MATHEMATICS

Courses

MTH 102. Fundamentals of Math. 3 Hours
Review of foundational algebraic skills essential for success in precalculus. Topics include real numbers, exponents, absolute value, radicals, along with polynomial and rational expressions and equations.

MTH 114. Contemporary Mathematics. 3 Hours
Study of contemporary mathematical topics and their applications. Topics may include management science, statistics, social choice, size and shape, and computer mathematics. Prerequisite(s): Two years of high school algebra.

MTH 116. Precalculus Math. 4 Hours
Review of topics from algebra and trigonometry including polynomials, functions and graphs, exponential and logarithmic functions, trigonometric functions and identities. Prerequisite(s): Two years of high school algebra.

MTH 128. Finite Mathematics. 3 Hours
Topics from mathematics used in business including systems of equations, inequalities, matrix algebra, linear programming and logarithms; applications to compound interest, annuities and other finance problems. Prerequisite(s): MTH 102 or sufficient college preparatory mathematics.

MTH 129. Calculus for Business. 3 Hours
Topics from differential and integral calculus used in business; applications to optimizing financial functions, marginal functions in economics, and consumer or producer surplus. Prerequisite(s): MTH 128 or sufficient college preparatory mathematics.

MTH 148. Introductory Calculus I. 3 Hours
Introduction to the differential and integral calculus; differentiation and integration of algebraic and transcendental functions with applications to the life and social sciences. Prerequisite(s): MTH 116 or equivalent.

MTH 149. Introductory Calculus II. 3 Hours
Continuation of MTH 148. Multivariable calculus, matrices, difference equations, probability, discrete and continuous random variables, and differential equations with applications to the life and social sciences. Prerequisite(s): MTH 138 or MTH 148.

MTH 168. Analytic Geometry & Calculus I. 4 Hours
Introduction to the differential and integral calculus; differentiation and integration of algebraic and transcendental functions with applications to science and engineering. Prerequisite(s): MTH 116 or equivalent.

MTH 169. Analytic Geometry & Calculus II. 4 Hours
Continuation of MTH 168. Conic sections, techniques of integration with applications to science and engineering, infinite series, indeterminate forms, Taylor's theorem. Prerequisite(s): MTH 138 or MTH 168.

MTH 1PF. COLLEGE ALGEBRA. 0-12 Hours

MTH 1PS. TRIGONOMETRY. 0-12 Hours

MTH 204. Mathematical Concepts I. 3 Hours
First course of a two-semester sequence designed for pre-service teachers. Concepts necessary for an understanding of the structure of arithmetic and its algorithms, number patterns, problem solving, fractions, percent, and proportions. Prerequisite(s): One year of high school algebra; one year of high school geometry.

MTH 205. Mathematical Concepts II. 3 Hours
Continuation of MTH 204- a two semester sequence designed for pre-service teachers. Topics include probability, representing and interpreting data, the metric system, elementary geometry, geometric patterns, coordinate geometry, algebra and geometry, and transformations. Prerequisite(s): MTH 204.

MTH 207. Introduction to Statistics. 3 Hours
Introduction to the concepts of statistical thinking for students whose majors do not require calculus. Methods of presenting data, including graphical methods. Using data to make decisions and draw conclusions. Basic ideas of drawing a sample and interpreting the information that it contains. Prerequisite(s): Two years of high school algebra.

MTH 208. Exploratory Data Analysis. 3 Hours
Introduction to graphical and modeling techniques for exploring data, with an emphasis on analyzing and summarizing the main characteristics of data sets, statistical thinking, data visualization, statistical interpretation, and communication of findings. Prerequisites: One of the following courses MTH 148, MTH 168, MTH 207, DSC 210, PSY 216 or permission of the instructor.

MTH 209. Data Manipulation and Management. 3 Hours
The main objective of this course is to demonstrate knowledge of technical terms, methods, and tools for data manipulation, data management, statistical computing and data visualization. Prerequisites: One of the following courses MTH 148, MTH 168, MTH 207, DSC 210, PSY 216 or permission of the instructor.

