

Mathematics (MATH)

MATH 502 Boundary Value Problems 3 Credits (3,0)

Solving boundary-value problems of partial differential equations using Fourier series, Laplace transforms, and other integral transforms. Applications in heat transfer, fluid mechanics, elasticity, and mechanical vibrations.

Course Offered at: Daytona Beach, Worldwide

MATH 504 Theory of the Potential 3 Credits (3,0)

Potential theory and Green's function. Solutions of Cauchy's initial value problems for first- and second-order equations. Applications in fluid mechanics, electromagnetic fields, heat conduction.

Prerequisites: MATH 502

Course Offered at: Daytona Beach

MATH 506 Probability and Statistical Inference 3 Credits (3,0)

Probability theory, distributions, central limit theorem, regression algorithms, classification analysis, statistical model selection, and evaluations. Application of probabilistic models to regression and classification problems.

Course Offered at: Daytona Beach

MATH 510 Fundamentals of Optimization 3 Credits (3,0)

Overview of optimization problems; mathematical models; linear programming; simplex method; sensitivity analysis; networks; Maple and Excel applications.

Course Offered at: Daytona Beach

MATH 520 Mathematical Programming and Decision-Making 3 Credits (3,0)

Mathematical modeling techniques in integer programming, nonlinear programming, and multiple-criteria decision making. Case studies from aviation/aerospace.

Course Offered at: Daytona Beach

MATH 532 Numerical Linear Algebra for Engineers 3 Credits (2,1)

Matrix operations, numerical linear algebra, matrix methods for solving linear systems, LU, QR, LQ, SVD, eigenvalues, least squares approximation, interpolation, tensors, structured matrices, and algorithm performance analysis.

Course Offered at: Daytona Beach

MATH 541 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

MATH 543 Complex Variables 3 Credits (3,0)

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

Course Offered at: Daytona Beach, Prescott

MATH 546 Application-Based Advanced Engineering Mathematics 3 Credits (3,0)

Survey of core advanced engineering mathematics topics using physical circumstances and mathematical modeling. Emphasis on introducing and applying mathematical approximations to real-world engineering problems.

Course Offered at: Daytona Beach, Worldwide

MATH 550 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 553 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.

Course Offered at: Daytona Beach

MATH 588 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).

Course Offered at: Daytona Beach

MATH 599 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 605 Statistical Quality Analysis 3 Credits (3,0)

Statistical quality control, including Shewhart charts, EWMA, multivariate charts, tolerance limits, capability analysis. Design of experiments using factorial and fractional factorial designs, nonparametric methods, advanced regression techniques. Industrial case studies emphasized.

Prerequisites: DSCI 505

Course Offered at: Daytona Beach

MATH 610 Multivariate Optimization 3 Credits (3,0)

Multiple-objective optimization, response surface methodology, goal programming, group decision-making, multivariate modeling, and optimal solution determination in aviation/aerospace.

Prerequisites: MATH 520 and MATH 605

Course Offered at: Daytona Beach

MATH 630 Complex Networks and Applications 3 Credits (2,1)

Introduction to complex network theory, big data system identification, statistical physics, real-world network models, network visualization, and applications in physics, biology, and social sciences.

Prerequisites: DSCI 540

Course Offered at: Daytona Beach

MATH 699 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

MATH 700 Graduate Thesis 1-9 Credit (1-9,0)

Written and defended documentation of a research project conducted under the supervision of a faculty committee. The research must be at the level of a published paper in an appropriate journal, as determined by the faculty committee.

Course Offered at: Daytona Beach