

# Mathematics (MATH)

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## **MATH 0302** Developmental Algebra **3 SCH (3-0)**

The mathematic skills necessary for success in college-level mathematics. Topics include real number operations, linear and quadratic equations, graphing linear and nonlinear equations, simplifying polynomial, rational and radical expressions, basic probability and geometry, and mathematical and statistical reasoning. Course does not count toward any degree. Placement based on student ACT/SAT, TSIA and/or placement test scores. Credit/Non-credit.

## **MATH 1314** College Algebra **3 SCH (3-0)**

College-level topics in algebra including functions, graphs, variation, piecewise defined functions, equations of lines, elementary curve fitting, quadratic equations and functions, systems of linear and nonlinear equations, composition of functions, inverse functions, exponential and logarithmic functions and applications related to these topics. Prerequisite: two years of high school algebra and appropriate scores on mathematics placement tests.

## **MATH 1316** Trigonometry **3 SCH (3-0)**

Fundamental notions and definitions, functions of angles, logarithms, circular measure, solution of triangles. Required of all engineering students. Prerequisites: two years of high school algebra and appropriate scores on mathematics placement tests, or MATH 1314 (MATH 1314 and MATH 1316 may be taken concurrently.)

## **MATH 1324** Math for Bus and Econ I **3 SCH (3-0)**

A course designed for students in business administration. Selected topics from finite mathematics including: linear inequalities, vectors, matrices, linear programming and probability. Prerequisites: two years of high school algebra and appropriate scores on mathematics placement tests.

## **MATH 1325** Math for Bus and Econ II **3 SCH (3-0)**

Applications of the theory of extrema. Area under a curve and its applications. Introduction to statistical measures. Prerequisite: MATH 1314 or MATH 1324.

Fee: \$5.00

## **MATH 1334** Contemporary Mathematics **3 SCH (3-0)**

An introduction to several contemporary applications of mathematics for the nonmajor. Emphasis is on the variety of problems which can be modeled and solved by analytic and quantitative means. Topics will vary, but may include such as: applications of graph theory to management problems; encoding and encrypting information; problems of social choice-fair division, voting systems, conflict; topics in geometry; and data analysis. Prerequisites: Appropriate scores on mathematics placement tests.

## **MATH 1348** Analytic Geometry **3 SCH (3-0)**

Equations and their graphs. Cartesian and polar coordinates, the straight line, circles and conic sections. Operations with vectors, the dot and cross product. Prerequisites: MATH 1314 and MATH 1316.

## **MATH 1350** Fundamentals of Mathematics I **3 SCH (3-0)**

Problems from number theory, number systems, systems of operations and proportional reasoning. Requires approaching problems from multiple perspectives, drawing connections among those perspectives and strengthening flexibility and fluency in mathematical thinking and communicating. Not applicable for credit in the physical sciences or engineering. Prerequisite: MATH 1314 or higher.

## **MATH 1351** Fundamentals of Mathematics II **3 SCH (3-0)**

Problems from probability, statistics, measurement, geometry and spatial thinking. Requires approaching problems from multiple perspectives, drawing connections among those perspectives and strengthening flexibility and fluency in mathematical thinking and communicating. Not applicable for credit in the physical sciences or engineering. Prerequisite: MATH 1350.

## **MATH 2413** Calculus I **4 SCH (3-2)**

Limits and continuity. Definition of the derivative of a function and techniques of differentiation. Derivatives of various functions, to include rational, exponential, logarithmic, trigonometric and their inverses. Maximizing or minimizing a function, curve sketching, and rate of change problems; L'Hospital's rule. Introduction to integration, the Fundamental Theorem of Calculus, applications to areas; introduction to numerical integration. Prerequisite: MATH 1348.

## **MATH 2414** Calculus II **4 SCH (3-0-2)**

Continuation of MATH 2413. Integration of logarithmic, exponential, and trigonometric functions. Techniques of integration. Applications of the integral to problems involving volumes, work, arc length, and fluid pressure. Infinite sequences and series, power series expansion of function. Calculus with parametric curves, and polar coordinates. Prerequisite: MATH 2413.

## **MATH 3320** Differential Equations **3 SCH (3-0)**

The ordinary differential equations of physics, chemistry and engineering; methods for their solution and the properties of their solution. Prerequisite: MATH 2414.

Fee: \$5.00

## **MATH 3325** Intro Mathematical Proofs (WI) **3 SCH (3-0)**

Principles and techniques of discovering and writing correct mathematical proofs. Independently prove theorems from various areas in mathematics, which may include topics from logic, the structure of the real number system, number theory, geometry and algebra. Prerequisite: MATH 2413.

**MATH 3352 Applied Fundamentals of Math 3 SCH (3-0)**

Applied projects in selected areas of mathematics, such as number systems, systems of operations, proportional reasoning, probability, statistics, measurement, and geometry. Emphasis on understanding pedagogical content for pre-service teachers in mathematics. Planning, implementing and assessing mathematics activities during a two-week summer camp for area youth. Prerequisite: MATH 2413.