MTH 214. Mathematical Concepts for Middle School Teachers. 3 Hours
Concepts necessary for an understanding of the arithmetic taught in both elementary and middle grades. Includes a study of the structure of arithmetic and its algorithms; problem solving; reasoning and proof; proportional reasoning; use of computers and calculators to solve problems. Prerequisite(s): Two years of high school algebra.

MTH 215. Algebra, Functions & Graphs. 3 Hours
Development of the algebra of various families of functions including polynomial, exponential, logarithmic, and trigonometric functions; factoring and roots; interpretation of graphs; use of calculators and data collection devices to solve problems. Prerequisite(s): MTH 214.

MTH 216. Calculus Concepts & Applications. 3 Hours
Develop conceptual understanding of basic calculus concepts; introduction to the notion of limit; rates of change; slopes and area computations; use of calculators and data collection devices to make predictions, estimations, and solve problems. Prerequisite(s): MTH 215.

MTH 218. Analytic Geometry & Calculus III. 4 Hours
Continuation of MTH 169. Solid analytic geometry, vectors and vector functions, multivariable calculus, partial derivatives, multiple integrals. Prerequisite(s): MTH 169.

MTH 219. Applied Differential Equations. 3 Hours
First order equations, linear equations with constant coefficients, systems of equations, the Laplace transform, numerical methods, applications. Prerequisite(s): MTH 218.

MTH 229. Theory of Interest. 3 Hours
Rigorous, calculus-based treatment of the Theory of Interest. Topics covered include interest, compounding, discounting, annuities, sinking funds, amortization, bonds, yield rates, and applications of these ideas and processes to problems in finance. Prerequisite(s): MTH 169.

MTH 266. Discrete & Finite Mathematics for Middle School Teachers. 3 Hours
Topics in finite and discrete mathematics; linear programming; applications in finance; graph theory; mathematics of social choice; logic; use of computers and calculators to model and solve problems. Prerequisite(s): MTH 214.

MTH 270. Geometry Concepts & Applications. 3 Hours
Introduction to the geometry of two- and three-dimensional space; patterns in geometry; measurement systems; transformations and similarity; coordinate geometry; the algebra of geometry; trigonometry; use of dynamic computer software to explore geometric concepts. Prerequisite(s): MTH 214.

MTH 290. Topics in Mathematics. 1-3 Hours
Exploration of varying topics under supervision of a faculty member. May be taken more than once. Prerequisites: Permission of department chairperson.

MTH 295. Historical Roots of Elementary Mathematics. 3 Hours
Fundamental historical development of modern arithmetic, algebra, geometry, and number systems from early Egyptian, Babylonian, and Greek sources. Students may not receive credit for both this course and MTH 395. Prerequisite(s): MTH 214.

MTH 301. Matrix Theory and Applications. 3 Hours
Investigation of systems of linear equations and matrices. Matrix operations, inverse matrix, partitioned matrices, matrix factorizations. Vector space and subspace of R^n. Null and Column spaces of matrices. Eigenvalues and eigenspaces of matrices. Orthogonal vectors, Least-Squares problems, Diagonaliztion, Quadratic forms, Singular value decompositions. Applications such as Markov chains, computer graphics, electric circuits, and image processing. Mathematics majors should take MTH 310 rather than MTH 301. Students cannot receive credit for both MTH 301 and MTH 310. Prerequisite(s): MTH 218.

MTH 308. Foundations & Discrete Mathematics. 3 Hours
An introduction to proof using topics in foundational and discrete mathematics; propositional logic; number theory; sequences and recursion; set theory; relations; combinatorics; linear programming. Prerequisite(s): MTH 169.

MTH 310. Linear Algebra & Matrices. 3 Hours
Fundamental concepts of vector spaces, determinants, linear transformations, matrices, inner product spaces, and eigen-vectors. Students cannot receive credit for both MTH 301 and MTH 310. Prerequisites: MTH 218, MTH 308.

