MTH. MATHEMATICS

MTH-411. REAL ANALYSIS
Credits: 4
A rigorous treatment of fundamental concepts in analysis, with emphasis on careful reasoning and proofs. Topics covered include the completeness and order properties of real numbers; limits and continuity; conditions for integrability and differentiability; infinite sequences and series of functions. Basic notions of the topology of the real line are also introduced.

Pre-Requisites
MTH-302 (Introduction to Higher Mathematics) or consent of instructor

MTH-413. FUNCTIONS OF SEVERAL VARIABLES
Credits: 3
A modern treatment of calculus of functions of several real variables. Topics include: Euclidean spaces, differentiation, integration and manifolds leading to the classical theorems of Green and Stokes.

Pre-Requisites
MTH-214 (Linear Algebra) and MTH-411 (Real Analysis) or consent of instructor.

MTH-414. COMPLEX ANALYSIS
Credits: 3
Complex functions, limit, continuity, analytic functions, power series, contour integration, Laurent expansion, singularities and residues.

Pre-Requisites
MTH-212 (Multivariable Calculus) or consent of instructor.

MTH-431. ABSTRACT ALGEBRA I
Credits: 4
A rigorous treatment of fundamental concepts in algebra, with emphasis on careful reasoning and proofs. Topics covered include equivalence relations, binary operations. Integers: divisibility, factorization, integers modulo n, elementary group theory, subgroups, cyclic groups, permutation groups, quotient groups. Homomorphisms and isomorphisms. Introductory topics in ring theory as time permits.

Pre-Requisites
MTH-302 (Introduction to Higher Mathematics) or consent of instructor

MTH-432. ABSTRACT ALGEBRA II
Credits: 3
A continuation of MTH-431. Includes the study of polynomial rings, ideals, field extensions and Galois Theory.

Pre-Requisites
MTH-431 (Abstract Algebra).

MTH-442. TOPOLOGY
Credits: 3
An introduction to point-set topology, including a study of metric spaces, topological spaces, countability and separation axioms, compactness, connectedness, product spaces.

Pre-Requisites
MTH-411 (Real Analysis) or consent of instructor.

MTH-443. GEOMETRY
Credits: 3
A study of selected topics from Euclidean and non-Euclidean geometry.

Pre-Requisites
MTH-302 (Introduction to Higher Mathematics) or consent of instructor

MTH-451. PROBABILITY AND MATHEMATICAL STATISTICS I
Credits: 3
Random variables, probability distributions, expectation and limit theorems, confidence intervals.

Pre-Requisites
A one-year calculus sequence or consent of instructor.

MTH-452. PROBABILITY AND MATHEMATICAL STATISTICS II
Credits: 3
Hypothesis testing, non-parametric methods, multivariate distributions, introduction to linear models.

Pre-Requisites
MTH-451 or consent of instructor.

MTH-454. STATISTICAL METHODOLOGY
Credits: 3
This course emphasizes applications, using statistical computer packages (R, SPSS) 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, including logistic regression.

Pre-Requisites
MTH-451 or consent of instructor.

MTH-461. PARTIAL DIFFERENTIAL EQUATIONS
Credits: 3
Fees: $40

Offered fall of odd years.

Pre-Requisites
MTH-211 and MTH-212
MTH-462. ADVANCED CALCULUS  
Credits: 3  
Fees: $40  
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 even years  

Pre-Requisites  
MTH-212 (Multivariable Calculus)  

MTH-463. 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-463. Offered in the spring semester of odd-numbered years when demand warrants.  

Pre-Requisites  
Programming experience in a high-level language and completion of a one-year calculus sequence.  

MTH-464. NUMERICAL ANALYSIS  
Credits: 3  
An introduction to numerical algorithms as tools to providing solutions to common problems formulated in mathematics, science, and engineering. Focus is given to developing the basic understanding of the construction of numerical algorithms, their applicability, and their limitations. (Cross-listed with CS-464)  

Pre-Requisites  
Programming experience in a high-level language and completion of a one-year calculus sequence.  

MTH-465. 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.  

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

MTH-470. READINGS IN MATHEMATICS  
Credits: 3  
Pre-Requisites  
Consent of Mathematics Department Chairperson  
May be repeated for credit if a different topic is selected.  

MTH-511. MEASURE AND INTEGRATION  
Credits: 3  
Measures, measurable functions, integration, convergence theorems, product measures, signed measures.  

Pre-Requisites  
MTH-442 or consent of instructor.  

MTH-513. FUNCTIONAL ANALYSIS  
Credits: 3  
Topics include: Banach spaces, Lp-spaces, Hilbert spaces, topological vector spaces, and Banach algebra.  

Pre-Requisites  
MTH-411 and a course in linear algebra.  

MTH-532. MODERN ALGEBRA  
Credits: 3  
A study of group theory (including the Sylow Theorems and solvable groups); ring theory (including the Noetherian rings and UFDs); modules, tensor algebra, and semi-simple rings.  

Pre-Requisites  
MTH-431, and a course in linear algebra or consent of instructor.  

MTH-542. ALGEBRAIC TOPOLOGY  
Credits: 3  
Polyhedra, simplicial homology theory, cohomology rings, and homotopy groups.  

Pre-Requisites  
MTH-442.  

MTH-590. THESIS WRITING  
Credits: up-6  
Pre-Requisites  
Consent of Department Chairperson