Mathematics

Undergraduate Study

For the undergraduate curriculum in liberal arts and sciences, major in mathematics, leading to the degree bachelor of science, see Liberal Arts and Sciences, Curriculum. The program in mathematics offers training suitable for students planning to enter secondary school teaching, to work in mathematics and computation for industry or government, or to continue their studies in graduate school. Students may satisfy the major requirements in several ways, suitable for various career objectives. Graduates can construct rigorous arguments to demonstrate mathematical facts. They can communicate their mathematical methods to others and can justify their assumptions.

Traditional Program

The traditional program of study for mathematics majors gives students a thorough grounding in mathematics. Graduates understand a broad range of mathematical topics and are familiar with a broad range of mathematical models. They have skills for solving problems in diverse situations. The program allows flexibility for specialization, and students are encouraged to steer their education according to career objectives. This traditional program of study requires:

- **MATH 101**: Orientation in Mathematics 1
- **MATH 165**: Calculus I 4
- **MATH 166**: Calculus II 4
- **MATH 201**: Introduction to Proofs 3
- **MATH 265**: Calculus III 4
- **MATH 317**: Theory of Linear Algebra 3-4
  or **MATH 407**: Applied Linear Algebra
- **MATH 301**: Abstract Algebra I 3
- **MATH 414**: Analysis I 3
- **MATH 266**: Elementary Differential Equations 3-4
  or **MATH 267**: Elementary Differential Equations and Laplace Transforms
- **Mathematics courses at the 300 level or above** 15

One of the following:

- **MATH 492**: Undergraduate Seminar 2
- **C I 480C**: Pre-Student Teaching Experience III: Mathematics 1

**Total Credits**: 45-47

1 C I 480C is available only for students seeking secondary school certification.

The courses listed above must include one of the sequences:

- **MATH 301**: Abstract Algebra I 6
  & **MATH 302**: Abstract Algebra II
- **MATH 373**: Introduction to Scientific Computing 6
  & **MATH 481**: Numerical Methods for Differential Equations
- **MATH 304**: Combinatorics 6
  & **MATH 314**: Graph Theory
- **MATH 414**: Analysis I 6
  & **MATH 415**: Analysis II
- **MATH 435**: Geometry I 6
  & **MATH 436**: Geometry II

**Communication Proficiency requirement:**

- **ENGL 150**: Critical Thinking and Communication 2 3
  One of the following: 3
    - **ENGL 250**: Written, Oral, Visual, and Electronic Composition 2
    - **ENGL 250H**: Written, Oral, Visual, and Electronic Composition: Honors 2
  One of the following: 3
    - **MATH 491**: Undergraduate Thesis 3
    - **ENGL 302**: Business Communication
    - **ENGL 305**: Creative Writing: Nonfiction
    - **ENGL 309**: Report and Proposal Writing
    - **ENGL 314**: Technical Communication
    - **JL MC 201**: Reporting and Writing for the Mass Media

2 The department requires a grade of C- or better.
3 With departmental approval.

Mathematics Plus

The Mathematics Plus option is for students who wish to establish a clear strength in a field of application of mathematics. They obtain the mathematics major by pursuing study of mathematics, through the upper division level, complementary to their application area. This program makes double majors more feasible and is appropriate for students who plan on employment or graduate study in the application field. It is not intended for students who plan on graduate study in mathematics. For more information, see the mathematics department web site or consult an adviser in mathematics.

Secondary Education

For certification requirements for teaching of mathematics in grades 5-12, see the Mathematics Department and School of Education web sites or consult an adviser.

Recommendations

The department strongly recommends that each student majoring in mathematics include in the program substantial supporting work beyond the minimum general education requirement of the college in one or more areas of application of mathematics, such as other mathematical sciences, engineering, natural science, or social science. Particularly useful are:

- **COM S 207**: Fundamentals of Computer Programming 3
- **COM S 208**: Intermediate Computer Programming 3
- **PHYS 221**: Introduction to Classical Physics I 5
- **PHYS 222**: Introduction to Classical Physics II 5
- **STAT 341**: Introduction to the Theory of Probability and Statistics I 3
- **STAT 342**: Introduction to the Theory of Probability and Statistics II 3

It also recommends that students contemplating graduate study in mathematics acquire a reading knowledge of French, German, or Russian.

Credits Not Counted

Credits earned in the following cannot be counted toward graduation by mathematics majors:

- **MATH 104**: Introduction to Probability 3
- **MATH 105**: Introduction to Mathematical Ideas 3
- **MATH 140**: College Algebra 3
- **MATH 143**: Preparation for Calculus 4
- **MATH 145**: Applied Trigonometry 3
- **MATH 150**: Discrete Mathematics for Business and Social Sciences 3
- **MATH 151**: Calculus for Business and Social Sciences 3
- **MATH 160**: Survey of Calculus 4
- **MATH 181**: Calculus and Mathematical Modeling for the Life Sciences I 4
- **MATH 182**: Calculus and Mathematical Modeling for the Life Sciences II 4
- **MATH 195**: Mathematics for Elementary Education I 3
- **MATH 196**: Mathematics for Elementary Education II 3

Minor in Mathematics

The department offers a minor in mathematics, which may be earned by credit in the following:

- **MATH 201**: Introduction to Proofs 3
- **MATH 265**: Calculus III 4
- **MATH 301**: Abstract Algebra I 3
  One of the following:
  - **MATH 266**: Elementary Differential Equations 3
  - **MATH 267**: Elementary Differential Equations and Laplace Transforms 4
  One of the following:
  - **MATH 317**: Theory of Linear Algebra 4
  - **MATH 407**: Applied Linear Algebra 3

Graduate Study

The department offers programs leading to a Master of Science or Doctor of Philosophy degree in mathematics or applied mathematics, as well as minor work.
for students whose major is in another department. The department also offers a program leading to the degree of Master of School Mathematics (M.S.M.).

Students desiring to undertake graduate work leading to the M.S. or Ph.D. degree should prepare themselves by taking several upper division mathematics courses. It is desirable that these credits include introduction to analysis and abstract algebra.

The M.S. degree requires a student to take at least 30 credit hours and to write a creative component or thesis. Additionally, students must pass a comprehensive oral examination over their coursework and their creative component or thesis. See the online Mathematics Graduate Handbook for specific requirements.

The Ph.D. degree requires a student to take 48 credit hours of coursework in addition to research hours, pass written qualifying examinations, pass an oral preliminary exam, and perform an original research project culminating in a dissertation which is defended by an oral exam. Ph.D. candidates must have at least one year of supervised teaching experience. See the on-line Mathematics Graduate Handbook for specific requirements.

The M.S.M. degree is primarily for in-service secondary mathematics teachers. Students desiring to pursue the M.S.M degree should present some undergraduate work in mathematics beyond calculus. Candidates for the M.S.M. degree must write an approved creative component and pass a comprehensive oral examination over their course work and their creative component.