MTH 328. Actuarial Probability Seminar. 1 Hour
Problem solving seminar to develop and improve skills in applied probability. This seminar will focus on actuarial applications of probability theory. Prerequisite(s): MTH 411.

MTH 329. Actuarial Finance Seminar. 1 Hour
Problem solving seminar to develop and improve skills in applied mathematical finance. This seminar will focus on integrating the mathematical presentation of the Theory of Interest to the field of finance. Prerequisite(s): FIN 470; MTH 229.

MTH 330. Intermediate Analysis. 3 Hours
Theoretical development of the calculus of a real-valued function of a real variable. Topics include the algebraic and topological properties of the real line, limits of sequences and functions, continuity, differentiability, and integration. Prerequisite(s): MTH 310.

MTH 342. Set Theory. 3 Hours
Elementary set theory including relations, functions, indexed families, denumerable and nondenumerable sets, cardinal and ordinal arithmetic, Zorn's Lemma, the well-ordering principle and transfinite induction. Prerequisite(s): MTH 218, MTH 308.

MTH 361. Introduction to Abstract Algebra. 3 Hours
Fundamental concepts of groups, rings, integral domains and fields. Prerequisite(s): MTH 218, MTH 308.

MTH 367. Statistical Methods I. 3 Hours
Probability distributions including binomial, hypergeometric, Poisson, and normal. Estimation of population mean and standard deviation: Confidence intervals and tests of hypotheses using t-, Chi-square, and F-statistics. Mathematics majors enroll in MTH 411 instead of MTH 367. Prerequisite(s): MTH 149 or MTH 169.

MTH 368. Statistical Methods II. 3 Hours
Distribution-free methods including rank tests, sign tests, and Kolmogorov-Smirnov test. Method of least squares, correlation, linear regression, analysis of variance. Design of experiments and computer applications. Mathematics majors enroll in MTH 412 instead of 368. Prerequisite(s): MTH 367.

MTH 369. Regression Models for Data Analytics. 3 Hours
Introduction to regression models including linear regression, logistic regression, poisson regression, and LASSO. Prediction and estimation using regression models. Regression model diagnostics. Model selection. Prerequisites: One of the following courses MTH 209, MTH 367, MTH 411 or (Both DSC 211 and CPS 149) or (Both PSY 216 and CPS 149) or permission of the instructor.

MTH 370. Introduction to Higher Geometry. 3 Hours
Projective, affine, and hyperbolic geometries using synthetic and/or analytic techniques. Prerequisite(s): MTH 218, MTH 308.

MTH 376. Number Theory. 3 Hours
Topics include Diophantine equations, Chinese Remainder theorem, Mobius inversion formula, quadratic residues and the Law of Quadratic Reciprocity, Gaussian integers, and integral quaternions. Prerequisite(s): MTH 218, MTH 308.

MTH 395. Development of Mathematical Ideas. 3 Hours
The evolution of mathematical ideas and techniques from ancient times to the present with emphasis on the Greek era. Famous people and famous problems. Chronological outline of mathematics in each of its branches along with applications. Prerequisite(s): MTH 218, MTH 308.

MTH 403. Boundary Value Problems. 3 Hours
Introduction to the Sturm-Liouville problem. Fourier trigonometric series, Fourier integrals, Bessel functions, and Legendre polynomials. The heat equation, wave equation, and Laplace's equation with applications. Solutions by the product method. Prerequisite(s): MTH 219, MTH 310.

MTH 404. Complex Variables. 3 Hours
Functions of a complex variable, conformal mapping, integration in the complex plane. Laurent series and residue theory. Prerequisite(s): MTH 219.

MTH 411. Probability & Statistics I. 3 Hours
Mathematical probability, random variables, Bayes' Theorem, Chebyshev's Inequality, Binomial, Poisson, and Normal probability laws, moment generating functions, limit theorems, descriptive statistics, large sample statistical inference. MTH 308 is recommended as preparation for this course. Prerequisite(s): MTH 218.

