MATHEMATICS & STATISTICS (MATH)

Course numbers with the # symbol included (e.g. #400) have not been taught in the last 3 years.

MATH 800 - Introduction to Mathematics Education
Credits: 3
General background information about mathematics education, such as theories of learning and teaching mathematics, mathematics curricula, classroom management, and techniques for the teaching and learning of mathematics that are common to all levels of mathematics education K-12. Two semesters of calculus and experience working in schools.
Mutual Exclusion: No credit for students who have taken EDC 831.
Grade Mode: Letter Grading

MATH 801 - Exploring Mathematics for Teachers I
Credits: 3
Provides prospective elementary teachers with the opportunity to explore and master concepts involving number systems and operations, data analysis and probability. Additional topics may include geometry, measurement, and algebraic thinking. Mathematical reasoning, problem solving, and the use of appropriate manipulatives and technology are integrated throughout the course. Readings, class discussions, and assignments focus on mathematics content as well as applicable theories of learning, curriculum resources, and state and national recommendations. The course models instructional techniques that can be adapted to the elementary curricula. Credit offered only to M.Ed. and M.A.T., certificate students, and in-service teachers. (Not offered for credit if credit is received for MATH 821 or MATH 823.)
Prerequisite(s): (EDUC 500 with a minimum grade of D- or EDUC 935 with a minimum grade of B-).
Equivalent(s): MATH 821
Grade Mode: Letter Grading

MATH 803 - Teaching of Mathematics in Grades K-5
Credits: 3
Methods of teaching mathematics at the elementary school level; uses of technology, manipulatives, models, and diagrams; developing unit and lesson plans; assessment ; instructional formats; teaching reading and writing in mathematics.
Prerequisite(s): MATH 801 with a minimum grade of D-.
Mutual Exclusion: No credit for students who have taken EDC 824, EDC 833.
Grade Mode: Letter Grading

MATH 805 - Introduction to Mathematics and Statistics Teaching
Credits: 1
This course introduces new graduate teaching assistants in mathematics and statistics to teaching in mathematics and statistics. Topics include group facilitation, active learning, grading, diversity and inclusion in the classroom, goal setting, classroom management, time management, designing rich mathematical tasks, and research on student learning.
Repeat Rule: May be repeated for a maximum of 2 credits.
Grade Mode: Graduate Credit/Fail grading

MATH 809 - Teaching of Mathematics in Grades 6-12
Credits: 3
Methods of teaching mathematics at the middle and high school levels; uses of technology, manipulatives, models, and diagrams; developing unit and lesson plans; assessment; instructional formats; teaching reading and writing in mathematics.
Prerequisite(s): MATH 800 with a minimum grade of D-.
Mutual Exclusion: No credit for students who have taken EDC 833, EDC 834.
Grade Mode: Letter Grading

MATH 831 - Mathematics for Geodesy
Credits: 3
A survey of topics from undergraduate mathematics designed for graduate students in engineering and science interested in applications to geodesy and Earth Sciences. Topics include essential elements from analytic geometry, geometry of surfaces, linear algebra and statistics, Fourier analysis, discrete Fourier transforms and software, filtering applications to tidal data.
Prerequisite(s): (MATH 645 with a minimum grade of D- or MATH 645H with a minimum grade of D- or MATH 762 with a minimum grade of D- or MATH 862 with a minimum grade of B-).
Grade Mode: Letter Grading

MATH 832 - Introduction to the R Software
Credits: 1
This course provides a basic introduction to the open-sources statistical software R for students who have never used this software or have never formally learned the basics of it. Topics include: Numeric calculations, simple and advanced graphics, object management and work-flow, RStudio, user-contributed packages, basic programming, writing of functions, statistical modeling and related graphs, distributed computing, reproducible research and document production via markup language.
Equivalent(s): MATH 859
Grade Mode: Graduate Credit/Fail grading

