

MATHEMATICS (MTH)

MTH 090 ELEMENTARY ALGEBRA 2 Credit

This course is a seven week course designed to prepare the student needing additional background before taking MTH 108. Topics will include: order of operations, basic algebraic rearrangement of equations, and graphing linear equations.

Grade Mode: Pass/Fail

Course Offerings: Hybrid, Lecture, Web Based

MTH 095 INTERMEDIATE ALGEBRA 2 Credit

This course is a seven week course designed to prepare the student needing additional background before taking MTH 110. Topics will include: exponent rules, factoring, and solving the quadratic equation.

Pre-requisite: MTH 090

Grade Mode: Pass/Fail

Course Offerings: Hybrid, Lecture, Web Based

MTH 106 CONTEMPORARY MATHEMATICS 3 Credit

The course emphasizes basic strategies of thought and analysis by introducing the student to some of the most commonly encountered mathematical ideas. Topics include but are not limited to, problem solving, linear models, mathematics of finance, probability and statistics, as well as practical applications of these topics to situations the student may encounter outside the classroom.

Pre-requisite: MTH 095

Grade Mode: Standard Letter, Audit, Homestudy, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 108 ELEMENTARY STATISTICS 3 Credit

Introduction to statistical reasoning as required by an informed citizen. Emphasis on concepts rather than in-depth coverage of traditional statistical methods. Topics include sampling and experimentation, descriptive statistics, concepts of basic probability, the normal distribution, estimation of a population mean and proportion, single sample and two sample hypothesis tests, regression and correlation, and ethical considerations.

Pre-requisite: MTH 095

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 110 PRECALCULUS I 4 Credit

Designed to prepare students in mathematics or science for entry into the calculus sequence. An analytical approach to algebraic and trigonometric functions as models of real world phenomena. Real and complex numbers, theory of polynomial and rational equations and inequalities, exponential, logarithmic, and trigonometric functions.

Pre-requisite: MTH 095

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 120 PRECALCULUS II 4 Credit

A continuation of Math 110. Analytic trigonometry, laws of sines and cosines, systems of equations and inequalities, matrices and determinants, sequences, series, conics, polar coordinates, and parametric equations.

Pre-requisite: MTH 110

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 177 DISCRETE MATHEMATICS 3 Credit

A collection of topics essential to further study of mathematics, or computer science. Topics include the Boolean algebra in the form of propositional logic and elementary set theory, partitions, foundations of number theory and modular arithmetic with applications to cryptography, relations and functions on discrete sets, permutations, algorithms and recursive sequences, and combinatorics.

Pre-requisite: MTH 110

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 241 CALCULUS I 4 Credit

Fundamental concepts of function, limit of a function, continuity, derivatives, applications of derivatives, antiderivatives, and the definite integral. Emphasis on analytical, numerical, and graphical approaches.

Pre-requisite: MTH 120

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 242 CALCULUS II 4 Credit

A continuation of MTH 241. Transcendental functions, applications of integration, integration techniques, and infinite series.

Pre-requisite: MTH 241

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 243 CALCULUS III 4 Credit

A continuation of Math 242. Vectors and vector-valued functions, functions of several variables, multiple integration, and vector analysis.

Pre-requisite: MTH 242

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 252 STAT METHODS FOR THE SCIENCES 3 Credit

Intensive survey course with applications for the sciences. Topics include descriptive statistics, probability theory, random variables, binomial, Poisson, normal, t, F, and Chi-Square distributions, estimation and hypothesis testing of common parameters, analysis of variance, correlation, linear regression, and ethical considerations. Familiarity with a Windows based computer environment is strongly suggested.

Pre-requisite: MTH 241, MTH 242, MTH 243

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 300 LINEAR ALGEBRA I 3 Credit

Linear systems of equations, row-reduction, vector algebra, linear transformations, matrix algebra, concrete and abstract vector spaces and subspaces, structure theorems, determinants, change of basis theory, real eigenvalues and eigenvectors, diagonalization, with applications to nutrition, engineering, chemistry, computer graphics, business, economics, discrete time population models, and more.

Pre-requisite: MTH 110, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 311 MATHEMATICAL STATISTICS I - PROBABILITY THEORY 3 Credit

Events and sets, the algebra of probability, Bayes' theorem, single and multivariate discrete and continuous random variables, expectation, transformation of random variables, moments and moment generating functions, sums of random variables and introductory concepts in estimation. This course includes some preparation for Society of Actuaries Exam P.

Pre-requisite: MTH 177, MTH 242, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 312 MATHEMATICAL STATISTICS II - STATISTICAL INFERENCE 3 Credit

A rigorous treatment of the most common estimators and hypothesis testing procedures at the undergraduate level. Including modes of convergence and limit theorems, theory and implementation for unbiased, consistent, and maximum likelihood estimators, as well as introductions to Fisher information and efficiency, Shannon entropy and sufficiency, and Bayesian estimation.

