm)
For up-to-date graduate faculty listings, see www.grad.umn.edu/faculty_rosters/step1.asp

Professor
John R. Miller, M2
Thomas F. Jordan (emeritus), AM2
Michael Sydor, M2

Associate Professor
Bo R. Casserberg, M2
Elise A. Ralph, M2

Assistant Professor
Alec T. Habig, M2
Jonathan Maps, M2
Brian D. May, M2

Curriculum—The M.S. program provides a grounding in the fundamentals of physics, combined with significant research involvement. The primary areas of research are computational physics, high-energy neutrino physics, experimental work in condensed-matter physics, and observational and theoretical work in physical limnology.

Admission Requirements—An undergraduate degree in physics or the equivalent is required.

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

M.S. Degree Requirements
The M.S. is offered under both Plan A and Plan B. All students take 11 credits in a common core of courses (including Phys 5501, 5511, 5521, and 2 credits in 5090), 3 credits in a methods course (Phys 5052 or 5053 or 5061), and 6 credits in a minor or related field. Plan A also requires 10 thesis credits. Plan B requires one or more projects for a total of 120 hours of work, preparation of a written report for each project, and 10 additional course credits in physics. These courses may include 4xxx courses if appropriate and if approved for graduate credit; for distinctly interdisciplinary programs, the courses may be outside physics. In all cases, the overall plan of study
and selection of elective courses must form a coherent program and be approved by the director of graduate studies.

**Language Requirements** — None.

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

**Minor Requirements for Students Majoring in Other Fields** — A master’s minor requires 6 credits, of which no more than 1 credit can be from Phys 5090.

### Social Work

**Contact Information** — Department of Social Work, University of Minnesota Duluth, 220 Bohannon Hall, 1207 Ordean Court, Duluth, MN 55812 (218-726-7245; fax 218-726-7185; sw@d.umn.edu; www.d.umn.edu/sw).

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

**Professor**
Dennis R. Falk, M2
Melanie F. Shepard, M2

**Associate Professor**
Priscilla A. Day, M2
Kathleen E. Nuccio, M2
R. Michael Raschick, M2

**Assistant Professor**
Lynn Ellen H. Bye, M2
Donald Carpenter, M2
Aimi Tellett, M2

**Instructor**
Kathleen V. Celtzer, M2

**Curriculum** — The master of social work (M.S.W.) program offers a concentration in advanced generalist practice that prepares students to practice in a variety of human service settings. Graduates undertake a variety of professional social work roles ranging from counselor and case manager to community organizer and administrator. The curriculum has a special focus on services to American Indians and their communities. Coursework is also available in the area of child welfare practice. The M.S.W. program is accredited by the Council on Social Work Education. Admission Requirements — 1) A bachelor’s degree from a regionally accredited college or university. The bachelor’s degree should include a solid background in the liberal arts, as evidenced on the transcript by courses in the arts, cultural studies, and behavioral and social sciences. Applicants should be knowledgeable about diverse cultures, social problems, social conditions, and the social, psychological, and biological determinants of human behavior. Applicants with undergraduate degree majors in social work or a related field or discipline are given preference over applicants with other majors.

2) Completion of at least 18 semester credits in two or more social science disciplines, such as sociology, psychology, economics, anthropology, or political science. 3) Strong academic preparation as demonstrated by a minimum undergraduate GPA of 3.00.

4) Potential to contribute to the social work profession. Preference is given to applicants with professional experience in human service settings, particularly when this experience involves working with underrepresented and protected classes.

**Enrollment Prerequisites** — Admitted applicants must complete a college-level biology course with content on human anatomical and physiological development and a college-level statistics course. The biology course must be completed before registering for the first semester in the M.S.W. program, and the statistics course must be completed before registering for the first research course. Interested persons can apply and be admitted before completing the enrollment prerequisites.

**Advanced Standing** — Applicants with a bachelor of social work degree from a program accredited by the Council on Social Work Education may apply for admission to the advanced standing program. All other applicants are ineligible for this program.

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

**M.S.W. Degree Requirements**
The M.S.W. requires 51 credits (34 credits for students admitted with advanced standing), including a minimum of 41 credits in social work courses (28 credits for advanced standing students), at least 2 credits in a related field, a master’s project and final examination. The program requires two field placements in human service agencies (one field placement for students with advanced standing). A minimum GPA of 3.00 for courses included in the degree program is required. A level of personal and professional competence considered satisfactory for entrance into the profession of social work, as indicated by course and field placement evaluations, is required.

**Language Requirements** — None.

**Final Exam** — None.

### Related Fields
Graduate degree programs do not exist in the following fields. However, students may earn graduate credit in courses related to their program and use faculty members on their examining committees from these fields. For graduate courses, see the Courses section of this catalog.

### American Indian Studies

**Professor**
John G. Red Horse, E

### Anthropology

**Professor**
Linda S. Belote, E
Michael D. Linn, Composition, E
Ron T. Marchese, E
Timothy G. Roufs, E
David M. Smith (emeritus), E

**Associate Professor**
Sharon R. Kemp (emeritus), E

**Assistant Professor**
Jennifer E. Jones, E
David Syring, E

### Art History

**Professor**
Thomas F. Hedlin, E

**Associate Professor**
Robyn S. Roslak, E

### Behavioral Sciences

**Professor**
Barbara A. Elliott, E
Frederic W. Hafferty, E

**Associate Professor**
Mustafa al’Absi, E
James G. Boulger, E
Gary L. Davis, E
Richard Hoffman, E

### Chemical Engineering

**Professor**
Richard A. Davis, E
A. Rashid Hasan, E

**Associate Professor**
Keith B. Lodge, E
Steven P. Sternberg, E

**Assistant Professor**
Michael A. Rother, E
Gregory Rutkowski, E

### Communication

**Professor**
Mike Sunnafrank, E

**Associate Professor**
Virginia T. Katz (emeritus), E
Linda T. Krug, E
Elizabeth J. Nelson, E
Gerald L. Pepper, E
Deborah Petersen-Perlman, E