MATH 834 - Statistical Computing
Credits: 3
This is a course on statistics-oriented programming and common computational methodologies used in statistics. Students will learn principles and techniques of sample-splitting, cross-validation, simulation, bootstrap, and optimization, and how to implement them in R. The students will gain experience of reading/modifying, writing and debugging code, and how to speed up computation.
Prerequisite(s): MATH 835 with a minimum grade of D- or MATH 838 with a minimum grade of D- or MATH 839 with a minimum grade of D-.
Grade Mode: Letter Grading

MATH 835 - Statistical Methods for Research
Credits: 3
This course provides a solid grounding in modern applications of statistics to a wide range of disciplines by providing an overview of the fundamental concepts of statistical inference and analysis, including t-tests and confidence intervals. Additional topics include: ANOVA, multiple linear regression, analysis of cross classified categorical data, logistic regression, nonparametric statistics and data mining using CART. The use of statistical software, such as JMP. S PLUS, or R, is fully integrated into the course.
Grade Mode: Letter Grading

MATH 836 - Advanced Statistical Modeling
Credits: 3
This is a course on statistical models behind normal linear model. Topics covered in this course include generalized linear model, linear mixed model, generalized additive model, generalized linear mixed model, generalized additive mixed model, and smoothing methods if time allows.
Prerequisite(s): (MATH 835 with a minimum grade of B- or MATH 839 with a minimum grade of B-).
Grade Mode: Letter Grading

MATH 837 - Statistical Methods for Quality Improvement and Design
Credits: 3
Six Sigma is a popular, data-focused methodology used worldwide by organizations to achieve continuous improvement of their existing processes, products and services or to design new ones. This course provides a thorough introduction to the Six Sigma principles, methods, and applications for continuous improvement (DMAIC process) and an overview of Design for Six Sigma (DFSS). Both manufacturing and non-manufacturing (transactional Six Sigma) applications will be included. Emphasis is placed on the use of case studies to motivate the use of, as well as the proper application of, the Six Sigma methodology. Formal Six Sigma Green Belt certification from UNH may be attained by successfully completing TECH 696. Students must have completed a calculus-based introductory statistics course.
Grade Mode: Letter Grading

MATH 838 - Data Mining and Predictive Analytics
Credits: 3
An introduction to supervised and unsupervised methods for exploring large data sets and developing predictive models. Unsupervised methods include: market basket analysis, principal components, clustering, and variables clustering. Important statistical and machine learning methods (supervised learning) include: Classification and Regression Tress (CART), Random Forests, Neural Nets, Support Vector Machines, Logistic Regression and Penalized Regression. Additional topics focus on metamodeling, validation strategies, bagging and boosting to improve prediction or classification, and ensemble prediction from a set of diverse models. Required case studies and projects provide students with experience in applying these techniques and strategies. The course necessarily involves the use of statistical software and programming languages. Students must have completed a calculus-based introductory statistics course.
Grade Mode: Letter Grading

MATH 839 - Applied Regression Analysis
Credits: 3
Statistical methods for the analysis of relationships between response and input variables: simple linear regression, multiple regression analysis, residual analysis model selection, multi-collinearity, nonlinear curve fitting, categorical predictors, introduction to analysis of variance, analysis of covariance, examination of validity of underlying assumptions, logistic regression analysis. Emphasizes real applications with use of statistical software. Students must have completed an introductory statistics course.
Grade Mode: Letter Grading

MATH 840 - Design of Experiments I
Credits: 3
First course in design of experiments with applications to quality improvement in industrial manufacturing, engineering research and development, or research in physical and biological sciences. Experimental factor identification, statistical analysis and modeling of experimental results, randomization and blocking, full factorial designs, random and mixed effects models, replication and sub-sampling strategies, fractional factorial designs, response surface methods, mixture designs, and screening designs. Focuses on various treatment structures for designed experimentation and the associated statistical analyses. Use of statistical software. Students must have completed an introductory statistics course.
Grade Mode: Letter Grading

MATH 841 - Survival Analysis
Credits: 3
Explorations of models and data-analytic methods used in medical, biological, and reliability studies. Event-time data, censored data, reliability models and methods, Kaplan-Meier estimator, proportional hazards, Poisson models, loglinear models. The use of statistical software, such as SAS, JMP, or R, is fully integrated into the course. (Offered in alternate years.)
Prerequisite(s): MATH 839 with a minimum grade of D-.
Grade Mode: Letter Grading

