

# MATHEMATICS (MATH)

## **MATH-111 Applied College Algebra (4 Credits)**

Algebra and trigonometry taught in context, using technology to enhance understanding of algebraic concepts. Topics include numeracy; data analysis; linear, quadratic, and exponential growth; formula use; laws of exponents; logarithms; and systems of equations. Not open to students who have completed MATH-112 or MATH-211.

**Offered:** All, Every Year

## **MATH-112 Precalculus (4 Credits)**

Functions explored from numerical, graphical, and analytic perspectives. Function notation, operations, and inverses. Includes study of polynomial, rational, exponential, logarithmic, and trigonometric functions. Intended as a preparation for calculus and not open to students who have taken calculus in college. Presumes competency in the content of MATH-111.

**Offered:** All, Every Year

## **MATH-135 Discrete Math for Computer Science (4 Credits)**

This course introduces the foundations of discrete mathematics as they apply to computer science. The topics covered include binary and hexadecimal number systems, sets, logic and truth tables, functions and relations, combinations and permutations, recurrence relations, Boolean algebra, graph theory, matrix operations, and induction.

**Offered:** Fall, Every Year

## **MATH-141 Introductory Statistics (4 Credits)**

Basic tools of descriptive statistics, discrete probability, binomial distribution, normal distribution, t-distribution, estimates and sample sizes, hypothesis testing, elementary correlation and regression, contingency tables. Use of graphing calculator and spreadsheet software.

**Offered:** All, Every Year

## **MATH-171 Math for Prek-6 Educators I (4 Credits)**

Examines the structures and properties of mathematics while focusing on the development of problem-solving skills. Includes sets, functions, whole numbers, integers, fractions, decimals, and number theory. Intended for prospective elementary school teachers. Utilizes appropriate grade-level technology.

**Offered:** All, Every Year

## **MATH-172 Math for Prek-6 Educators II (4 Credits)**

Considers applications of rational numbers, percent, probability and statistics, counting techniques, geometry, and measurement. Intended for prospective elementary school teachers. Utilizes appropriate grade-level technology.

**Prerequisite(s):** Grade C or higher in MATH-171

**Offered:** All, Every Year

## **MATH-181 Computer Tools for Problem Solving (4 Credits)**

Fundamental aspects of problem-solving using computer software such as Excel, Scratch, and Geogebra. Includes elementary programming concepts such as loops, conditionals, and variables. Appropriate for education majors as well as mathematics majors. Projects assigned based on individual students majors.

**Offered:** Spring, Every Year

## **MATH-211 Calculus I (4 Credits)**

Topics include limits, continuity, derivatives, and integrals of functions of one variable, and the Fundamental Theorem of Calculus. Applications of differentiation and development of mathematical modeling skills will be emphasized. Technology used where appropriate. Presumes competency in content of MATH-112.

**Offered:** All, Every Year

## **MATH-212 Calculus II (4 Credits)**

Techniques of integration for functions of one variable; numerical integration; first and second order differential equations; applications involving area, volume, and arc length; infinite series and Taylor series. Continued use of technology.

**Prerequisite(s):** Grade C or higher in MATH-211

**Offered:** Spring, Every Year

## **MATH-235 Discrete Mathematics With Proof (4 Credits)**

Introduction to mathematical language, reasoning, and proof techniques with focus on topics from discrete mathematics. Designed to deepen students mathematical problem-solving and reasoning skills. Content includes logic, sets, relations, functions, induction, counting techniques, and graph theory. Includes reading, writing, and development of proofs.

**Prerequisite(s):** Grade of C or higher in MATH-211

**Offered:** Fall, Every Year

## **MATH-298 Independent Study (1-8 Credits)**

An opportunity for a qualified student to explore work in an area of individual interest, selected and pursued in consultation with a faculty member. Consent required of the instructor who will supervise the independent study. Repeatable to a total of 8 credits

## **MATH-311 Vector Calculus (4 Credits)**

Extends calculus to vector-valued functions, real-valued functions of several variables, and vector fields. Topics include vector algebra and geometry; partial derivatives; Lagrange multipliers; multiple, line, and surface integrals; gradient, divergence, and curl. Applications to probability, physics, engineering, and other sciences. Extensive use of technology.