**MATH 3360 Modern Geometry 3 SCH (3-0)**

Historical review of set theory logic and applications in Euclidean Geometry, Hilbert's approach and revision of Euclid's postulates, rewriting of Euclid's fifth postulate, Axiomatic approach to modern Geometry, Foundations of non-Euclidean geometry. Prerequisite: MATH 3325.

**MATH 3370 Discrete Mathematics 3 SCH (3-0)**

This course covers many topics in mathematics which are important in computer science. Some of these topics are sets, relations, functions, algorithms, graphs, monoids, lattices, Boolean algebras and graphs. Prerequisite: 3 semester hours of advanced mathematics.

Fee: \$5.00

**MATH 3371 Prob Solving with Computers 3 SCH (3-0)**

Brief historical overview of computing and computers; strategies for solving problems by computers; programming in a higher level language. Students will be exposed to problem solving using technology, graphing calculator, and computer algebra system. Prerequisite: MATH 2413.

**MATH 3390 Selected Topics in Math 3 SCH (3-0)**

Different topics will be covered at varying times. May be repeated for credit with consent of the instructor. Prerequisite: 3 semester hours of advanced mathematics.

**MATH 3415 Calculus III 4 SCH (3-0-2)**

Continuation of MATH 2414. Vector operations in 2 and 3 dimensions, lines, planes; vector functions, space curves, partial derivatives, curvature; multivariable calculus, optimization, Lagrange multipliers; multiple integral; vector fields, theorems of Green, Gauss and Stokes. Prerequisite: MATH 2414.

Fee: \$5.00

**MATH 4321 Real Variables 3 SCH (3-0)**

The real number system, its structure and properties. Properties of real functions and sequences, including uniform continuity and the Cauchy criterion. Introduction to the theory of sets. Theory and application of the derivative. Introductory concepts of function spaces, norms and metrics. Prerequisite: 6 semester hours of advanced mathematics, including MATH 3325.

**MATH 4340 Modern Algebra 3 SCH (3-0)**

Properties of the Integers: divisibility, prime factorization and congruences. Integral domains, rings and fields. Groups, permutations and cosets. A historical development of these topics is included. Prerequisite: MATH 3325.

**MATH 4341 Linear Alg and Matrix Theory 3 SCH (3-0)**

Vector spaces and their linear subspaces. Representation of linear transformations by matrices. Normal forms, eigenvalues, special transformations and applications. Prerequisite: 6 semester hours of advanced mathematics.

Fee: \$5.00

**MATH 4342 Algebraic Structures 3 SCH (3-0)**

An intensive axiomatic study of groups, rings, polynomial rings, fields and modules, along with their principal substructures. Emphasis on classification and structure theorems. Prerequisite: 6 hours of advanced mathematics or consent from instructor.

**MATH 4351 Mathematical Theory of Games 3 SCH (3-0)**

Introduction to game theory. Topics include: combinatorial and strategic games, backward induction, payoffs, cooperative and non-cooperative games, mixed strategies, equilibria, repeated games and finite automata, common knowledge and incomplete information, the prisoner's dilemma. Selected applications to economics, biology, computer science, and political science. Prerequisite: MATH 3340 or consent of instructor.

**MATH 4370 Vector Analysis 3 SCH (3-0)**

Vector algebra and geometry. Scalar and vector products. Vector functions and motion in polar coordinates. Scalar and vector fields with applications to line and surface integrals. Prerequisites: MATH 3320 and MATH 3415 or their equivalents.

**MATH 4371 Laplace Transformation 3 SCH (3-0)**

An introduction to the theory of the Laplace Transformation. Applications to the solution of ordinary and partial differential equations, integral equations, difference equations and integro-differential equations. An introduction to other types of integral transformations. Prerequisites: MATH 3320 and MATH 3415 or their equivalents.

**MATH 4372 Math for Physics and Eng I 3 SCH (3-0)**

Infinite series, matrix methods, vector analysis, applied multivariate calculus and Fourier series. Prerequisites: MATH 3320 and MATH 3415 or their equivalents.

**MATH 4373 Application of Matrix Methods 3 SCH (3-0)**

Matrices and their inverses, determinants, eigenvalues and eigenvectors, Jordan canonical forms. Applications to simultaneous linear equations, matrix calculus and linear differential equations. Prerequisites: MATH 3320 and MATH 3415.

Fee: \$5.00

**MATH 4374 Numerical Analysis 3 SCH (3-0)**

The mathematical formation of the concepts in numerical analysis. These concepts include the theory of errors, roots of equations, interpolation, linear systems of equations, numerical differentiation and integration and solutions of ordinary differential equations. Prerequisites: MATH 3320 and MATH 3415.

**MATH 4390 Selected Topics in Mathematics 3 SCH (3-0)**

Different topics will be covered at varying times. May be repeated for credit with consent of instructor. Prerequisite: 3 semester hours of advanced mathematics.

**MATH 4399 Capstone Experience in Math 3 SCH (3-0)**

Designed to integrate mathematical standards and skills of mathematics majors. Students will demonstrate their ability to organize and synthesize mathematical knowledge; and design, implement, and present an advanced project in mathematics or mathematics education. Prerequisite: Senior standing in mathematics.