MATH 843 - Time Series Analysis
Credits: 3
An introduction to univariate time series models and associated methods of data analysis and inference in the time domain and frequency domain. Topics include: Auto regressive (AR), moving average (MA), ARMA and ARIMA processes, stationary and non-stationary processes, seasonal ARIMA processes, auto-correlation and partial auto-correlation functions, identification of models, estimation of parameters, diagnostic checking of fitted models, forecasting, spectral density function, periodogram and discrete Fourier transform, linear filters. parametric spectral estimation, dynamic Fourier analysis. Additional topics may include wavelets and long memory processes (FARIMA) and GARCH Models. The use of statistical software, such as JMP, or R, is fully integrated in to the course. Offered in alternate years in the spring.
Prerequisite(s): (MATH 835 with a minimum grade of B- or MATH 839 with a minimum grade of B-).
Grade Mode: Letter Grading

MATH 844 - Design of Experiments II
Credits: 3
Second course in design of experiments, with applications in quality improvement and industrial manufacturing, engineering research and development, research in physical and biological sciences. Covers experimental design strategies and issues that are often encountered in practice complete and incomplete blocking, partially balanced incomplete blocking (PBIB), partial confounding, intra and inter block information, split plotting and strip plotting, repeated measures, crossover designs, Latin squares and rectangles, Youden squares, crossed and nested treatment structures, variance components, mixed effects models, analysis of covariance, optimizations, space filling designs, and modern screening design strategies.
Prerequisite(s): MATH 840 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 845 - Foundations of Applied Mathematics I
Credits: 3
An introduction to Partial Differential Equations (PDEs) and associated mathematical methods and the analytical foundation for applied mathematics. Topics include: PDE classification, superposition, separation of variables, orthonormal functions, completeness, convergence, Fourier Series, Sturm-Liouville eigenvalue problems, and eigenfunctions. Methods are introduced for the analysis and solution of boundary value problems, in particular, the Heat, Wave, and Laplace equations. Students are required to have a mastery of differential equations and ordinary differential equations.
Grade Mode: Letter Grading

MATH 846 - Foundations of Applied Mathematics II
Credits: 3
An introduction to special functions, asymptotic analysis, and transform methods applied to partial differential equations. Topics include: Boundary value problems in cylindrical coordinates, the Bessel equation and Bessel functions, Fourier-Bessel expansions in cylindrically symmetric spatial domains, the Fourier Transform, the Hilbert Transform, Cosine and Sine Transforms, problems on semi-infinite intervals, and Asymptotic Analysis. Students are required to have a mastery of differential equations and ordinary differential equations.
Grade Mode: Letter Grading

MATH 847 - Introduction to Nonlinear Dynamics and Chaos
Credits: 3
An introduction to the mathematics of chaos and nonlinear dynamics. Topics include: linear and nonlinear systems of ordinary differential equations; discrete maps; chaos; phase plane analysis; bifurcations; and computer simulations. Students taking this course are required to have some background in elementary differential equations, linear algebra, and multidimensional calculus. (Not offered every year.)
Grade Mode: Letter Grading

MATH 853 - Introduction to Numerical Methods
Credits: 3
Introduction to mathematical algorithms and methods of approximation. A wide survey of approximation methods are examined including, but not limited to, polynomial interpolation, root finding, numerical integration, approximation of differential equations, and techniques used in conjunction with linear systems. Included in each case is a study of the accuracy and stability of a given technique, as well as its efficiency and complexity. It is assumed that the student is familiar and comfortable with programming a high-level computer language. (Also offered as CS 853).
Grade Mode: Letter Grading

MATH 855 - Probability with Applications
Credits: 3
Introduces the theory, methods, and applications of randomness and random processes. Probability concepts, random variable, expectation, discrete and continuous probability distributions, joint distributions, conditional distributions; moment-generating functions, convergence of random variables.
Grade Mode: Letter Grading