**Prerequisite(s):** Grade C or higher in MATH-212

**Offered:** Spring, Even Years

## **MATH-312 Differential Equations (4 Credits)**

Introduction to analytical and numerical solution techniques for ordinary differential equations including series solutions and Laplace transforms. Emphasis on modeling using differential equations. Mathematical software is used throughout the course.

**Prerequisite(s):** Grade of C or higher in MATH-212

**Offered:** Spring, Odd Years

## **MATH-335 Linear Algebra (4 Credits)**

Develops the mathematical structures, algebraic properties, and applications of matrices, determinants, vectors, vector spaces, linear transformations, eigenvalues, and eigenvectors. Development and solution of mathematical models involving systems of linear algebraic equations and applications such as systems of linear differential equations or difference equations. Extensive use of technology.

**Prerequisite(s):** Grade C or higher in MATH-135, MATH-211, or MATH-235

**Offered:** Spring, Every Year

## **MATH-341 Applied Statistics (4 Credits)**

Fundamentals of hypothesis testing (means, proportions, chi-square), confidence intervals, and regression analysis (simple, multiple, logistic). Introduction to data analysis and visualization in R.

**Prerequisite(s):** MATH-141 or PSYC-251 or MGT-140

**Offered:** Fall, Every Year

## **MATH-342 Probability (4 Credits)**

A calculus-based course introducing elementary probability theory; discrete and continuous distributions and random variables; and sampling distributions. Applications to data analysis and inferential statistics.

**Prerequisite(s):** Grade C or higher in both MATH-141 and MATH-212

**Offered:** Spring, Odd Years

**MATH-381 Math Modeling (4 Credits)**

Introduction to the modeling process including defining the problem, identifying assumptions, building the model, validating the model, and dissemination of results. Specific modeling topics include differential equations and data analysis. Building models based on specific needs in the local community. Emphasis on communication. Mathematical software used throughout the course.

**Prerequisite(s):** Grade C or higher in both MATH-181 and MATH-211

**Offered:** Spring, Even Years

**MATH-421 Abstract Algebra (4 Credits)**

An introduction to the basic concepts of abstract algebra. Topics include groups, rings, fields, and their homomorphisms.

**Prerequisite(s):** Grade of C or higher in MATH-235 or MATH-335

**Offered:** Fall, Even Years

**MATH-422 Geometry (4 Credits)**

Rigorous treatment of key concepts from geometry and trigonometry. Euclidean and non-Euclidean geometries. Synthetic, analytic, and transformational approaches. Axiomatic systems, parallel postulates, congruence, similarity. Incorporates the use of dynamic geometry software.

**Prerequisite(s):** Grade of C or higher in MATH-235 or MATH-335

**Offered:** Fall, Odd Years

**MATH-423 Real Analysis (4 Credits)**

A rigorous presentation of functions of one variable. Topics include limits, continuous functions, derivatives, Riemann integrals, the Fundamental Theorem of Calculus, and infinite series.

**Prerequisite(s):** Grade C or higher in MATH-212 and MATH-235

**Offered:** Spring, Even Years

**MATH-490 Advanced Special Topics (4 Credits)**

Study of a selected topic in mathematics at an advanced level. May be repeated as topics change.

**Prerequisite(s):** Grade of C or higher in MATH-235 or MATH-335

**MATH-494 Cooperative Education (1-8 Credits)**

Sequential work learning experience for which compensation may be received. Placements arranged, supervised, and evaluated by full time faculty. Elective credit to maximum of 8 credits. May be repeated for credit. Graded Pass/Fail.

**Prerequisite(s):** 2.5 cumulative GPA, Declaration of Mathematics Major, and permission of instructor

**MATH-498 Independent Study (1-8 Credits)**

Individual investigation of selected topics. May be repeated to a total of 8 credits.

**Prerequisite(s):** Permission of instructor