MTH 412. Probability & Statistics II. 3 Hours
Multivariate distributions, transformations of random variables, sampling distribution theory, estimation of parameters including maximum likelihood, confidence intervals, the Neyman-Pearson lemma, tests of hypotheses, likelihood ratio tests. Prerequisite(s): MTH 411.

MTH 415. Machine Learning for Data Analytics. 3 Hours
Introduction to commonly used machine learning algorithms and techniques for supervised and unsupervised learning including classifiers, ensemble methods, variable selection, etc. The focus will be on statistical learning algorithms. Prerequisites: Both MTH 209 and MTH 369 or permission of the instructor.

MTH 416. Bayesian Statistics. 3 Hours
An introduction to Bayesian statistical methods, focusing on concepts, modeling, computational techniques, and applications. This course covers Bayesian theory, prior probability distribution, Bayesian estimation, and hierarchical models, with practical applications using statistical software. Prerequisites: MTH 209 and MTH 412, or permission of the instructor.

MTH 417. Introduction to Computational Statistics. 3 Hours
Introduction to computational methods in statistics, focusing on the practical application of statistical programming, data manipulation, simulation techniques, and algorithmic approaches to solve statistical problems. Emphasis on hands-on experiences with real datasets. Prerequisites: MTH 209, and one of the following courses: MTH 367, MTH 411; or permission of the instructor.

MTH 430. Real Analysis. 3 Hours
Continuation of MTH 330. Topics include the theory of convergence of sequences and series of functions in the context of metric spaces, uniform continuity, uniform convergence, and integration. Prerequisite(s): MTH 330.

MTH 435. Advanced Multivariate Calculus. 3 Hours
Topics include directional derivatives, chain rule, Lagrange multipliers, Taylor's formula, the mean value theorem, inverse mapping theorem, implicit function theorem, integration, Fubini's theorem, change of variables, line integrals, Green's theorem and Stoke's theorem. Prerequisite(s): MTH 310.

MTH 445. Special Topics in Mathematics. 1-3 Hours
Lectures in specialized areas such as abstract algebra, applied mathematics, complex variables, differential forms, functional analysis, Galois theory, game theory, general topology, normed linear spaces, probability theory, real variables, topological groups. May be taken more than once. Prerequisite(s): Permission of department chairperson.

MTH 447. Applied Design of Experiments. 3 Hours
This course introduces the principles and methods of designing experiments in various fields of study. It covers the basics of experimental design, including factorial designs, randomized blocks, Latin squares, and response surface methodologies. Students will learn how to plan, conduct, and analyze experiments effectively to make informed decisions. Prerequisites: MTH 367 or MTH 411 or permission of the instructor.

MTH 458. Mathematical Models in Finance. 3 Hours
Mathematical models in finance which include discrete and continuous models for stock price, interest rate model, bond pricing model, and option pricing model. Quantitative methods are introduced and employed. The methods include Black-Scholes formula, Monte-Carlo simulation, and binomial tree. Markowitz's optimal portfolio selection method is introduced and employed. Prerequisite(s): MTH 310.

MTH 465. Linear Algebra. 3 Hours
Vector spaces, linear transformations and matrices, determinants, inner product spaces, invariant direct-sum decomposition and the Jordan canonical form. Prerequisite(s): MTH 310.

MTH 466. Graph Theory & Combinatorics. 3 Hours
Graphs as algebraic structures; Eulerian, Hamiltonian, complete, connected and planar graphs. Applications include scheduling and routing problems. Discussion of algorithms for optimal or near-optimal solutions. Combinatorial topics could include generating functions, recurrence relations, Polya's theorem and Ramsey Theory. Prerequisite(s): MTH 308 or MTH 310.

MTH 467. Combinatorial Design Theory. 3 Hours
Topic include discussion of Latin squares, mutually orthogonal Latin squares, orthogonal and perpendicular arrays, Steiner triple systems, block designs, difference sets, and finite geometries. Prerequisite(s): MTH 308.