Pre-requisite: MTH 311, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 351 DIFFERENTIAL EQUATIONS 3 Credit

Ordinary differential equations of first and second order, linear differential equations, Laplace transform approach to initial value problems, exact and approximate power series solutions, and linear systems of differential equations, with applications including population growth models, accumulation of interest in annuities and loans, economic models, epidemiology, chemical kinetics, projectile motion with air resistance, spring-mass and (RLC) electrical oscillators, pendulums, buoyancy, and more. Introduction to separation of variables and Fourier series solutions to the heat and wave PDEs as time permits.

Pre-requisite: MTH 242, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 365 FINANCIAL MATHEMATICS 3 Credit

A thorough treatment of interest theory with introduction to derivatives markets as time permits. Topics will include present, current, and accumulated value of money, annuity and loan payments, bonds, yield curves and analysis of portfolios, immunization, and determinants of interest rates. Additional topics may include forward contracts, insurance, hedging, call and put options. This course includes some preparation for Society of Actuaries Exam FM.

Pre-requisite: MTH 242, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 392 SPECIAL TOPICS - MATH 1-6 Credit

Expected to be offered: Sufficient demand

Pre-requisite: ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 400 LINEAR ALGEBRA II 3 Credit

Theory of complex eigenvalues with application to discrete and continuous linear dynamical systems; theory of inner products and orthonormal bases with application to the general least squares regression problem, polynomial trend analysis, and Fourier series; spectral theory of symmetric matrices and singular value decomposition with applications to principal component analysis for data dimension reduction and the use of a covariance matrix in multivariate Gaussian data modeling.

Pre-requisite: MTH 300, MTH 241, ENG 117

Grade Mode: Standard Letter, Pass/Fail

Course Offerings: Hybrid, Lecture, Web Based

MTH 401 REAL ANALYSIS I 3 Credit

Properties of the real numbers, convergence of sequences, functions, continuity, differentiability and integration.

Pre-requisite: MTH 243, MTH 177, ENG 117

Grade Mode: Standard Letter

Course Offerings: Hybrid, Lecture, Web Based

MTH 402 REAL ANALYSIS II 3 Credit

Analysis in \mathbb{R}^n and introduction to abstract metric spaces. Implicit and inverse function theorems. Sequences and series of functions, modes of convergence.

Pre-requisite: MTH 177, MTH 243, ENG 117

Grade Mode: Standard Letter

Course Offerings: Hybrid, Lecture, Web Based

MTH 405 MODERN ALGEBRA 3 Credit

Topics and techniques of abstract algebra. Prepares students for graduate work in mathematics or applications in cryptography while furnishing the theoretical foundations of the familiar: groups, rings, fields, vector spaces.

Pre-requisite: MTH 177, MTH 300, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 406 GAME THEORY 3 Credit

After the groundbreaking work of Morgenstern and vonNeumann in 1944, game theory quickly progressed to reshape and dominate modern economics, business analytics, and even military strategy. This course for mathematically and economically prepared undergraduates lays a rigorous foundation for further study, while also providing abundant examples for the terminal student of how game-theoretic setups and analyses are applied in concrete situations arising in business, economics, finance, sports, and everyday life.

Pre-requisite: MTH 311, ECN 202, ENG 117

Grade Mode: Standard Letter, Audit, Homestudy, Pass/Fail, Transfer

Course Offerings: Lecture, Web Based

MTH 421 MATHEMATICAL & NUMERICAL ANALYSIS 3 Credit

Numerical approaches to single-variable equations, polynomial approximation, integration and differentiation, initial value problems, and selected topics in numerical linear algebra. Emphasis on supporting topics from real analysis and practical software implementations. Software usage will include Geogebra and Octave/Matlab.

Pre-requisite: MTH 300, MTH 351, ENG 117

Grade Mode: Standard Letter, Audit, Pass/Fail, Transfer

Course Offerings: Hybrid, Lecture, Web Based

MTH 492 SPECIAL PROBLEMS IN MATH 1-6 Credit

Credit for research, workshops, special problems, and independent study.

Restrictions: Enrollment limited to students with a classification of Junior or Senior

Grade Mode: Standard Letter, Credit/No Credit, Pass/Fail

Course Offerings: Hybrid, Lecture, Web Based

MTH 495 INTERNSHIP 1-15 Credit

Expected to be offered: Sufficient demand

Pre-requisite: ENG 117

Grade Mode: Pass/Fail, Audit, Other to Include Option of IP, Standard Letter, Transfer

Course Offerings: IN/FE/Rsrch/Thsis/Prjct/Capstn

MTH 499 SENIOR THESIS 1-3 Credit

This upper division course for mathematics majors requires submission of a written report (thesis) and oral seminar presentation based on critical evaluation of scientific literature and/or an independent research project.

Pre-requisite: ENG 117

Grade Mode: Pass/Fail, Standard Letter

Course Offerings: IN/FE/Rsrch/Thsis/Prjct/Capstn