**Assistant Professor**
Ryan Goei, E
Michael W. Pfau, E

### Cultural Studies

**Professor**
Thomas D. Bacig, Sociology-Anthropology, E
Thomas J. Farrell, Composition, E
Ronald T. Marchese, History, E

**Assistant Professor**
Mitra C. Emad, Sociology-Anthropology, E
Education

Professor
Dennis R. Falk, Social Work, E
David A. McCarthy, E
Linda Miller-Cleary, English, E
Associate Professor
Kenneth Gilbertson, Health, Physical Education, and Recreation, E
Francis Gulbrandsen, E
Nedra A. Hazareesingh, E
John R. Keener, Health, Physical Education, and Recreation, E
Georgia L. Keeney, Health, Physical Education, and Recreation, E
June E. Kreutzkampf, E
Edmond F. Lundstrom (emeritus), Health, Physical Education, and Recreation, E
Helen Mongan-Rallis, E
Bruce H. Munson, E
Thomas D. Peacock, E
Terrie M. Shannon, E
Assistant Professor
Mary R. Hermes, E
Trudie A. Hughes, E
Susan Larson-Kidd, E
Mary A. Marchel, E
Chang’aa Mwetii, E
Jean M. Stevenson, E
Joyce Strand, E
Joan Varney, E
Jiyoon, Yoon, E
Instructor
Molly H. Minkkinen, E

French

Associate Professor
Yolande J. Jenny, Foreign Languages and Literatures, E
Milan Kovacovic, Foreign Languages and Literatures, E

Geography

Professor
Lawrence M. Knopp, E
Associate Professor
Tongxin Zhu, E
Assistant Professor
Gordon L. Levine (emeritus), E

Assistant Professor
Gordon L. Levine (emeritus), E

Instructor
Stacey L. Stark, E

German

Assistant Professor
Gesa Zinn, Foreign Languages and Literatures, E

Health Education

Professor
Eugene S. Ley, Health, Physical Education, and Recreation, E

Associate Professor
Lori Dewald, Health, Physical Education, and Recreation, E
Georgia L. Keeney, Health, Physical Education, and Recreation, E
Assistant Professor
Ladona Tornabene, Health, Physical Education, and Recreation, E

Industrial Engineering

Professor
David Wyrick, E
Associate Professor
Ryan Rosandich, E
John C. Voss, E
Assistant Professor
Emmanuel Enemuoh, E
Bill Pedersen, E

Journalism

Instructor
Abhinav K. Aima, Composition, E
Drew Digby, History, E
Catherine E. Winter, Composition, E

Mechanical Engineering

Professor
David A. Wyrick, E
Associate Professor
Ryan Rosandich, E
Assistant Professor
Emmanuel Enemuoh, E
Bill Pedersen, E
Daniel Pope, E

Philosophy

Professor
James H. Fetzer, E
David J. Mayo, E
Associate Professor
David J. Cole, E
Eve Browning, E
Assistant Professor
Steven J. Vanderheiden, E

Physical Education

Associate Professor
Lori Dewald, E
Kenneth Gilbertson, E
John R. Keener, E
Duane Millsagle, E
Mark Nierenreiter, E
Assistant Professor
Jane Carlson, E
Donald Collins, E
Morris Levy, E

Political Science

Professor
Elizabeth Bartlett, Women’s Studies, E
Paul Sharp, E

Associate Professor
Stephen P. Chilton, E
Craig H. Grau, E
Assistant Professor
Thomas F. Powers, E
Steven Vanderheiden, E

Recreation

Associate Professor
Lori Dewald, Health, Physical Education, and Recreation, E
Kenneth Gilbertson, Health, Physical Education, and Recreation, E
Edmond F. Lundstrom, Health, Physical Education, and Recreation, E
Instructor
Thomas Beery, Health, Physical Education, and Recreation, E

Sociology

Professor
John A. Arthur, E
William Fleischman, E
J. Clark Laundergan, E
Associate Professor
Sheryl J. Grana, E
John E. Hamlin, E
Janelle L. Wilson, E
Assistant Professor
Jeffrey Maahs, E
Deborah Plechiner, E
Robert Weidner, E
Instructor
Gary Gasel, E
Bruce Mork, E

Spanish

Professor
Richard A. Seybolt, Foreign Languages and Literatures, E
Eileen M. Zeitz, Foreign Languages and Literatures, E

Theatre

Professor
Ann A. Bergeron, E
Arden W. Weaver, E
Associate Professor
Jon M. Berry, E
Patricia Dennis, E
Mark A. Harvey, E
Karen Hoffman, E
Thomas K. Isbell, E
William Payne, E
Cathryn F. Ufema, E

Women’s Studies

Associate Professor
Margaret N. Kamau, E
Tineke A. Ritmeester, E
University of Minnesota, Twin Cities
West Bank
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Below is an alphabetical list of course designators and their referents under which courses are organized within the Courses section of this catalog. The list is provided to help students find the full description of prerequisite courses and identify the programs to which the courses apply.

Directly following each designator and its referent is a “see” note in cases where the program name or names differ from the referent. For example, courses in physiology (Phsl) pertain to the cellular and integrative physiology program.

Courses in fields that do not offer graduate programs, but which may be taken for graduate credit if related to a student’s program, also appear in the course section; their designators and referents below are followed by “related courses.”

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