MTH 471. Topology. 3 Hours
Introduction to topological spaces and continuous functions including a study of separation and countability axioms and elementary properties of metric spaces, connected spaces, and compact spaces. Prerequisite(s): MTH 308.

MTH 477. Honors Thesis Project. 3 Hours
First of two courses leading to the selection, design, investigation, and completion of an independent, original Honors Thesis project under the guidance of a faculty research advisor. Restricted to students in the University Honors Program with permission of the program director and department chairperson. Students pursuing an interdisciplinary thesis topic may register for three semester hours each in two separate disciplines in consultation with the department chairpersons. Prerequisite(s): Approval of University Honors Program.

MTH 478. Honors Thesis Project. 3 Hours
Second of two courses leading to the selection, design, investigation, and completion of an independent, original Honors Thesis project under the guidance of a faculty research advisor. Restricted to students in the University Honors Program with permission of the program director and department chairperson. Students pursuing an interdisciplinary thesis topic may register for three semester hours each in two separate disciplines in consultation with the department chairpersons. Prerequisite(s): Approved 477; approval of University Honors Program.

MTH 480. Mathematics Capstone. 1 Hour
Students will prepare a presentation or a paper appropriate for a general audience on an advanced mathematical topic that builds on the foundation laid by previous mathematics courses. This course fulfills the Major Capstone component of the Common Academic Program for MTA, MTH and MTE majors. Junior or senior standing. Prerequisite(s): MTH 308.

MTH 490. Readings in Mathematics. 1-3 Hours
Individual study in specialized areas carried out under the supervision of a staff member. May be taken more than once. Prerequisite(s): Permission of department chairperson.

MTH 519. Statistical Inference. 3 Hours
Sample spaces, Borel fields, random variables, distribution theory, characteristic functions, exponential families, minimax and Bayes' procedures, sufficiency, efficiency, Rao-Blackwell theorem, Neyman-Pearson lemma, uniformly most powerful tests, multi-variate normal distributions.

MTH 520. Statistical Inference. 3 Hours
Sample spaces, Borel fields, random variables, distribution theory, characteristic functions, exponential families, minimax and Bayes' procedures, sufficiency, efficiency, Rao-Blackwell theorem, Neyman-Pearson lemma, uniformly most powerful tests, multi-variate normal distributions.

MTH 521. Real Analysis and Applications. 3 Hours
Introduction to topology of n-dimensional space, properties of sequences and series of functions, metric spaces and Banach spaces, contraction mapping principle, applications to fixed point theory, applications to successive approximations and implicit functions.

MTH 522. Real Variables. 3 Hours
The topology of the real line, continuity and differentiability, Riemann and Stieltjes integrals, Lebesgue measure and Lebesgue integral. Measure and integration over abstract spaces, Lp-spaces, signed measures, Jordan-Hahn decomposition, Radon-Nikodym theorem, Riesz representation theorem, and Fourier series.

MTH 525. Complex Variables I. 3 Hours
Analytic functions, integration on paths, the general Cauchy theorem. Singularities, residues, inverse functions and other applications of the Cauchy theory.

MTH 526. Complex Variables II. 3 Hours
Infinite products, entire functions, the Riemann mapping theorem and other topics as time permits. Prerequisite(s): MTH 525 or equivalent.

MTH 527. Biostatistics. 3 Hours
Introduction to statistical concepts and skills including probability theory and estimation, hypothesis tests of means and proportions for one or two samples using normal or t-distributions, regression and correlation, one- and two-way ANOVA, selected nonparametric tests.

MTH 531. Advanced Differential Equations. 3 Hours
Existence and uniqueness theorems, linear equations and systems, self-adjoint systems, boundary value problems and basic nonlinear techniques. Basic knowledge of linear algebra and differential equations.

MTH 532. Difference Equations & Applications. 3 Hours
The calculus of finite differences, first order equations, linear equations and systems, z-transform, stability, boundary value problems for nonlinear equations, Green's function, control theory and applications. Prerequisites: Basic knowledge of linear algebra and differential equations.

