MATHEMATICS (MATH)

MATH 0990: Intermediate Algebra
Developmental Studies
A remedial course for students not yet prepared to take college mathematics. Students with ACT mathematics subscores less than 19, SAT mathematics scores of less than 450 or SATR mathematics scores of less than 510 are required to enroll in DS 099 during their first semester of enrollment and continue in the course until receiving a passing grade. Students with an ACT mathematics subscore of 19 are strongly encouraged to enroll in Intermediate Algebra. Students enrolled in Intermediate Algebra are not allowed to enroll in other mathematics courses (nondegree).
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 1150: Elementary Statistics
Mathematics
This course will provide students with a basic understanding of the proper statistical techniques used to estimate population parameters. These techniques include ways of setting up a well-defined study, methods for organizing and displaying data, and how to summarize data by using descriptive statistics. In addition, students will learn the basic concepts of probability and probability distributions as well as how to create confidence intervals and complete hypothesis tests.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$65.00

MATH 1160: Quantitative Reasoning
Mathematics
This course is designed for students who need 3 hours of unspecified mathematics credit. A survey of possible mathematical topics may include set theory, logic, probability and statistics, and personal finance.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$65.00

MATH 1200: Business Mathematics
Mathematics
Students gain a solid foundation for topics in logic including but not limited to statements and their negations and truth tables, as well as topics in statistics including but not limited to data collection, display and analysis, binomial and normal distribution. Students will be prepared to solve linear and quadratic equations used in business calculus. Students will work with exponential and logarithmic functions and functions used in business such as cost, demand, revenue, and profit.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$65.00

MATH 1210: College Algebra
Mathematics
In this course, students will learn how to solve types of equations such as linear, quadratic, higher-order, rational, radical, exponential, and logarithmic equations. Students will also solve linear, polynomial, and rational inequalities. Other topics include the algebra of functions (including polynomial, rational, exponential, and logarithmic functions), the graphs of some of these functions, and solving systems of equations in two variables.
3 credits
Potentially offered with the following Instruction Type(s):
Laboratory, Lecture
Course Fees:
$65.00

MATH 1210S: College Algebra With Support
Mathematics
This is a 4-credit course that will cover the same material as all other sections of MATH 1210, but with support. The support portion of this course is designed to provide just-in-time instruction and practice with the prerequisite content required to be successful in College Algebra. The course design also contributes to the development of other skills that are important for student achievement. Students will solve linear, quadratic, higher-order, rational, radical, exponential, and logarithmic equations. Students will also solve linear, polynomial, and rational inequalities. Other topics include the algebra of functions (including polynomial, rational, exponential, and logarithmic functions), the graphs of some of these functions, and solving systems of equations in two variables.
4 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 1211: College Algebra With Support
Mathematics
This is a 4-credit course that will cover the same material as all other sections of MATH 1210, but with support. The support portion of this course is designed to provide just-in-time instruction and practice with the prerequisite content required to be successful in College Algebra. The course design also contributes to the development of other skills that are important for student achievement. Students will solve linear, quadratic, higher-order, rational, radical, exponential, and logarithmic equations. Students will also solve linear, polynomial, and rational inequalities. Other topics include the algebra of functions (including polynomial, rational, exponential, and logarithmic functions), the graphs of some of these functions, and solving systems of equations in two variables.
4 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 1230: Trigonometry
Mathematics
In this course, students will learn to work with angles in degree and radian measure, write the ratio definitions of the six trigonometric functions, evaluate trigonometric functions of special angles, sketch graphs of trigonometric functions, verify trigonometric identities, solve trigonometric equations, solve triangles by a variety of methods, and solve application problems using trigonometric functions and identities.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 1250: Basic Math for Sci. & Eng
Mathematics
This course is designed especially for students requiring a review of both algebra and trigonometry before beginning the calculus sequence. Students will solve a variety of algebraic equations and inequalities; examine and graph algebraic, exponential, logarithmic, and trigonometric functions; evaluate trigonometric functions and their inverses; verify trigonometric identities; and solve exponential, logarithmic, and trigonometric equations.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 2451: Math for Elem. Teachers I
Mathematics
Students are introduced to sets, the real number system and its subsystems.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 2452: Math for Elem. Teachers II
Mathematics
This course covers informal geometry; measurement and the metric system; probability and statistics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 2511: Calc for Bus Econ & Acc. I
Mathematics
This course covers differential and integral calculus with an emphasis on business applications.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$65.00

