

Mathematics (MATH)

MATH 6 Intermediate Algebra 3 Credits (3,0)

Intermediate algebra concepts including linear equations, inequalities, polynomials, rational expressions, exponents, functions, and systems of equations. Credit not applicable to any degree. A grade of C or higher is required.

Prerequisites: Math placement

MATH 100 Foundations in Mathematical Problem Solving 3 Credits (3,0)

Equips students with mathematical reasoning skills through problem-based activities in algebra. Prepares for MATH 106, MATH 111, or MATH 140. Cannot satisfy General Education requirements.

Course Offered at: Worldwide, Asia

MATH 106 Basic Algebra and Trigonometry 3 Credits (3,0)

Basic laws of numbers, exponents, complex numbers, equations, inequalities, polynomials, quadratics, and elements of trigonometry.

Prerequisites: MATH 100

Course Offered at: Worldwide, Asia

MATH 111 Pre-calculus for Aviation 3 Credits (3,0)

Precalculus for aviation students. Topics include algebra fundamentals, linear and quadratic equations, polynomial, rational, exponential, and trigonometric functions, radian measure, right triangle solutions, vectors.

Prerequisites: MATH 6 or MATH 106

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 112 Applied Calculus for Aviation 3 Credits (3,0)

Basic calculus for aviation students. Differentiation and integration of algebraic functions, applications to velocity, acceleration, area, and curve sketching.

Prerequisites: MATH 111 or (MATH 140 and MATH 142)

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 120 Applied College Algebra 3 Credits (3,0)

Algebra methods applied to business and economics. Systems of linear equations and inequalities, modeling, and problem-solving.

Prerequisites: Math placement

Course Offered at: Daytona Beach, Prescott

MATH 140 College Algebra 3 Credits (3,0)

Exponents, radicals, linear and quadratic equations, inequalities, graphing, sequences, systems of equations, matrices, functions, and basic logarithmic and trigonometric concepts.

Prerequisites: MATH 106 or MATH 6

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 142 Trigonometry 3 Credits (3,0)

Trigonometric functions, identities, radian measure, trigonometric equations, right and oblique triangles, vectors, and trigonometric form of complex numbers.

Prerequisites: MATH 106 or MATH 6

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 143 Precalculus Essentials 3 Credits (3,0)

Precalculus with emphasis on functions and graphs, including polynomial, rational, exponential, and trigonometric functions; radian measure; vectors; parametric and polar curves; binomial theorem. Open only to engineering students.

Prerequisites: Math placement

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 145 College Algebra and Trigonometry 5 Credits (5,0)

Fundamentals of exponents, equations, inequalities, polynomials, logarithmic, and trigonometric functions, radian measure, vectors, laws of sines, cosines, and complex numbers.

Course Offered at: Daytona Beach, Prescott

MATH 199 Special Topics in Mathematics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in mathematics.

Course Offered at: Daytona Beach, Prescott, Worldwide

MATH 201 Learning to Reason: Art and Quotient 3 Credits (3,0)

Data science, proportionality, and geometric concepts. Focus on the development of mathematics and technologies across disciplinary boundaries.

Prerequisites: MATH 106

Course Offered at: Worldwide, Asia

MATH 202 Learning to Reason: Commerce and Flux 3 Credits (3,0)

Quantitative approach to decision-making in finance, technology, and design. Focus on mathematics and technology for decision-making processes.

Prerequisites: MATH 106

Course Offered at: Worldwide, Asia

MATH 210 Introduction to Data Science 3 Credits (3,0)

Principles of data collection, management, visualization, ethics, privacy, statistical inference, and machine learning. No prior programming or statistics experience required.

Prerequisites: MATH 111 or MATH 120 or MATH 140 or qualifying score on the placement test.

Course Offered at: Daytona Beach

MATH 220 Concepts of Calculus 3 Credits (3,0)

Introductory calculus for business and economics. Topics include limits, differentiation, integration, maximization, minimization, and curve sketching.

Prerequisites: MATH 111 or MATH 120 or MATH 140 or qualifying score on the placement exam

Course Offered at: Daytona Beach, Prescott

MATH 241 Calculus and Analytical Geometry I 4 Credits (4,0)

Limits, continuity, differentiation and integration of algebraic and elementary transcendental functions. Applications of derivatives and integration.

