Mathematics (MATH)

MATH 100 Topics in Mathematics (4)
Intended for prospective majors outside of mathematics, computer science, and the physical sciences, this course focuses on one or more important areas of mathematics with emphasis on the creativity and power of abstract representation, mathematical inquiry, and logical reasoning. Specific past topics have included calculus, probability, number theory, group theory, and encryption. Current topics vary by instructor.

MATH 101 Calculus I (4)
An elementary course introducing the student to the basic concepts of calculus: functions, transcendental functions, limits, derivatives, and integrals. Emphasis on problem solving. *Prerequisite: Placement.*

MATH 102 Calculus II (4)
A continuation of Calculus I. Topics include further theory and applications of integration, techniques of integration, and introduction to series. Some work with a computer is included. *Prerequisite: MATH 101 or placement.*

MATH 207 Multidimensional Calculus (4)
Calculus of several variables. Vectors, partial and directional derivatives, space curves, gradients, maxima and minima, linear and differentiable transformations, vector fields, line integrals, multidimensional Riemann integrals, and applications in physics and geometry are considered. *Prerequisite: MATH 102 or placement.*

MATH 210 Linear Algebra (4)
A course designed to provide some important mathematical tools useful in a variety of fields. Systems of linear equations, vectors and matrices, determinants, vector spaces, linear transformations, inner and cross products, and eigen values and canonical forms are considered. *Prerequisite: One course with attribute G5Q..*

MATH 212 Differential Equations (4)
Ordinary differential equations, with applications. Methods of numerical approximation, power series, and Laplace transforms. Existence and uniqueness of solution. *Prerequisite: One course with attribute G5Q..*

MATH 215 Discrete Mathematical Structures (4)
This course is required for most courses in mathematics or computer science numbered 300 or above. Topics normally include the following: logic, sets, functions, relations, graphs and trees, mathematical induction, combinatorics, recursion, and algebraic structures. The subject matter is to be of current interest to both mathematics and computer science students. *Prerequisite: One course with attribute G5Q..*

MATH 303 Analysis I (4)
A rigorous treatment of continuity, differentiation, and integration for functions of a real variable. The course also includes convergence of series and sequences of functions as well as topology of the real line. *Prerequisite: MATH 207 and MATH 215.*

MATH 305 Abstract Algebra I (4)
A study of these important algebraic structures: integral domains, polynomials, groups, vector spaces, rings and ideals, fields, and elementary Galois theory. *Prerequisite: MATH 215.*

MATH 306 Abstract Algebra II (4)
A study of these important algebraic structures: integral domains, polynomials, groups, vector spaces, rings and ideals, fields, and elementary Galois theory. *Prerequisite: MATH 305.*

MATH 310 Advanced Linear Algebra (4)
Advanced theory of linear algebra, including topics such as special families of matrices (symmetric, stochastic, etc.), and matrix decompositions (SVD, QR, etc.). Applications of linear algebra drawn from a variety of fields, such as linear programming, regression, ranking algorithms, principal component analysis, spectral graph theory, and Markov chains. Includes an emphasis on implementation in a programming language. *Prerequisite: MATH 210 and MATH 215 and CSCI 157.*

MATH 311 Functions of a Complex Variable (4)
An introduction to analytic functions. Rational, exponential, logarithmic, and trigonometric functions in the complex plane, Cauchy's integral formula, Taylor series, Laurent series, residues, poles, and conformal mapping are considered along with applications to physical problems and other areas of mathematics. *Prerequisite: MATH 207 and MATH 215.*

MATH 313 Algebraic Number Theory (4)
Largely an algebraic study of the standard number-theoretic functions, congruences, primes, quadratic residues, and other topics selected according to the interests of the students and instructor. *Prerequisite: MATH 215.*

MATH 314 Topology (4)
An introduction to point-set topology with emphasis on Euclidean spaces and applications to analysis. Topics include connectedness, compactness, countability conditions, separation properties, metric spaces, continuity, homeomorphisms, and product spaces. *Prerequisite: MATH 215.*

MATH 321 Probability and Statistics I (4)
A treatment of probability and a logical development of the framework of mathematical statistics. Topics include random variables, distribution functions, sampling, and statistical inference. *Prerequisite: MATH 207.*

MATH 322 Probability and Statistics II (4)
A treatment of probability and a logical development of the framework of mathematical statistics. Topics include random variables, distribution functions, sampling, and statistical inference. *Prerequisite: MATH 321.*

MATH 325 Theory of Computation (4)
This course introduces computability and the theory of computational complexity. Topics include automata, regular and context-free languages, the Church-Turing thesis, decidability, reducibility, and recursive function theory. *Prerequisite: MATH 215 and CSCI 157.*

MATH 330 History of Mathematics (4)
A survey of classical mathematics from ancient times to the development of calculus, together with selected topics from the history of modern mathematics. *Prerequisite: MATH 102.*

MATH 332 Mathematical Modeling (4)
An introduction to the creation of mathematical models, both deterministic and probabilistic, for the description of problems drawn from physical, biological, social, and environmental sources. *Prerequisite: MATH 215 and CSCI 157.*

MATH 334 Partial Differential Equations and Modeling (4)
This course addresses the techniques and theory of partial differential equations. Many physical and biological applications and models are explored, including the heat equation, the wave equation, and LaPlace's equation. Significant attention is given to both theory and applications. *Prerequisite: MATH 207 and MATH 212.*

MATH 401 Analysis II (4)
A concentrated study of the theory of functions of a real variable. Abstract methods are emphasized. Students are active participants in the presentation. *Prerequisite: MATH 303.*

MATH 402 Special Topics (4)
Study of a variable topic in mathematics. This course may be repeated for credit when the topic differs. *Prerequisite: MATH 215.*

MATH 416 Algebraic Topology (4)
An introduction to algebraic and combinational topology with emphasis on applications to analysis and Euclidean geometry. Topics covered include simplicial homology, the fundamental group, covering spaces, the higher homotopy groups, and the homology sequence. *Prerequisite: MATH 314.*

MATH 444 Independent Study (2 or 4)
An opportunity for advanced students to pursue topics of special interest. *Prerequisite: Instructor prerequisite override required.*

MATH 460 Senior Capstone (2)
In the first semester, students work with faculty mentors to design and begin working on substantial projects that require integrating and building on what they have learned in their other courses. In the second semester, students complete these projects and present their results in a public venue. *Open only to seniors pursuing majors in mathematics.*