MATH 2512: Calc for Bus Econ & Acc. II
Mathematics
Differential and integral calculus with an emphasis on business applications.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$65.00

MATH 2513: Intro. to Linear Programming
Mathematics
Selected topics in quantitative methods with an emphasis on business applications. Topics include Gauss-Jordan elimination, simplex solutions for linear programming models and transportation and assignment algorithms.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 2611: Unif Calc & Analytic Geom I
Mathematics
This is the first course in a four-term calculus sequence for engineering and science majors. Topics include limits, continuity, and differentiation of functions of one real variable. Differentiation rules, derivatives as rates of change, implicit differentiation, the mean and extreme value theorems, L'Hospital's rule, optimization problems, higher order derivatives, graphing functions, antiderivatives. After completing Math 261 with a C or higher, students may not receive credit for Math 121, Math 125, or Math 267.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 2612: Unif Calc & Analytic Geom II
Mathematics
This is the second course in a four-term calculus sequence for engineering and science majors. Topics include definite and indefinite integrals, areas under and between curves, the fundamental theorem of calculus, integration techniques, computation of volumes, surface areas, and length of curves, improper integrals. After completing Math 262 with a C or higher, students may not receive credit for Math 121, 125, or 268.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 2613: Unif Calc & Analytic Geom III
Mathematics
This is the third course in a four-term calculus sequence for engineering and science majors. Topics include sequences and series, convergence tests, Taylor series, parametric and polar curves, dot and cross product of vectors, calculus of vector-valued functions.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 2614: Unif Calc & Analytic Geom IV
Mathematics
This is the fourth course in a four-term calculus sequence for engineering and science majors. Topics include limits, continuity, and partial differentiation of functions of several real variables, directional derivatives and gradient, tangent planes and linear approximation, maximum and minimum problems, Lagrange multipliers, double and triple integrals in Cartesian, polar, and spherical coordinates, vector fields, line integrals, Green's theorem, surface integrals, Stokes' theorem.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 2711: Calculus of Decision Making I
Mathematics
Differential calculus with an emphasis on its uses in decision making. Topics will include techniques to analyze functions of one variable and maximize functions of several variables subject to constraints, using the Lagrange method. Other topics may include elementary encryption techniques. Students may not receive credit for both Math 267 and Math 271.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 2712: Calculus of Decision Making II
Mathematics
Integral calculus with an emphasis on its uses in decision making. Other topics may include markets and auctions. Nash equilibria and game theory and discrete forms on optimization. Students may not receive credit for both Math 268 and Math 272.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 2811: Computer Lab. for Calculus I
Mathematics
Investigation of the techniques in Calculus I (Math 261) through the use of a computer.
1 credit
Corequisites
MATH 2611
Potentially offered with the following Instruction Type(s):
Lecture/Lab

MATH 2812: Computer Lab. for Calculus II
Mathematics
Investigation of the techniques in Calculus II (Math 262) through the use of a computer.
1 credit
Corequisites
MATH 2612
Potentially offered with the following Instruction Type(s):
Lecture/Lab

MATH 2813: Computer Lab. for Calculus III
Mathematics
Investigation of the techniques in Calculus III (Math 263) through the use of a computer.
1 credit
Corequisites
MATH 2613
Potentially offered with the following Instruction Type(s):
Lecture/Lab

MATH 2814: Computer Lab. for Calculus IV
Mathematics
Investigation of the techniques in Calculus IV (Math 264) through the use of a computer.
1 credit
Corequisites
MATH 2614
Potentially offered with the following Instruction Type(s):
Lecture/Lab