MATH 856 - Principles of Statistical Inference
Credits: 3
Introduces the basic principles and methods of statistical estimation and model fitting. One- and two-sample procedures, consistency and efficiency, likelihood methods, confidence regions, significance testing, Bayesian inference, nonparametric and re-sampling methods, decision theory.
Prerequisite(s): MATH 855 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 857 - Mathematical Optimization for Applications
Credits: 3
This course introduces the foundations of mathematical optimization and reinforces them via applications. The content includes convex optimization, first and second-order methods, constrained problems, duality, linear and quadratic programming, as well as discrete and non-convex optimization. Applications will focus on machine learning methods but also include problems from engineering and operations research. Students are required to have a mastery of Calculus II and programming proficiency in MATLAB, R, Java, C, Python, or equivalent.
Equivalent(s): CS 857
Grade Mode: Letter Grading

MATH 861 - Abstract Algebra
Credits: 3
This course establishes the axiomatic framework that underlies number systems and similar mathematical structures, investigating basic properties of groups, rings, fields and their homomorphisms.
Grade Mode: Letter Grading

MATH 863 - Abstract Algebra II
Credits: 3
This course extends the investigations of MATH 861 into more specialized situations related to old and new problems in mathematics, such as the nature of solutions of polynomial equations. It presents advanced properties of groups, rings, fields and their applications.
Prerequisite(s): MATH 861 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 865 - Introduction to Commutative Algebra and Algebraic Geometry
Credits: 3
Methods of determining solution sets of polynomial systems; affine varieties and their ideals; the 'algebra-geometry correspondence'; theory and applications of Grobner bases.
Grade Mode: Letter Grading

MATH 867 - One-Dimensional Real Analysis
Credits: 3
Theory of limits, continuity, differentiability, integrability.
Grade Mode: Letter Grading

MATH 868 - Real Analysis II
Credits: 3
Theory of integration; series; power series and uniform convergence of power series.
Grade Mode: Letter Grading

MATH 869 - Introduction to Differential Geometry
Credits: 3
Introduction to the study of the geometric properties of curves and surfaces in 3-dimensional space.
Grade Mode: Letter Grading

MATH 870 - Foundations of Number Theory
Credits: 3
Factorization and prime numbers, arithmetic functions, congruences, reciprocity laws, quadratic forms, Diophantine equations, computational number theory. Offered in alternate years.
Grade Mode: Letter Grading

MATH 872 - Combinatorics
Credits: 3
Graph theory (including planar graphs, graph coloring, Hamiltonian circuits, trees); counting principles (including permutations, combinations, pigeonhole principle, inclusion-exclusion principle); and related topics.
Grade Mode: Letter Grading

MATH 876 - Logic
Credits: 3
Induction and recursion; sentential logic; first-order logic; completeness, consistency, and decidability; recursive function. (Not offered every year.)
Grade Mode: Letter Grading

MATH 883 - Set Theory
Credits: 3
Axiomatic set theory, including its history, Zermelo-Fraenkel axioms, ordinal and cardinal numbers, consistency, independence, and undecidability. (Not offered every year.)
Grade Mode: Letter Grading

MATH 884 - Topology
Credits: 3
Open sets, closure, base, and continuous functions. Connectedness, compactness, separation axioms, and metrizability.
Prerequisite(s): (MATH 767 with a minimum grade of D- or MATH 867 with a minimum grade of B-).
Grade Mode: Letter Grading

MATH 888 - Complex Analysis
Credits: 3
Complex functions, sequences, limits, differentiability and Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor's and Laurent's series, residues, conformal mapping.
Prerequisite(s): MATH 867 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 896 - Topics in Mathematics and Statistics
Credits: 1-4
New or specialized courses not covered in regular course offerings.
Repeat Rule: May be repeated for a maximum of 99 credits.
Grade Mode: Letter Grading

MATH 898 - Master's Project
Credits: 1-6
Master's Project.
Repeat Rule: May be repeated for a maximum of 6 credits.
Grade Mode: Graduate Credit/Fail grading