Daytona Beach Prerequisites: MATH 143 with a minimum grade of C

Prescott Prerequisites: MATH 143 with a minimum grade of C

Worldwide Prerequisites: MATH 143 or (MATH 140 and MATH 142 with a minimum grade of C)

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 242 Calculus and Analytical Geometry II 4 Credits (4,0)

Differentiation and integration of transcendental functions; special integration techniques, power series, applications of definite integrals.

Prerequisites: MATH 241 with a minimum grade of C

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 243 Calculus and Analytical Geometry III 4 Credits (4,0)

Solid analytic geometry, vector functions in three dimensions, partial differentiation, directional derivative, gradient, multiple integrals.

Prerequisites: MATH 242

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 245 Applied Differential Equations 3 Credits (3,0)

Treatment of ordinary differential equations, Laplace transforms, matrix algebra, numerical methods, least squares, and normal distribution applications.

Prerequisites: MATH 242

Course Offered at: Daytona Beach

MATH 270 Computational Mathematics Seminar 1 Credit (1,0)

Introduction to computational models using guided inquiry, open-ended inquiry, cooperative learning, and computer algebra systems. Topics include model implementation and assessment.

Course Offered at: Daytona Beach

MATH 299 Special Topics in Mathematics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in mathematics.

Course Offered at: Daytona Beach, Prescott, Worldwide

MATH 305 Introduction to Scientific Computing 3 Credits (3,0)

Introduction to Unix operating system, programming in high-level languages, and use of mathematical libraries. Topics include root-finding algorithms, quadrature, and differential equations.

Prerequisites: MATH 242 and ENGR 115 or CPSC 223

Course Offered at: Daytona Beach

MATH 314 Applied Linear Algebra and Statistics 3 Credits (3,0)

Introductory mathematical concepts for problem-solving in software development and data analysis. Topics include linear algebra, probability, statistics, and combinatorics.

Course Offered at: Prescott

MATH 325 Matrix Methods 1 Credit (1,0)

Matrices, matrix algebra, determinants, linear equations, Gaussian elimination, eigenvalues, and applications in science and engineering.

Prerequisites: MATH 242

Course Offered at: Daytona Beach

MATH 335 Introduction to Linear and Abstract Algebra 3 Credits (3,0)

Theoretical aspects of modern algebra. Topics include linear and abstract algebra, proof-writing, and applications.

Course Offered at: Prescott

MATH 341 Introduction to Mathematical Analysis 3 Credits (3,0)

Theoretical aspects of calculus. Topics include the real number system, limits, continuity, derivatives, Riemann integral, topology, and metric spaces.

Course Offered at: Daytona Beach, Prescott

MATH 345 Differential Equations and Matrix Methods 4 Credits (4,0)

Ordinary differential equations; methods of substitution, linear equations, Laplace transforms, series solutions, linear algebra, and matrix methods applied to physics and engineering.

Prerequisites: MATH 243

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 348 Numerical Methods 3 Credits (3,0)

Floating point arithmetic, error analysis, interpolation, integration, differentiation, matrix algebra, solution of equations, and use of numerical software packages.

Prerequisites: MATH 345 and ENGR 115 or equivalent

Course Offered at: Daytona Beach, Prescott

MATH 350 Introduction to Partial Differential Equations 3 Credits (3,0)

First-order linear and nonlinear partial differential equations, numerical solutions, convergence, Fourier series, Greens functions, and difference equations.

Course Offered at: Daytona Beach

MATH 360 Mathematical Modeling and Simulation I 3 Credits (3,0)

Cyberlearning course in computational mathematics. Topics include matrix operations, optimization, and interdisciplinary problems. Use of software tools like MATLAB, Stella, and Agentsheets for modeling and simulation.

Prerequisites: MATH 392

Course Offered at: Daytona Beach

MATH 392 Applied Linear Algebra 3 Credits (3,0)

Vector and matrix operations, matrix decomposition, vector spaces, subspaces, linear transformations, change of basis, eigenvectors, eigenvalues, diagonalization of matrices, inner products, orthonormal bases, and applications.

Prerequisites: MATH 242

Course Offered at: Daytona Beach, Prescott, Worldwide

MATH 399 Special Topics in Mathematics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in mathematics.

Course Offered at: Daytona Beach, Prescott, Worldwide

MATH 404 Statistics and Research Methods 3 Credits (3,0)

Probability theory, statistical methods (regression, hypothesis testing, experimental design), ethics in experimentation, non-quantitative research, and use of statistics packages.