MATH 3010: Discrete Mathematics
Mathematics
This course covers elementary counting principles, mathematical induction and other proof methods, relations and functions, and graphs.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3020: Applied Modern Algebra
Mathematics
This course covers elementary group theory with applications, including modular arithmetic, public key encryption, Polya enumeration, and an introduction to coding theory
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3050: Foundations of Mathematics
Mathematics
Set theory with emphasis on functions, techniques used in mathematical problems, cardinal numbers.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3190: Introduction to Linear Algebra
Mathematics
Vectors, matrices, determinants, linear transformations, introduction to vector spaces.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3530: Elem. Differential Equations
Mathematics
This course covers equations of first and second order; linear equations with constant coefficients; solution in series.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 3680: Intro. to Operations Research
Mathematics
An introduction to the mathematics involved in optimal decision making and the modeling of deterministic systems. Major topics to include linear programming, the simplex method, transportation algorithms, integer programming, network theory, and CPM/PERT.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3750: Introduction to Statistics I
Mathematics
This course covers basic concepts and methods of statistics, including descriptive statistics, probability, random variables and distributions, sampling distributions, estimation, large and small sample confidence intervals, hypothesis testing of parameters associated with a single population and for comparison of two populations, simple linear regression.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture
Course Fees:
$40.00