MATH #899 - Master's Thesis
Credits: 1-6
Master's Thesis.
Repeat Rule: May be repeated for a maximum of 6 credits.
Grade Mode: Graduate Credit/Fail grading

MATH 900 - Bridges from the Classroom to Mathematics
Credits: 1
An introduction to the goals of the MST program. Students have the opportunity to explore mathematical problems; to complete activities that make connections between several areas of mathematics, including the mathematical content in the MST degree program and the secondary school mathematics classroom; and to participate in readings/on-line discussion on the nature of mathematics.
Grade Mode: Graduate Credit/Fail grading

MATH #902 - Classroom Mathematics Practicum
Credits: 1
A follow-up course to the six core mathematics content courses of the MST degree program. During the course, students choose a mathematical topic and/or set of concepts learned in one of the core MST courses and develop and teach a unit based on these concepts at the middle school or secondary school level.
Repeat Rule: May be repeated up to 3 times.
Grade Mode: Graduate Credit/Fail grading

MATH 905 - Euclidean and non-Euclidean Geometries from a Synthetic Perspective
Credits: 3
An axiomatic development of geometry, beginning with finite geometries; emphasis is given to the fundamental concepts of Euclidean and non-Euclidean geometries from a synthetic perspective.
Grade Mode: Letter Grading

MATH 906 - Analytic and Transformational Geometry
Credits: 3
Fundamental concepts of transformational, projective geometry, and inversive geometry, including properties of conics and quadratic surfaces.
Grade Mode: Letter Grading

MATH #909 - Probability and Statistics for Teachers
Credits: 3
Permutations and combinations; finite sample spaces; random variables; binomial distributions; statistical applications.
Grade Mode: Letter Grading

MATH 913 - Graph Theory and Topics in Discrete Mathematics
Credits: 3
Key theoretical and computational aspects of graph theory and related areas of discrete mathematics. Applications of graph theory as well as current "open" problems are explored.
Grade Mode: Letter Grading

MATH 915 - Algebraic Structures
Credits: 3
An exploration of the structural similarities between and among seemingly disparate number systems, beginning with counting numbers, and progressing to integers, the rational numbers, the real numbers, and the complex numbers; and leading to a discussion of polynomials as an integer analogue and to fields as polynomial "quotients" through the basic concepts of splitting fields and Galois Theory.
Grade Mode: Letter Grading

MATH 916 - Theory of Numbers for Teachers
Credits: 3
Divisibility and primes; congruences; quadratic reciprocity; number theoretic functions; Diophantine equations; perfect and amicable numbers.
Grade Mode: Letter Grading

MATH 918 - Analysis of Real Numbers
Credits: 3
An introduction to the fundamental concepts in real analysis that provide the mathematical foundation for calculus. Content focuses on properties of sequences and series; properties of functions, including continuity, the derivative and the Riemann integral.
Grade Mode: Letter Grading

MATH 925 - Problem Solving Seminar
Credits: 3
A study of variety of problem solving strategies and techniques in the context of solving mathematical problems. Problems will emphasize the connections between the core areas of algebra, geometry and analysis. Other mathematical topics may be included. Typically taken in conjunction with the Concluding Experience Problem Set.
Grade Mode: Graduate Credit/Fail grading

MATH 928 - Selected Topics in Mathematics for Teachers
Credits: 1-3
New or specialized topics not covered in the regular course offerings. May be repeated for credit barring duplication of topic.
Repeat Rule: May be repeated up to unlimited times.
Grade Mode: Letter Grading

MATH 929 - Directed Reading
Credits: 1-3
A directed reading project on a selected topic in mathematics or mathematics education, planned in collaboration with a faculty member.
Repeat Rule: May be repeated for a maximum of 6 credits.
Grade Mode: Letter Grading

MATH 931 - Mathematical Physics
Credits: 3
Complex variables, differential equations, asymptotic methods, integral transforms, special functions, linear vector spaces and matrices, Green's functions, and additional topics selected from integral equations, variational methods, numerical methods, tensor analysis, and group theory. Students are required to have a mastery of differential equations; linear algebra; multidimensional calculus.
Equivalent(s): PHYS 931
Grade Mode: Letter Grading

