

Mathematics (MATH)

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 0315 Foundations of Algebra **3 SCH (3-0)**

A study of relations and functions, inequalities, algebraic expressions and equations, with a special emphasis on linear and quadratic expressions and equations. The course is the study of basics concepts necessary for success in MATH 1314 to include rational expressions, equations, functions, graphs, systems of linear equations, problem solving, exponent, and radicals. Corequisite with MATH 1314. Placement based on Multiple Measure Placement.

MATH 0335 Foundations Contemporary Math **3 SCH (3-0)**

A study of relations, functions, inequalities, algebraic expressions and equations. The course if the study of basic concepts necessary for success in MATH 1334 with an emphasis on logical reasoning, numeracy, probabilistic reasoning, algebraic competence, modeling and interpretation. Corequisite with MATH 1334. Placement based on Multiple Measure Placement.

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: Multiple Measure Placement.

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

Fundamental notions and definitions, functions of angles and inverse trigonometric functions, trigonometric equations, circular measure, law of sine and law of cosine, solution of triangles, applying trigonometric formulae. Required of all engineering students. Prerequisite: Multiple Measure Placement or MATH 1314 (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. Prerequisite Multiple Measure Placement.

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 1332 Contemporary Mathematics **3 SCH (0-3-0)**

An introduction to several contemporary applications of mathematics for the nonmajor. Topics will vary, but may include: applications of mathematics to management problems, applications of number theory, mathematics for social science, topics in geometry, and introductory data analysis. Prerequisite: Multiple Measure Placement.

MATH 1342 Elementary Statistical Methods **3 SCH (3-0)**

Elementary description of tools of statistics inference, including empirical and theoretical distributions, probability, sampling, treatment of both continuous and discrete data, correlation, regression, hypothesis testing and applications to practical problems. Prerequisite: Multiple Measure Placement.

Fee: \$5.00

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

Exponentials and logarithms, complex numbers. Polynomials and their zeroes. Equations and their graphs, Cartesian and polar coordinates, lines and linear models, circles and conic sections. Operations with vectors, the dot and cross product. Prerequisites: MATH 1316 or Multiple Measure Placement.

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 2412 Precalculus **4 SCH (4-0)**

Study fundamental concepts of algebra, trigonometry, and analytic geometry to prepare for calculus. Explore functions, equations, and their graphs in Cartesian and polar coordinates; analyze polynomials and their zeros; and apply exponential, logarithmic, and trigonometric functions. Solve trigonometric equations, work with inverse trigonometric functions, and use the laws of sines and cosines to solve triangles. Investigate circles, conic sections, complex numbers, and vectors, including dot and cross products. Prerequisite: Placement through Multiple Measures, successful completion of MATH 1314 with a grade of C or better, or qualifying score on the Department of Mathematics placement exam.

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: Placement through Multiple Measures, MATH 1348, MATH 2412, or qualifying score on the Department of Mathematics placement exam. Fee: \$15.00

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. Fee: \$15.00

MATH 3320 Differential Equations 3 SCH (3-0)

An introduction to both theoretical and applied aspects of ordinary differential equations. Topics may include: first order differential equations, methods to solve linear second and higher order differential equations, numerical methods, the Laplace transform, and systems of first order differential equations using eigenvalues and eigenvectors. Prerequisite: MATH 2414. Fee: \$15.00

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 2413 or Instructor consent.

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: MATH 2413 or Instructor Consent. Fee: \$5.00

MATH 3371 Problem 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 or Instructor consent.

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: Instructor consent.

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: \$15.00

MATH 4305 Applied Math with Python & ML 3 SCH (3-0)

Introduction to Python programming and foundational machine learning for mathematics and statistics. Topics include data manipulation and visualization using NumPy, Pandas, and Matplotlib, and implementation of basic algorithms such as regression, classification, and clustering with scikit-learn. Emphasis on hands-on coding and data analysis projects. Prerequisites: MATH 2413.

MATH 4321 Real Variables 3 SCH (3-0)

Proofs oriented course. 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)

Course topics include linear systems, determinants, solution of linear systems, vector spaces and their linear subspaces, representation of linear transformations by matrices, eigenvalues and eigenvectors, special transformations and applications, orthogonality and least squares, symmetric matrices and quadratic forms. Prerequisite: 6 semester hours of advanced mathematics.

Fee: \$15.00

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 hours of advanced mathematics, including MATH 3325.

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 2414 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 3415 and Instructor consent.

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. Exponential of a matrix with applications. An introduction to other types of integral transformations. Prerequisites: MATH 3320 and MATH 3415.

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.

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 algebra, and linear differential equations. Numerical applications may be emphasized. 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 or consent of instructor.

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.