MATH 3780: Stat. Computing & Data Anlys.
Mathematics
This course is an introduction to statistical computing and data analysis in R or SAS. Topics include basic programming, simulation and bootstrap sampling, exploratory data analysis, statistical graphics, simple linear and multiple linear regression modeling, logistic regression and classification, linear discriminant analysis and clustering. Real data applications are emphasized in this course.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3900: Tech. in Tching Sec. Lvl Math
Mathematics
Teaching techniques for algebra, geometry, trigonometry, and calculus are presented and discussed. May not be used for mathematics major or minor credit.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 3970: Special Problems
Mathematics
May be repeated twice for credit for a total of 6 hours.
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 4010: Combinatorics
Mathematics
This course explores the counting methods of Math 301 in further depth. Additional topics may include Ramsey theory, combinatorial designs, graph theory, matroid theory, and other related topics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4250: Intro. to Abstract Algebra
Mathematics
Real number system, groups, rings, integral domains, fields.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4540: Intmd. Differential Equations
Mathematics
Certain special methods of solution; systems of equations; elementary partial differential equations; equations occurring in physical sciences.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4590: Intro. to Complex Analysis
Mathematics
Complex numbers, complex differentiation, the Cauchy-Riemann equations and applications; the Cauchy integral formula, contour integration, series.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4611: Num. Mathematical Anlys. I
Mathematics
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4612: Num. Mathematical Anlys. II
Mathematics
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4640: Intro. to Dynamics and Chaos
Mathematics
The course is an introduction to nonlinear dynamics and chaos theory. It will cover stability in nonlinear systems of differential equations, bifurcation theory, chaos, strange attractors, iteration of nonlinear mappings, fractals, and applications. This course will be of interest to students majoring either in natural sciences or mathematics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4750: Introduction to Statistics II
Mathematics
This course covers principles of nonparametric statistics and analysis of variance, including measure of association, contingency table analysis, goodness of fit tests, statistical methods based on rank order, logistic regression and other generalized linear models, and some basic Bayesian statistics concepts.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 4780: Intro. to Actuarial Science
Mathematics
Students will develop knowledge of the fundamental probability tools for quantitatively assessing risk with emphasis on the application of these tools to problems encountered in actuarial science. Topics include general probability concepts, univariate distributions, multivariate distribution, and risk management concepts.
3 credits
Prerequisites
min grade of C in MATH 2614 and 24 Earned Credits.
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5011: General Topology I
Mathematics
Metric spaces; Baire's theorem; topological spaces; continuity; separation axioms; connectedness; compactness; and quotient and product topologies.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5012: General Topology II
Mathematics
Algebraic invariants in topology.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5051: Advanced Calculus I
Mathematics
Suprema and infima on the real line; limits, liminf, and limsup of a sequence of reals; convergent sequences; Cauchy sequences; and series, absolute and conditional convergence of series.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5052: Advanced Calculus II
Mathematics
Limits, continuity, power series, partial differentiation; multiple, definite, improper, and line integrals; applications.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5131: Theory of Numbers I
Mathematics
Divisibility; properties of prime numbers; congruences and modular arithmetic; quadratic reciprocity; and representation of integers as sums of squares.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5132: Theory of Numbers II
Mathematics
Arithmetic functions and their distribution; distribution of prime numbers; Dirichlet characters and primes in arithmetic progression; and partitions.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5141: Intro. to Dynamical Systems I
Mathematics
This course is an introduction to the theory of dynamical systems. The course will cover linear maps and differential equations, nonlinear systems, conservative dynamics, one-dimensional dynamics and connections with ergodic theory and number theory.
3 credits
Prerequisites
min grade of C in MATH 3530.
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5142: Intro. to Dynamical Systems II
Mathematics
This course is the second semester of an introduction to the theory of dynamical systems. The course will cover some aspects of linear maps and differential equations, nonlinear systems, conservative dynamics, one-dimensional dynamics, and connections with ergodic theory and number theory.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5171: Intro. to Functional Anlys. I
Mathematics
Hilbert spaces, Banach spaces, Hahn-Banach Theorem, Banach Steinhaus Theorem, Open Mapping Theorem, weak topologies, Banach-Alaoglu Theorem, and Classical Banach spaces.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5172: Intro. to Functional Anlys. II
Mathematics
Topics in Banach space theory.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5190: Matrices
Mathematics
Basic matrix theory, eigenvalues, eigenvectors, normal and Hermitian matrices, similarity, Sylvester's Law of Inertia, normal forms, functions of matrices.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5200: Linear Algebra
Mathematics
An introduction to vector spaces and linear transformations; eigenvalues, and the spectral theorem.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5220: Intro. to Probability & Stat.s
Mathematics
Emphasis on standard statistical methods and the application of probability to statistical problems.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5230: Applied Probability
Mathematics
Emphasis on understanding the theory of probability and knowing how to apply it. Proofs are given only when they are simple and illuminating. Among topics covered are joint, marginal, and conditional distributions, conditional and unconditional moments, independence, the weak law of large numbers, Tchebycheff's inequality, Central Limit Theorem.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5240: Probability
Mathematics
Topics introduced in Math 573 will be covered at a more sophisticated mathematical level. Additional topics will include the Borel-Cantelli Lemma, the Strong Law of Large Numbers, characteristic functions, fourier transforms.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5251: Intro. to Abstract Algebra I
Mathematics
General theory of groups.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5252: Intro. to Abstract Algebra II
Mathematics
General theory of rings and fields.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5270: Applied Stochastic Processes
Mathematics
Emphasis on the application of the theory of stochastic processes to problems in engineering, physics, and economics. Discrete and continuous time Markov processes, Brownian Motion, Ergodic theory for stationary processes. Prerequisite requirements for this course may also be satisfied by consent of instructor.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5280: Stochastic Processes
Mathematics
Topics will include general diffusions, Martingales, and Stochastic differential equations.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5330: Topics in Euclidean Geometry
Mathematics
A study of incidence geometry; distance and congruence; separation; angular measure, congruences between triangles; inequalities; parallel postulate; similarities between triangles; circles area.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5351: Mathematical Statistics I
Mathematics
Mathematical treatment of statistical and moment characteristics; probability models; random variables; distribution theory; correlation; central limit theorem; and multiparameter models.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5352: Mathematical Statistics II
Mathematics
