

# Mathematics

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from ancient times through modern times. Theorems with historical significance will be studied as they relate to the development of modern mathematics. S

## **MATH 145. Problem Solving (3)**

Prerequisites: MATH 111; EHD 50 (may be enrolled concurrently). A study of formulation of problems into mathematical form; analysis of methods of attack such as specialization, generalization, analogy, induction, recursion, etc. applied to a variety of non-routine problems. Topics will be handled through student presentation. F

## **MATH 149. Capstone Mathematics for Teachers (4)**

Prerequisites: MATH 151, 161, and 171. (MATH 161 and MATH 171 may be taken concurrently.) Secondary school mathematics from an advanced viewpoint. Builds on students' work in upper-division mathematics to deepen their understanding of the mathematics taught in secondary school. Students will actively explore topics in number theory, algebra, analysis, geometry.

## **MATH 151. Principles of Algebra (4)**

Prerequisite: MATH 111. Equivalence relations; groups, cyclic groups, normal sub-groups, and factor groups; rings, ideals, and factor rings; integral domains and polynomial rings; fields and field extensions. FS

## **MATH 152. Linear Algebra (4)**

Prerequisite: MATH 77. Vector spaces, linear transformations, matrices, determinants, eigenvalues and eigenvectors, linear functions, inner-product spaces, bilinear forms, quadratic forms, orthogonal and unitary transformations, selected applications. FS

## **MATH 161. Principles of Geometry (3)**

Prerequisite: MATH 111. The classical elliptic, parabolic, and hyperbolic geometries developed on a framework of incidence, order and separation, congruence; coordinatization. Theory of parallels for parabolic and hyperbolic geometries. Selected topics of modern Euclidean geometry. S

**MATH 165. Differential Geometry (3)**  
Prerequisite: MATH 111 or permission of instructor. Study of geometry in Euclidean space by means of calculus, including theory of curves and surfaces, curvature, theory of surfaces, and intrinsic geometry on a surface. F

## **MATH 171. Intermediate**

### **Mathematical Analysis I (4)**

Prerequisite: MATH 111. Natural and rational numbers, real numbers as a complete ordered field, its usual topology, sequences and series of real numbers, functions of a real variable, limits, continuity, uniform continuity, differentiability, generalized mean value theorem, Riemann integrals, and power series. FS

## **MATH 172. Intermediate**

### **Mathematical Analysis II (4)**

Prerequisite: MATH 77 and 171. Pointwise and uniform convergence of sequences and series of functions, convergence of sequences in higher dimensions, continuity and differentiability of functions of several variables. Inverse and implicit function theorems; topics in integration theory in higher dimensions. S

## **MATH 181. Differential Equations (3)**

Prerequisite: MATH 81 or 123. Definition and classification of differential equations; general, particular, and singular solutions; existence theorems; theory and technique of solving certain differential equations: phase plane analysis, elementary stability theory; applications. F

## **MATH 182. Partial Differential Equations (3)**

Prerequisites: MATH 81 or 123. Classical methods for solving partial differential equations including separation of variables, Green's functions, the Riemann-Volterra method and Cauchy's problem for elliptic, parabolic, and hyperbolic equations; applications to theoretical physics. S even

## **MATH 190. Independent Study**

**(1-3; max total 6)**

See *Academic Placement — Independent Study*. Approved for RP grading.

## **MATH 191T. Proseminar**

**(1-3; max total 9)**

Prerequisite: permission of instructor. Presentation of advanced topics in mathematics in the field of the student's interest.

## **MATH 198. Senior Project (3)**

Prerequisites: senior standing or permission of instructor; MATH 151, 171, and 152. Independent investigation and presentation of an advanced topic in mathematics. Satisfies the senior major requirement for the B.A. in Mathematics.

## **GRADUATE COURSES**

(See *Catalog Numbering System*.)

## **Mathematics (MATH)**

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## **MATH 202. Fundamental Concepts of Mathematics (3)**

Prerequisites: MATH 151, 161, and 171. Fundamental notions regarding number theory, number systems, algebra of number fields; functions.

## **MATH 216T. Topics in Number Theory (3; max total 6)**

Prerequisite: MATH 116. An investigation of topics having either historical or current research interest in the field of number theory.