MTH. MATHEMATICS

MTH-198, MTH-289, MTH-398, MTH-498. TOPICS IN MATHEMATICS
Credits: Variable

A study of topics of special interest. It may be a continuation of intensive study of topics begun in the upper-level courses in analysis, topology, algebra, and probability. May be repeated for credit for a different topic.

Pre-Requisites

Varies with topic

MTH-94. COLLEGE ALGEBRA
Credits: 3

Designed for students who need to review basic algebra before taking [[MTH-100]] or [[MTH-150]]. Topics include polynomials, solution of equations and inequalities, exponents and radicals, graphing, and solution of systems of equations. Offered every fall.

MTH-100. PRECALCULUS
Credits: 3

A course in advanced algebra and trigonometry designed to prepare students for calculus. Topics include functions, inverse functions, logarithms, exponentials, and trigonometry.

Pre-Requisites

MTH 94 with grade of 2.0 or better or meet Department of Mathematics and Computer Science placement criteria.

MTH-101. SOLVING PROBLEMS USING MATHEMATICS
Credits: 3

An introduction to the methodology of mathematical modeling as a technique in working towards the solution to real world problems. In an effort for the non-specialist to gain an appreciation of the use of mathematics in our society, topics are selected from among the following: basic voting theory, fair division schemes, routing problems, population growth, and descriptive statistics and probability.

MTH-103. MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS
Credits: 3

A study of the theory of arithmetic, structure of the number systems, and other topics relevant to the teaching of mathematics in elementary schools. Offered every fall.

Pre-Requisites

Admission to the Teacher Education Program or consent of the instructor.

MTH-104. MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS II
Credits: 3

A continuation of [[MTH-103]]. Topics include elementary probability, statistics, and geometry. Offered every spring.

Pre-Requisites

Admission to the Teacher Education Program or consent of the instructor.

MTH-111. CALCULUS I
Credits: 4

Calculus of functions of one variable. Topics include functions, limits and continuity, derivatives and integrals. Course will focus on applying conceptual aspects of calculus to modeling and solving problems from across the sciences and engineering.

Pre-Requisites

[[MTH-100]] with a grade of 2.0 or better OR meet Department of Mathematics and Computer Science placement criteria.

MTH-112. CALCULUS II
Credits: 4

A continuation of [[MTH-111]]. Topics include inverse functions, techniques of integration, applications of the integral, and infinite sequences and series.

Pre-Requisites

[[MTH-111]] with grade of 2.0 or better

MTH-114. CALCULUS AND MODELING FOR THE BIOLOGICAL AND HEALTH SCIENCES
Credits: 4

A continuation of MTH 111 for students in the biological and environmental sciences. Topics include integrals, differential equations and continuous dynamical systems, stochastic models and Markov chains, and discrete and continuous probability models. Course will focus on applying ideas from calculus to modeling and solving problems drawn from the biological and environmental sciences. Major credits cannot be granted for both MTH 112 and MTH 114.

Pre-Requisites

[[MTH-111]] with grade of 2.0 or better

MTH-150. ELEMENTARY STATISTICS
Credits: 3

Elementary statistical inference, with an emphasis on ideas, techniques, and applications in the life, physical, and social sciences. Topics include descriptive statistics, confidence intervals, hypothesis testing, contingency tables, multiple regression, and analysis of variance. Not open to mathematics majors or students with credit in MTH 351.

Pre-Requisites

[[MTH-94]] with grade of 2.0 or better OR meet Department of Mathematics and Computer Science placement criteria.

MTH-211. INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS
Credits: 4

First-order and linear higher order differential equations; matrices, determinants, and systems of differential equations; numerical and power series methods of solution; the Laplace transform. Offered every fall.

Pre-Requisites

[[MTH-112]] with grade of 2.0 or better

Mathematics

MTH-212. MULTIVARIABLE CALCULUS
Credits: 4

Differential and integral calculus of real and vector valued functions. Topics include continuity, partial differentiation, implicit functions, Taylor's Theorem, gradient, curl, line, surface, and multiple integrals, inverse functions, theorems of Green and Stokes.
Click here for course fee.

Pre-Requisites
[[MTH-112]] with grade of 2.0 or better

MTH-214. LINEAR ALGEBRA
Credits: 3

An axiomatic approach to vector spaces, linear transformations, systems of linear equations, Eigen values, and Eigen vectors. Offered every spring.

Pre-Requisites
[[MTH-112]] with grade of 2.0 or better OR consent of the instructor.

MTH-231. DISCRETE MATHEMATICS I
Credits: 3

An introduction to logic, sets, relations, and counting for students in the mathematical and computing sciences. Topics include: Introduction to symbolic logic; types of proof including direct proof and proof by contradiction; introduction to mathematical induction; elementary set theory including sets, equivalence and partial order relations and functions; basic counting principles including permutations and combinations with and without multiplicity, the Binomial Theorem, an introduction to combinatorial proof and the Pigeonhole Principle; Introduction to recursive definition, solving first-order recurrences using iteration; solving linear homogeneous and non-homogeneous recurrences with constant coefficients.