Mathematical treatment of statistical inference; maximum likelihood estimation and maximum likelihood ratio test; minimum variance unbiased estimators; most powerful tests; asymptotic normality and efficiency; and Baysian statistics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5370: Non-Euclidean Geometry
Mathematics
Brief review of the foundation of Euclidean plane geometry with special emphasis given the Fifth Postulate; hyperbolic plane geometry; elliptic plane geometry.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5400: History of Mathematics
Mathematics
Development of mathematics, especially algebra, geometry, and analysis; lives and works of Euclid, Pythagoras, Cardan, Descartes, Newton, Euler, and Gauss. Prerequisite requirements for this course may also be satisfied by consent of instructor.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5410: Tech. in Tching College Math
Mathematics
Directed studies of methods in the presentation of college mathematics topics, teaching and testing techniques. This course is required of all teaching assistants, each semester, and may not be used for credit toward a degree. Z grade
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5450: Topics for Sec. School Tchrs
Mathematics
High-school subjects from an advanced point of view and their relation to the more advanced subjects. May be repeated once for credit.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5471: Special Problems I
Mathematics
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 5472: Special Problems II
Mathematics
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 5473: Special Problems III
Mathematics
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 5511: General Topology I
Mathematics
Metric spaces; Baire's theorem; topological spaces; continuity; separation axioms; connectedness; compactness; and quotient and product topologies.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5512: General Topology II
Mathematics
Algebraic invariants in topology.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5551: Advanced Calculus I
Mathematics
Suprema and infima on the real line; limits, liminf, and limsup of a sequence of reals; convergent sequences; Cauchy sequences; and series, absolute and conditional convergence of series.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5552: Advanced Calculus II
Mathematics
Limits, continuity, power series, partial differentiation; multiple, definite, improper, and line integrals; applications.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5631: Theory of Numbers I
Mathematics
Divisibility; properties of prime numbers; congruences and modular arithmetic; quadratic reciprocity; and representation of integers as sums of squares.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5632: Theory of Numbers II
Mathematics
Arithmetic functions and their distribution; distribution of prime numbers; Dirichlet characters and primes in arithmetic progression; and partitions.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5641: Intro. to Dynamical Systems I
Mathematics
This course is an introduction to the theory of dynamical systems. The course will cover linear maps and differential equations, nonlinear systems, conservative dynamics, one-dimensional dynamics and connections with ergodic theory and number theory.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5642: Intro. to Dynamical Systems II
Mathematics
This course is the second semester of an introduction to the theory of dynamical systems. The course will cover some aspects of linear maps and differential equations, nonlinear systems, conservative dynamics, one-dimensional dynamics, and connections with ergodic theory and number theory.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5671: Intro. to Functional Anlys. I
Mathematics
Hilbert spaces, Banach spaces, Hahn-Banach Theorem, Banach Steinhaus Theorem, Open Mapping Theorem, weak topologies, Banach-Alaoglu Theorem, and Classical Banach spaces.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5672: Intro. to Functional Anlys. II
Mathematics
Topics in Banach space theory.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5690: Matrices
Mathematics
Basic matrix theory, eigenvalues, eigenvectors, normal and Hermitian matrices, similarity, Sylvester's Law of Inertia, normal forms, functions of matrices.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5700: Linear Algebra
Mathematics
An introduction to vector spaces and linear transformations; eigenvalues, and the spectral theorem.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5720: Intro. to Probability & Stat.s
Mathematics
Emphasis on standard statistical methods and the application of probability to statistical problems.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5730: Applied Probability
Mathematics
Emphasis on understanding the theory of probability and knowing how to apply it. Proofs are given only when they are simple and illuminating. Among topics covered are joint, marginal, and conditional distributions, conditional and unconditional moments, independence, the weak law of large numbers, Tchebycheff's inequality, Central Limit Theorem.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5740: Probability
Mathematics
Topics introduced in Math 573 will be covered at a more sophisticated mathematical level. Additional topics will include the Borel-Cantelli Lemma, the Strong Law of Large Numbers, characteristic functions, fourier transforms.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5751: Intro. to Abstract Algebra I
Mathematics
General theory of groups.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5752: Intro. to Abstract Algebra II
Mathematics
General theory of rings and fields.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5770: Applied Stochastic Processes
Mathematics
Emphasis on the application of the theory of stochastic processes to problems in engineering, physics, and economics. Discrete and continuous time Markov processes, Brownian Motion, Ergodic theory for stationary processes. Prerequisite requirements for this course may also be satisfied by consent of instructor.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5780: Stochastic Processes
Mathematics
Topics will include general diffusions, Martingales, and Stochastic differential equations.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5830: Topics in Euclidean Geometry
Mathematics
A study of incidence geometry; distance and congruence; separation; angular measure, congruences between triangles; inequalities; parallel postulate; similarities between triangles; circles area.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5851: Mathematical Statistics I
Mathematics
Mathematical treatment of statistical and moment characteristics; probability models; random variables; distribution theory; correlation; central limit theorem; and multiparameter models.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5852: Mathematical Statistics II
Mathematics
Mathematical treatment of statistical inference; maximum likelihood estimation and maximum likelihood ratio test; minimum variance unbiased estimators; most powerful tests; asymptotic normality and efficiency; and Baysian statistics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5870: Non-Euclidean Geometry
Mathematics
Brief review of the foundation of Euclidean plane geometry with special emphasis given the Fifth Postulate; hyperbolic plane geometry; elliptic plane geometry.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5900: History of Mathematics
Mathematics
Development of mathematics, especially algebra, geometry, and analysis; lives and works of Euclid, Pythagoras, Cardan, Descartes, Newton, Euler, and Gauss. Prerequisite requirements for this course may also be satisfied by consent of instructor.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5910: Tech. in Tching College Math
Mathematics
Directed studies of methods in the presentation of college mathematics topics, teaching and testing techniques. This course is required of all teaching assistants, each semester, and may not be used for credit toward a degree. Z grade
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5950: Topics for Sec. School Tchrs
Mathematics
High-school subjects from an advanced point of view and their relation to the more advanced subjects. May be repeated once for credit.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 5971: Special Problems I
Mathematics
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 5972: Special Problems II
Mathematics
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 5973: Special Problems III
Mathematics
1 - 3 credits
Potentially offered with the following Instruction Type(s):
Independent Study