MATH 941 - Bayesian and Computational Statistics
Credits: 3
Current approaches to Bayesian modeling and data analysis and related statistical methodology based on computational simulation. Fundamentals of Bayesian estimation and hypothesis testing. Multi-level and hierarchical Bayesian modeling for correlated data. Introduction to Markov chain Monte Carlo based estimation approaches such as the Gibbs sampler and the Metropolis-Hastings algorithm. Mastery of intermediate statistics is required for this course, including: distributions, discrete and continuous random variables, transformation of variables (calculus based), bivariate and multivariate normal distribution, maximum likelihood estimation; working knowledge of linear regression and analysis of variance; basic linear algebra: vectors and matrices, linear spaces, matrix multiplication, inverse of a matrix, positive definiteness. Matrix-vector notation for linear regression and ANOVA.
Grade Mode: Letter Grading

MATH 944 - Spatial Statistics
Credits: 3
Frequentist and Bayesian methods for estimation of characteristics measured in space (usually 2-dimensional Euclidean space). Spatial averaging. Spatial point processes: models for clustering and inhibition. Cluster detection. Point referenced data: variogram estimation, Kriging, spatial regression. Lattice based data: spatial auto-regression, Markov random field models. Spatial regression models. Non-Gaussian response variables. Hierarchical Bayesian spatial models and Markov chain Monte Carlo methods. Multivariable spatial models. Mastery of intermediate statistics including basics of maximum likelihood estimation; linear regression modeling including familiarity with matrix notation, basic concepts of calculus including partial derivatives is required for this course.
Grade Mode: Letter Grading

MATH 945 - Advanced Theory of Statistics I
Credits: 3
Introduction to the theory and practice of statistical modeling and inference. Basic multivariate analysis: covariance and expectation, multivariate-normal and non-central chi-squared distributions, linear and quadratic forms. Basic inequalities for probabilities and expectations: Markov, Chebyshev, Jensen, and Cauchy-Schwartz. Basic decision theory, sufficiency, minimal sufficiency, ancillarity and completeness, Point estimation: method of moments, maximum likelihood, Bayesian procedures, likelihood procedures and information inequalities. Measures of performance, notions of optimality, and construction of optimal procedures in simple situations. Convergence in distribution and in probability.
Prerequisite(s): MATH 856 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 946 - Advanced Theory of Statistics II
Credits: 3
Asymptotic statistical inference: consistency, asymptotic normality and efficiency. Hypothesis testing: Neyman-Pearson lemma, uniformly most powerful test, generalized likelihood ration tests, Chi squared goodness-of-fit tests, Wald tests and related confidence intervals, pivotal quantities, optimality properties. Modern likelihood methods (quasi, pseudo and composite). Algorithmic inference: Gibbs sampling, bootstrapping, simultaneous inferences in high-dimensional data and functional data. Nonparametric and semiparametric estimation methods, asymptotic estimation theory and large sample tests.
Prerequisite(s): MATH 945 with a minimum grade of D-.
Grade Mode: Letter Grading

MATH 951 - Algebra I
Credits: 3
Groups and their homomorphisms, products and sums, structure of groups; rings and their homomorphisms, ideals, factorization properties.
Prerequisite(s): MATH 861 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 952 - Algebra II
Credits: 3
Field extensions; Galois theory; module theory.
Prerequisite(s): MATH 951 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 953 - Analysis I
Credits: 3
Measurable spaces and functions, measures, Lebesgue integrals, convergence theorems.
Prerequisite(s): MATH 867 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 954 - Analysis II
Credits: 3
Cauchy theory and local properties of analytic functions, Riemann mapping theorem, representation theorems, harmonic functions.
Prerequisite(s): MATH 888 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 955 - Topology I
Credits: 3
Subspace, product, and quotient topologies; embedding; separation and countability axioms; connectedness; compactness and compactifications; paracompactness, metrization, and metric completions.
Prerequisite(s): MATH 884 with a minimum grade of B-.
Grade Mode: Letter Grading