MTH 535. Partial Differential Equations. 3 Hours
Classification of partial differential equations; methods of solution for the wave equation, Laplace's equation, and the heat equation; applications. Basic knowledge of linear algebra and differential equations.

MTH 540. Mathematical Modeling. 3 Hours
An introduction to the use of mathematical techniques and results in constructing and modifying models designed to describe and/or predict behavior of real-world situations. Prerequisite(s): Permission of instructor.

MTH 541. Mathematics Clinic. 3 Hours
Student teams will be responsible for developing or modifying and testing a mathematical model designed for a particular purpose. Faculty guidance will be provided. May be repeated once for a maximum of 6 credit hours. Prerequisite(s): Permission of department chairperson or program director.

MTH 543. Linear Models. 3 Hours
Least square techniques, lack of fit and pure error, correlation, matrix methods, F test, weighted least squares, examination of residuals, multiple regression, transformations and dummy variables, model building, stepwise regression, multiple regression applied to analysis of variance problems. Need knowledge of linear algebra. Prerequisite(s): MTH 367 or equivalent.

MTH 544. Time Series. 3 Hours
Multiple linear regression; time series regression, modeling of trends and seasonality, stationary time series, autocovariance, autocorrelation and partial autocorrelation functions, modeling and forecasting with ARMA processes, nonstationary and seasonal time series. Multivariable calculus and an introductory course in statistics.

MTH 545. Special Functions. 3 Hours
The special functions arising from solutions of boundary value problems which are encountered in engineering and the physical sciences. Hypergeometric functions, Bessel functions, Legendre polynomials. Prerequisite(s): MTH 403 or equivalent.

MTH 547. Design of Experiments. 3 Hours
Single-factor analysis of variance: estimation of parameters, model adequacy checking; blocking in single-factor experiments; factorial designs; blocking and confounding; fractional factorial designs. Prerequisite(s): MTH 367 or equivalent.

MTH 551. Methods of Mathematical Physics. 3 Hours
Linear transformations and matrix theory, linear integral equations, calculus of variations, eigenvalue problems. Basic knowledge of linear algebra and differential equations.

MTH 552. Methods of Applied Mathematics. 3 Hours
Dimensional analysis and scaling, regular and singular perturbation methods with boundary layer analysis, the stability and bifurcation of equilibrium solutions, other asymptotic methods. Basic knowledge of linear algebra and differential equations.

MTH 555. Numerical Analysis. 3 Hours
Floating point arithmetic, root finding for the nonlinear equation, fixed points analysis, solution of linear system, stability, use of Taylor's theorem to analyze the methods, numerical differentiation, numerical integration, computation of Eigenvalues and Eigenvectors (Power, Jacobi and QR methods), least squares (solved by SVD and QR algorithms), interpolation and numerical solution of ordinary differential equations using finite difference methods. Some programming experience; basic knowledge of Linear Algebra and Differential Equations.

MTH 556. Numerical Solution of Partial Differential Equations. 3 Hours
Short review of numerical linear algebra, solution of systems of nonlinear equations, stability of algorithms, iterative methods for linear systems, introduction to numerical solution of ordinary differential equations using Runge-Kutta methods, numerical solution of partial differential equations using finite difference methods and method of lines. Some programming experience; basic knowledge of Linear Algebra and Differential Equations.

MTH 557. Financial Derivatives & Risk Management. 3 Hours
This course provides a theoretical foundation for the pricing of contingent claims and for designing risk-management strategies. It covers option pricing models, hedging techniques and trading strategies. It also includes portfolio insurance, value-at-risk measure, multistep binomial trees to value American options, interest rate options and other exotic options. Prerequisites: MBA 520 or MBA 620.

MTH 558. Financial Mathematics I-Discrete Model. 3 Hours
Discrete methods in financial mathematics. Topics include introduction to financial derivatives, discrete probability theory, discrete stochastic processes (Markov chain, random walk, and Martingale), binomial tree models for derivative pricing and computational methods (European and American options), forward and futures, and interest rate derivatives. Prerequisite(s): MTH 411 or equivalent.

