

Department of Mathematics Mission Statement

The Department of Mathematics seeks to provide an excellent education for our students as our primary goal. Deeply rooted in the tradition of liberal arts education, mathematics is essential to many areas of study. We serve a diverse group of students and disciplines; we give a solid foundation to the science students, provide the tools needed for professional students, and prepare our mathematics majors for graduate work or for entering the work force. To do this, we provide a variety of learning environments and methods including technologies, group and individual study, and off-campus experiences. We strive to help all students view mathematics as part of the human endeavor, apply mathematics and logical skills as world citizens, and become life-long learners. Through research, we expand fundamental knowledge of mathematics and sustain our intellectual vitality. We invite students to join us on this journey.

Department Goals

1. To advance the university's Principles of General Education and Integrated Learning Objectives.
2. To provide backgrounds for other disciplines.
3. To provide a comprehensive pre-professional program for those directly entering the fields of teaching and applied mathematics.
4. To provide a nucleus of essential courses which will develop the breadth and maturity of mathematical thought for continued study of mathematics at the graduate level.
5. To develop the mental skills necessary for the creation, analysis, and critique of mathematical topics.
6. To provide a view of mathematics as a part of humanistic behavior.

Learning Objectives for Math Majors

All students completing any of the mathematics majors will demonstrate:

1. The ability to communicate mathematics effectively and precisely both verbally and in writing. Central to this is a command of mathematical grammar and of mathematical notation, such as
 - The order of operations;
 - The use of quantifiers such as “there exists” and “for every”.
2. Computational skill with and theoretical understanding of:
 - The algebraic properties of real numbers and of polynomial and rational functions with real coefficients (including knowledge of the Fundamental Theorem of Algebra);
 - Trigonometric, inverse trigonometric, logarithmic and exponential functions;
 - Limits;

- Differentiation (including, but not limited to, the definition of a derivative; conceptual and graphical meanings of derivatives; techniques for computing and standard applications of both single and multivariate derivatives);
 - Integration (including, but not limited to, Riemann sums; the definition of definite and indefinite integrals; basic techniques for computing and standard applications of single and multivariate definite and indefinite integrals);
 - The Fundamental Theorem of Calculus;
 - Vectors in at least two and three dimensions;
 - Matrix algebra for real matrices (including determinants);
 - Probability;
 - Statistical concepts including means and variances.
3. Proof-related skills, including:
- A recognition of the centrality of proofs in mathematics;
 - An understanding of the roles played by axioms, definitions, theorems and proofs in mathematics;
 - An understanding of the underlying logic of proofs;
 - The ability to read, understand and recognize a valid (or invalid) proof;
 - The ability to use examples and counterexamples correctly;
 - The ability to prove and disprove statements using a variety of proof techniques (e.g., proofs by induction; by contradiction, and by counterexamples, in addition to direct proofs).
4. An understanding of the role of abstraction in mathematics, including:
- Recognition that mathematics has advanced by generalizing and abstracting old concepts in order to obtain new ones;
 - Familiarity with abstractions such as
 - vector spaces as an algebraic generalization of geometry in real two- and three-dimensional spaces;
 - matrix algebra as a generalization of algebra on the real numbers;
 - non-Euclidean geometry as a generalization of Euclidian geometry;
 - real analysis as an extension of naïve ideas about the set of real numbers;
 (Note: students need not be familiar with all of the above abstractions.)
5. A familiarity with and command of technological tools, including:
- The ability to decide when the use of technology is appropriate.
 - The ability to use a graphing calculator and/or mathematical software to examine graphs, perform computations that would be cumbersome by hand, or analyze nontrivial sets of data.
6. An ability to apply core mathematical knowledge in new situations (both within mathematics itself and within mathematical applications).
7. An appreciation for the truth and beauty of mathematics as a collaborative, human endeavor.