MATH 958 - Foundations of Math Education
Credits: 1
Topics include: major issues and trends in mathematics education research, the profession and infrastructure of mathematics education, theoretical perspectives, cultural and historical aspects of mathematics education, and the research-practice interface. Examples span the K-16 spectrum.
Grade Mode: Letter Grading

MATH 959 - Introduction to Research Design in STEM Education
Credits: 3
This course provides an overview of research design including preliminary considerations that go into selecting a qualitative, quantitative, or mixed methods design. Topics include the definition of the various approaches, developing research questions and/or hypotheses, reviewing the literature, understanding the use of theory, anticipating ethical issues, and developing writing strategies.
Grade Mode: Letter Grading

MATH 961 - Topics in Algebra I
Credits: 3
An introduction to topics chosen from algebra and number theory. May be repeated barring duplication of subject.
Prerequisite(s): MATH 951 with a minimum grade of D- and MATH 952 with a minimum grade of D-.
Repeat Rule: May be repeated up to unlimited times.
Grade Mode: Letter Grading

MATH 966 - Topics in Algebraic Topology I
Credits: 3
An introduction to topics in algebraic topology.
Prerequisite(s): MATH 956 with a minimum grade of B-.
Repeat Rule: May be repeated for a maximum of 99 credits.
Grade Mode: Letter Grading

MATH 968 - Topics in Mathematics Education I
Credits: 3
A) The Teaching and Learning of Mathematics; B) Curriculum and History in Mathematics Education. Topics selected from: epistemologies of knowledge applied to mathematics; theories of learning and teaching mathematics; theoretical perspectives in research; mathematics education research programs K-16; research methods for studying mathematics teaching, learning, and curricula; theoretical frameworks for curriculum development, implementation of new curricula, and research on curricula; historical perspectives of research in mathematics education; the evolution and history or K-16 mathematics curricula both in United States and internationally. Versions A and B offered alternately.
Prerequisite(s): MATH 958 with a minimum grade of B-.
Repeat Rule: May be repeated for a maximum of 99 credits.
Grade Mode: Letter Grading

MATH 973 - Topics in Operator Theory
Credits: 3
Selected topics in operator theory.
Prerequisite(s): MATH 863 with a minimum grade of B-.
Repeat Rule: May be repeated for a maximum of 99 credits.
Grade Mode: Letter Grading

MATH 978 - Topics in Mathematics Education II
Credits: 1-3
An exploration of an area of research in mathematics education.
Repeat Rule: May be repeated for a maximum of 99 credits.
Grade Mode: Letter Grading

MATH 979 - Research Topics in Statistics
Credits: 3
An exploration of the main statistical issues and computational methods associated with research problems from such areas as survival analysis, reliability, latitudinal data, categorical data, spatio-temporal data, and industrial processes. Student term projects require: literature searches, presentation, use of modern statistical software, and written reports. May be repeated barring duplication of topic.
Repeat Rule: May be repeated up to unlimited times.
Grade Mode: Letter Grading

MATH 997 - Statistics Seminar
Credits: 1
A seminar of weekly and bi-weekly meetings organized by the statistics Ph.D. students with supervision by a statistics faculty member. Informal presentations of faculty members, students, and outside guest presenters; also discussion of topics that are of mutual interest to its participants. Dissertation proposal presentations. Seminar presentations are open to the greater public. Statistics Ph.D. students are required to enroll for at least 3 semesters. Attendance is mandatory by those students who are enrolled in the seminar. Credits do not count towards the Master's degree.
Repeat Rule: May be repeated for a maximum of 6 credits.
Grade Mode: Graduate Credit/Fail grading

MATH 998 - Reading Courses
Credits: 1-6
A) Algebra; B) Analysis; C) Operator Theory; D) Geometry; E) General Topology; F) Algebraic Topology; G) Applied Mathematics; H) Mathematics Education; I) Probability and Statistics.
Grade Mode: Letter Grading

MATH 999 - Doctoral Research
Credits: 0
Doctoral Research.
Grade Mode: Graduate Credit/Fail grading
Special Fee: Yes