MATH 6251: Modern Algebra I
Mathematics
Advanced group theory.
3 credits
Prerequisites
MATH 5751.
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6252: Modern Algebra II
Mathematics
Advanced theory of rings and fields, including Galois theory and modules.
3 credits
Prerequisites
MATH 6251.
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6310: Foundations of Geometry
Mathematics
Development of Euclidean goemetry in two and three dimensions using the axiomatic method; introduction to high dimensional Euclidean geometry and to non-Euclidean geometrics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6390: Projective Geometry
Mathematics
Fundamental propositions of projective geometry from synthetic and analytic point of view; principle of duality; poles and polars; cross ratios; theorems of Desargues, Pascal, Brianchon; involutions.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6490: Continued Fractions
Mathematics
Arithmetic theory; analytic theory; applications to Lyapunov theory.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6551: Thry Func. of Complex Var. I
Mathematics
Complex numbers; analtic functions; complex integration; Cauchy's theorem and integral formula; Liouvilles's theorem; maximum modulus principles; Schwarz's lemma; sequences and series of analytic's functions; isolated singularities; and the residue theorem.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6552: Thry Func. of Complex Var. II
Mathematics
This course covers conformal mappings, harmonic functions, and infinite products.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6611: Numerical Analysis I
Mathematics
Numerical linear algebra; error analysis; computation of eigenvalues and eigenvectors; and finite differences.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6612: Numerical Analysis II
Mathematics
This course covers techniques for ordinary and partial differential equations, and stability and convergence analysis.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6630: Special Functions
Mathematics
Advanced study of gamma functions; hypergeometric functions; generating function; theory and application of cylinder functions and spherical harmonics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6640: Topics in Dynamical Systems
Mathematics
The course covers some important topics in dynamical systems. In particular, low-dimensional dynamics, circle dynamics, Hamiltonian dynamics. It will also contain an introduction to Kolmogorov-Arnold-Moser theory and renormalization methods in dynamics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6671: Functional Analysis I
Mathematics
Topological vector spaces (tvs); complete tvs; product and quotient tvs; separation theorems for convex sets; locally convex spaces; Krein-Milman theorem; linear operations; dual pairs and Mackey-Arens theorem; Alaoglu-Bourbaki theorem; and bornological and barreled spaces.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6672: Functional Analysis II
Mathematics
This course covers topics in applied functional analysis.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6691: Partial Diff. Equations I
Mathematics
Classical theories of wave and heat equations.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6692: Partial Diff. Equations II
Mathematics
Hilbert space methods for boundary value problems.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6711: Statistical Methods I
Mathematics
This course and its sequel, Math 672, cover linear statistical models for regression, analysis of variance, and experimental design. The courses seek to blend theory and application. Topics in this course include simple and multiple linear regressions, model diagnostics, model selection and validation, generalized linear models, nonlinear regression, and neural networks. SAS or R will be used to apply these methods with real data.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 6712: Statistical Methods II
Mathematics
This course is a continuation of Math 671. Topics covered are one-way and multi-way analysis of variance (ANOVA), balanced and unbalanced designs with fixed effects, random effects and mixed effects, model diagnostics, nested designs, repeated measures designs, fractional designs, Latin squares. SAS or R will be used to apply these methods with real data.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 6731: Advanced Probability I
Mathematics
Topics in probability at an advanced level; measure theoretic foundations; infinitely divisible laws; and stable laws.
3 credits
Corequisites
MATH 7532
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6732: Advanced Probability II
Mathematics
Multidensional central limit theorem; strong laws; and law of the integrated logarithm.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6771: Advanced Stochastic Proc.es I
Mathematics
Topics in the theory of stochastic processes; separability; Martingales; stochastic integrals; and the Wiener process.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6772: Advanced Stochastic Proc.es II
Mathematics
Gaussian process; random walk; Ornstein-Uhlenbeck process; and semi-group theory for diffusions.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 6790: Statistical Bioinformatics
Mathematics
Introduction to bioinformatics, an interdisciplinary study that combines techniques and knowledge in mathematical, statistical, computational, and life sciences in order to understand the biological significance of genetic sequence data.
3 credits
Prerequisites
min grade of C in MATH 5851.
Potentially offered with the following Instruction Type(s):
Lecture/Lab