Pre-Requisites
[[MTH-111]] with grade of 2.0 or better

MTH-232. DISCRETE MATHEMATICS II
Credits: 3

A continuation of [[MTH-231]] providing background in discrete mathematics. Emphasis will be placed on the development of mathematical algorithms and their usage in computer science. Topics include: Introduction to divisibility, the integers, and the Euclidean Algorithm; growth rates of functions, big OH notation and an introduction to algorithm analysis including analyzing iterative and recursive algorithms; basics of graph theory including paths, cycles, graph isomorphism, and graph colorings; introduction to greedy algorithms and their use; trees, spanning trees, binary trees and related algorithms; introduction to combinatorial circuits and Boolean algebra, introduction to finite state machines.

Pre-Requisites
[[MTH-231]] with grade of 2.0 or better

MTH-234. FINANCIAL MATHEMATICS
Credits: 3

This is an introductory course in Financial Mathematics. students will learn about the different types of interest (simple interest, discount interest, compound interest), annuities, debt retirement methods, investing in stocks and bonds. If time is permissible, more advanced topics will also be covered.

Pre-Requisites
[[MTH-100]] with grade of 2.0 or better or consent of the instructor.

MTH-302. INTRODUCTION TO HIGHER MATHEMATICS
Credits: 3

A continuation of [[MTH-231]] which provides foundational background for upper-level courses in pure mathematics. Topics include advanced studies of relations including a review of equivalence relations, an introduction to partial order and total order relations; properties of the integers including divisibility, the notion of congruence, the Euclidean Algorithm, and the Fundamental Theorem of Arithmetic; properties of the real number system including axioms for the real numbers, subsets of the real number system (including the integers, rational numbers, and irrational numbers), the completeness of the real number system; properties of sets and functions including cardinality, countable vs uncountable sets, the cardinal hierarchy of infinite sets and the Continuum Hypothesis.

Pre-Requisites
[[MTH-231]] with a grade of 2.0 or higher

MTH-303. THE TEACHING OF MATHEMATICS IN MIDDLE LEVEL AND SECONDARY SCHOOLS
Credits: 4

This course deals with educational perspectives that pertain to the teaching of mathematics at the middle and secondary levels (grades 4 through 12). Topics of discussion include recommendations by the National Council for Teachers of Mathematics (NCTM) regarding instructional methods, assessment, techniques, and curricular issues. The course includes a 40-hour practicum. Offered in the fall semester of odd-numbered years.

Pre-Requisites
MTH 111, Junior or Senior in Mathematics or Middle-Level Education, and admission to the Teacher Education Program.

MTH-311. REAL ANALYSIS
Credits: 4

A rigorous study of the topology of the real line, limits, continuity, differentiation, integration, and series of functions. Offered in the fall semester of even-numbered years.

Pre-Requisites
[[MTH-302]] or consent of the instructor.

MTH-314. COMPLEX ANALYSIS
Credits: 3

Complex functions, limit, continuity, analytic functions, power series, contour integration, Laurent expansion, singularities, and residues. Offered when demands warrants.

Pre-Requisites

[[MTH-212]] or consent of the instructor.

MTH-331. ABSTRACT ALGEBRA I
Credits: 4

A rigorous study of elementary number theory, groups, rings, and fields. Offered in the fall semester of odd-numbered years.

Pre-Requisites

[[MTH-302]] or consent of the instructor.

MTH-343. GEOMETRY
Credits: 3

A study of selected topics from Euclidean and non-Euclidean geometry. Offered in the fall semester of even-number years.

Pre-Requisites

[[MTH-302]] or consent of the instructor.

MTH-351. PROBABILITY AND MATHEMATICAL STATISTICS I
Credits: 3

Random variables, probability distributions, expectation and limit theorems, introduction to confidence intervals and hypotheses testing. Offered every fall.

Pre-Requisites

[[MTH-112]] or consent of the instructor.

MTH-352. PROBABILITY AND MATHEMATICAL STATISTICS II
Credits: 3

Hypothesis testing, non-parametric methods, multivariate distributions, introduction to linear models. Offered in the spring semester of odd-numbered years when demand warrants.

Pre-Requisites

[[MTH-351]] or consent of the instructor.

MTH-353. ACTUARIAL MATHEMATICS
Credits: 3
Terms Offered: On Demand

Actuarial science is the discipline that applies mathematical and statistical methods to assess risk in the insurance and finance industries. Actuarial science includes a number of interrelating subjects, including probability and statistics, finance, and economics. This course will provide basic aspects of the theory of insurance, concentrating on the part of this theory related to life insurance.

Pre-Requisites

[[MTH-351]] or consent of the instructor.