Prerequisites: MATH 112 or MATH 241

Course Offered at: Daytona Beach

MATH 410 Linear Optimization 3 Credits (3,0)

Techniques for solving deterministic optimization models. Topics include linear programming, simplex method, duality theory, network flow models, and integer programming.

Prerequisites: MATH 392

Course Offered at: Daytona Beach

MATH 412 Probability and Statistics 3 Credits (3,0)

Finite sample spaces; conditional probability; Bayes Theorem; discrete and continuous random variables; expected value; variance; standard deviation; major distributions; moment generating functions; hypothesis testing and estimation.

Prerequisites: MATH 242

Course Offered at: Daytona Beach, Prescott, Worldwide, Asia

MATH 420 Nonlinear Optimization 3 Credits (3,0)

Modeling and analysis of nonlinear optimization problems. Topics include convex analysis, optimization methods, duality theory, Karush-Kuhn-Tucker conditions, and penalty methods.

Prerequisites: MATH 243

Course Offered at: Daytona Beach

MATH 433 Review of Optimization Techniques 3 Credits (3,0)

Mathematical optimization methods; problem formulation; optimality criteria; linear programming methods; numerical methods for unconstrained and constrained problems; sequential linear programming; genetic algorithms; hybrid optimal control.

Course Offered at: Prescott

MATH 435 Linear and Abstract Algebra II 3 Credits (3,0)

Advanced topics in linear and abstract algebra, including Hilbert spaces, spectral theorem, tensor products, and non-associative algebra.

Course Offered at: Prescott

MATH 441 Mathematical Methods for Engineering and Physics I 3 Credits (3,0)

Line and surface integrals; vector fields; Green, Gauss, and Stokes Theorems; vector field applications; Fourier series.

Prerequisites: MATH 243

Course Offered at: Daytona Beach, Prescott

MATH 442 Mathematical Methods for Engineering and Physics II 3 Credits (3,0)

Linear differential equations with variable coefficients; derivation and solutions of partial differential equations; Fourier series, Fourier and Laplace transforms, Green's function; applications in science and engineering.

Prerequisites: MATH 441

Course Offered at: Daytona Beach, Prescott

MATH 443 Complex Variables 3 Credits (3,0)

Algebra of complex numbers; analytic functions; conformal mappings; applications. Topics include complex integration, power series expansion.

Prerequisites: MATH 441

Course Offered at: Daytona Beach, Prescott

MATH 448 Numerical Methods for Differential Equations 3 Credits (3,0)

Numerical techniques for solving differential equations: initial value problems, Taylor series methods, Runge-Kutta, multistep methods, boundary value problems, shooting method, finite difference method for heat and wave equations. Use of computational tools like MATLAB, C, Fortran, and Python.

Prerequisites: MATH 345 and MATH 305 or ENGR 115

Course Offered at: Daytona Beach

MATH 453 High Performance Scientific Computing 3 Credits (3,0)

Introduction to high-performance computing in computational mathematics and sciences. Overview of parallel computing, shared-memory parallelization (OpenMP), distributed-memory parallel programming (MPI), with applications in sciences, engineering, and physics.

Prerequisites: MATH 305 or MATH 348

Course Offered at: Daytona Beach

MATH 488 Data-driven Numerical Methods for Differential Equations 3 Credits (3,0)

Numerical methods for ODEs and PDEs: Runge-Kutta, multistep, shooting, finite difference, finite volume; stability, consistency, convergence. Data-driven modeling: sparse regression (SINDy), physics-informed neural networks (PINNs), model discovery, integration of physical laws with machine learning. Computational implementation, theoretical foundations, applications in science and engineering (fluids, climate and biology).

Prerequisites: MATH 442 and MATH 348 or MATH 305

Course Offered at: Daytona Beach

MATH 490 Capstone Project 3 Credits (3,0)

Consolidation of knowledge in mathematics through investigating a computational problem in an application area. Development of a mathematical paradigm and tools to solve the problem. Teams create mathematical models and present written and oral reports.

Prerequisites: BS Computational Math majors only and senior standing

Course Offered at: Daytona Beach

MATH 499 Special Topics in Mathematics 1-6 Credit (1-6,0)

Individual, independent, or directed studies of selected topics in mathematics.

Course Offered at: Daytona Beach, Prescott, Worldwide