Duluth Campus
Mathematics B.S.
Mathematics & Statistics
Swenson College of Science and Engineering

• Program Type: Baccalaureate
• Requirements for this program are current for Fall 2013
• Required credits to graduate with this degree: 120
• Required credits within the major: 54
• Degree: Bachelor of Science

The program in mathematics develops competence in mathematical techniques and sharpens mathematical insight. Mathematics is fundamental to solving problems in physics, chemistry, biology, medicine, business, engineering, and technology. The mathematics major prepares students for careers in business, industry, and government and for further graduate studies.

Note: the B.S. in statistics and actuarial science is listed separately.

Honors Requirements: To graduate with department honors, a student must complete the program with an overall and department GPA of 3.50, satisfactorily complete a research project under the guidance of a department faculty member, and convey research results in a public presentation.

Program Delivery
This program is available:
• via classroom (the majority of instruction is face-to-face)

Admission Requirements
For information about University of Minnesota admission requirements, visit the Office of Admissions website.

General Requirements
The Board of Regents, on recommendation of the faculty, grants degrees from the University of Minnesota. Requirements for an undergraduate degree from University of Minnesota Duluth include the following:
1. Students must meet all course and credit requirements of the departments and colleges or schools in which they are enrolled including an advanced writing course. Students seeking two degrees must fulfill the requirements of both degrees. However, two degrees cannot be awarded for the same major.
2. Students must complete all requirements of the Liberal Education Program.
3. Students must complete a minimum of 120 semester credits.
4. At least 30 of the last 60 degree credits earned immediately before graduation must be awarded by UMD.
5. Students must complete at least half of their courses at the 3xx-level and higher at UMD. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
6. If a minor is required, students must take at least three upper division credits in their minor field from UMD.
7. The minimum cumulative UM GPA required for graduation will be 2.00 and will include only University of Minnesota coursework. A minimum UM GPA of 2.00 is required in each UMD undergraduate major and minor. No academic unit may impose higher grade point standards to graduate.
8. Diploma, transcripts, and certification will be withheld until all financial obligations to the University have been met.

Program Requirements
Requirements for the B.S. in mathematics include:

* Minor or second major from another area of study.

Introduction to Calculus Courses (10 cr)
Calculus I
Take one of the following three Calculus I courses:
MATH 1290 - Calculus for the Natural Sciences [LE CAT2, LOGIC & QR] (5.0 cr)
or MATH 1296 - Calculus I [LE CAT2, LOGIC & QR] (5.0 cr)
or MATH 1596 - Honors: Calculus I [LE CAT2, LOGIC & QR] (5.0 cr)

Take one of the following two Calculus II courses:
MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)
or MATH 1597 - Honors: Calculus II [LOGIC & QR] (5.0 cr)

Mathematics Core Courses (20 cr)
Core courses cannot count as electives.
Take the following six courses:
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
MATH 3355 - Discrete Mathematics (4.0 cr)
MATH 3941 - Undergraduate Colloquium (1.0 cr)
MATH 4201 - Elementary Real Analysis (4.0 cr)
MATH 4326 - Linear Algebra (3.0 cr)
STAT 3611 - Introduction to Probability and Statistics (4.0 cr)

Required From Other Departments (8 cr)
CS 1511 - Computer Science I [LE CAT3, LOGIC & QR] (5.0 cr)
WRIT 31xx (3.0 cr)

Electives (16 cr)
Core courses cannot count as electives.
MATH elective courses must be at least 3100.
STAT elective courses must be at least 5000.
At least 10 credits of MATH and/or STAT electives must be 4xxx or above.
At least 6 credits of electives must have MATH prefix and be 4xxx or above.
Only one credit of MATH 3120 may count toward the math major.
MATH 3326 or 4371 cannot be counted toward the major.

MATH
Take 0 - 6 credit(s) from the following:
• MATH 3xxx
MATH/STAT 4xxx-5xxx
Take 10 - 16 credit(s) from the following:
• MATH 4xxx
• MATH 5xxx
• STAT 5xxx

Double Majors ONLY
- A student pursuing a second major in statistics and actuarial science cannot apply STAT courses as electives.
- A student with a second major other than statistics and actuarial science may substitute courses from the approved nondepartmental list (below) on a one elective MATH credit for two outside credits exchange basis for up to seven MATH elective credits.

Approved Nondepartmental List:
Take 0 - 14 credit(s) from the following:
• BIOL 5807 - Mathematical Ecology (3.0 cr)
• CHE 4301 - Chemical Reaction Engineering (3.0 cr)
• CHE 4402 - Process Dynamics and Control (3.0 cr)
• CHEM 4641 - Physical Chemistry I (3.0 cr)
• CHEM 4642 - Physical Chemistry II (3.0 cr)
• CS 4511 (Inactive) (4.0 cr)
• CS 4521 (Inactive) (4.0 cr)
• CS 5541 - Artificial Intelligence (4.0 cr)
• CS 5721 - Computer Graphics (4.0 cr)
• CS 5751 - Introduction to Machine Learning (4.0 cr)
• EE 5151 - Digital Control System Design (3.0 cr)
• EE 5741 - Digital Signal Processing (3.0 cr)
• EE 5831 - Fuzzy Set Theory and Its Application (3.0 cr)
• GEOL 5240 - Physical Hydrogeology (4.0 cr)
• ME 4112 - Heat and Mass Transfer (3.0 cr)
• ME 4135 - Robotics and Controls (3.0 cr)
• PHYS 4001 - Classical Mechanics (4.0 cr)
• PHYS 4011 - Electromagnetic Theory (4.0 cr)
• PHYS 4021 - Quantum Physics II (4.0 cr)
• PHYS 4031 - Thermal and Statistical Physics (4.0 cr)
• PHYS 5052 - Computational Methods in Physics (3.0 cr)
• PHYS 5501 - Advanced Classical Mechanics (3.0 cr)
• PHYS 5541 - Fluid Dynamics (3.0 cr)

Program Areas of Emphasis
Mathematics includes a wide variety of areas in which students can specialize: traditional mathematics (preparation for Graduate School), applied analysis, computational mathematics, discrete mathematics, and mathematics education. Although no area is required for the MATH major, students are encouraged to work with their advisers to develop a coherent major plan. See the Department of Mathematics and Statistics Web page: http://www.d.umn.edu/math for descriptions of elective course groups.