MTH-354. STATISTICAL METHODOLOGY
Credits: 3

This course emphasizes applications, using statistical computer packages, such as BMDP, SPSS, and JMP, and real data sets from a variety of fields. Topics include estimation and testing, stepwise regression, analysis of variance and covariance, design of experiments, contingency tables, and multivariate techniques, include logistic regression. Offered in the spring semester of even-numbered years when demand warrants.

Pre-Requisites

[[MTH-150]] or [[MTH-351]] or consent of the instructor.

MTH-356. ACTUARIAL P EXAM PREPARATION
Credits: 1
Terms Offered: On Demand

This is a seminar course with the aim of helping students prepare for the actuarial exams as needed.

Pre-Requisites

[[MTH-351]]

MTH-361. PARTIAL DIFFERENTIAL EQUATIONS
Credits: 3

Partial differential equations and boundary value problems, inner product spaces, orthogonal functions, eigenvalue problems, Sturm-Liouville equations, Fourier series, Fourier transforms, Green's functions, and classical equations of engineering and physics. Offered fall of even years.
Click here for course fee.

Pre-Requisites

[[MTH-211]] & [[MTH-212]] or consent of the instructor

MTH-362. ADVANCED CALCULUS
Credits: 3

Topics from advanced calculus including matrix representation of differentials and the multivariable chain rule, vector calculus, curvilinear coordinates, tensors, change of variables in higher dimensions, improper multiple integrals, applications of line and surface integrals, differential forms and the general Stokes theorem, potential theory, and Taylor's formula for functions of several variables. Offered Fall of odd years.
Click here for course fee.

Pre-Requisites

[[MTH-212]]

MTH-363. OPERATIONS RESEARCH
Credits: 3

A survey of operations research topics such as decision analysis, inventory models, queuing models, dynamic programming, network models and linear programming. Cross-listed with [[CS-363]]. Offered in the spring semester of odd-numbered years when demand warrants.
Click here for course fee.

Pre-Requisites

[[MTH-112]] and [[CS-125]].

Mathematics

MTH-364. NUMERICAL ANALYSIS
Credits: 3

Numerical techniques for solving equations, interpolation and function approximation, numerical integration, and differentiation, and solution of differential equations. Error analysis and applications. Cross-listed with [[CS-364]]. Offered spring of odd-numbered years.

Pre-Requisites
[[MTH-211]]and [[CS-125]] (or equivalent programming experience).

MTH-365. NUMERICAL LINEAR ALGEBRA
Credits: 3

Direct and iterative methods for the solution of systems of linear equations, matrix decompositions, computation of eigenvalues and eigenvectors, and relaxation techniques. The theoretical basis for error analysis, including vector and matrix norms. Applications such as least squares and finite difference methods. Offered spring semester of even-numbered years.
Click here for course fee.

Pre-Requisites
[[MTH-214]] and [[CS-125]] (or equivalent programming experience)

MTH-391. SENIOR SEMINAR
Credits: 1

Presentations and discussions of selected topics in mathematics, conducted by students and faculty.

Pre-Requisites
[[MTH-311]] or [[MTH-331]] and senior standing in mathematics.

MTH-392. SENIOR SEMINAR
Credits: 2

Presentations and discussions of selected topics in mathematics, conducted by students and faculty.

Pre-Requisites
[[MTH-311]] or [[MTH-331]] and senior standing in mathematics.

MTH-397. SEMINAR
Credits: 1-3

Presentations and discussions of selected topics.

Pre-Requisites
Approval of the department chairperson.

MTH-399. COOPERATIVE EDUCATION
Credits: 1-6

Professional cooperative education placement in a private or public organization related to the student's academic objectives and career goals. In addition to their work experiences, students are required to submit weekly reaction papers and an academic project to a Faculty Coordinator in the student's discipline. See the Cooperative Education section of this bulletin for placement procedures. Requirements: Sophomore standing; minimum 2.0 cumulative GPA; consent of the academic advisor; and approval of placement by the department chairperson.

MTH-413. FUNCTIONS OF SEVERAL VARIABLES
Credits: 3

A modern treatment of the calculus of functions of several real variables. Topics include Euclidean spaces, differentiation, integration of manifolds leading to the classical theorems of Green and Stokes. Offered when demand warrants.

Pre-Requisites
[[MTH-214]] and [[MTH-311]].

MTH-432. ABSTRACT ALGEBRA II
Credits: 3

A continuation of [[MTH-331]]. Polynomial rings, ideals, field extensions, and Galois Theory. Offered when demand warrants.

Pre-Requisites
[[MTH-331]].

MTH-442. TOPOLOGY
Credits: 3

Metric spaces, topological spaces, countability and separation axioms, compactness, connectedness, product spaces. Offered when demand warrants.

Pre-Requisites
[[MTH-311]] or consent of the instructor.

MTH-470. READING COURSE
Credits: 1-3

Requirements: Senior standing in mathematics and approval of the department chairperson.