MTH 559. Financial Mathematics II-Continuous Model. 3 Hours
Continuous methods in financial mathematics. Topics include review of continuous probability theory, Ito's Lemma, the Black-Scholes partial differential equation, option pricing via partial differential equations, analysis of exotic options, local and stochastic volatility models, American options, fixed income and stopping time. Computational methods are introduced. Prerequisite(s): MTH 558.

MTH 560. Advanced Topics in Financial Mathematics. 3 Hours
Advanced topics in financial mathematics including: stochastic processes with jumps, Monte-Carlo simulations for financial models, portfolio selection problems. Quantitative theories and computational methods are introduced and employed, and are applied to some applications in financial mathematics. Prerequisite(s): MTH 559.

MTH 561. Modern Algebra I. 3 Hours
Groups, rings, integral domains and fields; extensions of rings and fields; polynomial rings and factorization theory in integral domains; modules and ideals.

MTH 562. Modern Algebra II. 3 Hours
Finite and infinite field extensions, algebraic closure, constructible numbers and solvability by use of radicals, Galois theory, and selected advanced topics. Prerequisite(s): MTH 561.

MTH 563. Computational Finance. 3 Hours
The purpose of this course is to introduce students to numerical methods and various financial problems that include portfolio optimization and derivatives valuation that can be tackled by numerical methods. Students will learn the basics of numerical analysis, optimization methods, monte carlo simulations and finite difference methods for solving PDEs. Prerequisites: MBA 520 or MBA 620 or permission of instructor.

MTH 565. Linear Algebra. 3 Hours
Vector spaces, linear transformations and matrices; determinants, inner product spaces, invariant direct-sum decomposition and the Jordan canonical form.

MTH 567. Combinatorial Design Theory. 3 Hours
Latin squares, mutally orthogonal Latin squares, orthogonal and perpendicular arrays, Steiner triple systems, block designs, difference sets and finite geometries. Prerequisite(s): MTH 308 or instructor's permission.

MTH 568. Coding Theory. 3 Hours
The study of linear codes, Hamming and Golay codes, BCH codes, cyclic codes, random error detection and correction, burst-error correction, and decoding algorithms.

MTH 571. Topology. 3 Hours
An axiomatic treatment of the concept of a topological space; bases and subbases; connectedness, compactness; continuity, homeomorphisms, separation axioms and countability axioms; convergence in topological spaces.

MTH 572. Topology II. 3 Hours
Compactification theory, para-compactness and metrizability theorems, uniform spaces, function spaces, and other advanced topics of current interest. Prerequisite(s): MTH 571 or equivalent.

MTH 573. Functional Analysis. 3 Hours
The study of linear metric spaces with emphasis on Banach and Hilbert spaces. The Hahn-Banach theorem, the Banach fixed point theorem, and their consequences. Approximations and other selected advanced topics.

MTH 575. Differential Geometry. 3 Hours
Vector and tensor algebra; covariant differentiation. An introduction to the classical theory of curves and surfaces treated by means of vector and tensor analysis.

MTH 582. Vector & Tensor Analysis. 3 Hours
The differential and integral calculus of scalar and vector fields with emphasis on properties invariant under transformations to curvilinear coordinate systems. An introduction to tensor analysis via Cartesian tensors and then more general tensors. Derivation of the divergence, gradient, and curl in generalized coordinates. Prerequisite(s): (MTH 218, MTH 302) or equivalent.

MTH 583. Discrete & Continuous Fourier Analysis. 3 Hours
Fourier representations of complex-valued functions, rules for finding Fourier transforms, mathematical operators associated with Fourier analysis, fast algorithms, wavelet analysis, selected applications. Prerequisite(s): (MTH 219 or MTH 319) or equivalent; MTH 302 or equivalent.

MTH 590. Topics in Mathematics. 1-6 Hours
This course, given upon appropriate occasions, deals with specialized material not covered in the regular courses. May be taken more than once as topics change. Prerequisite(s): Permission of advisor.