MATH 6997A: Thesis
Mathematics
No grade
1 - 12 credits
Potentially offered with the following Instruction Type(s):
Thesis

MATH 6999A: Topics in Modern Mathematics
Mathematics
Survey of the more recent developments in pure and applied mathematics.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 7000: Seminar in Topology
Mathematics
This course is a study of specialized topics within or with connections to the area of topology, to be chosen by the instructor. May be repeated for credit up to a maximum of 6 credit hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7200: Seminar in Algebra
Mathematics
This course is a study of specialized topics within or with connections to the area of algebra, to be chosen by the instructor. May be repeated for credit up to a maximum of 6 credit hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7300: Seminar in Number Theory
Mathematics
This course is a study of specialized topics within or with connections to the area of number theory, to be chosen by the instructor. May be repeated for credit up to a maximum of 6 credit hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7500: Seminar in Analysis
Mathematics
This course is a study of specialized topics within or with connections to the area of analysis, to be chosen by the instructor. May be repeated for credit up to a maximum of 6 credit hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7531: Thry of Func. of Real Var. I
Mathematics
Lebesgue measure and integration; differentiation; bounded variation; and absolute continuity of functions.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 7532: Thry of Func. of Real Var. II
Mathematics
This course covers general measure theory.
3 credits
Prerequisites
MATH 7531.
Potentially offered with the following Instruction Type(s):
Lecture

MATH 7600: Seminar in Dynamical Systems
Mathematics
This course is a study of specialized topics within or with connections to the area of dynamical systems, to be chosen by the instructor. May be repeated for credit up to a maximum of 6 hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7710: Time Series and Data Analysis
Mathematics
This course covers time series analysis in time domain and frequency domain. Topics include ARIMA models, FARIMA models, GARCH models, nonstationary and seasonal time series models, and other time series models, spectral analysis, long memory time series, forecasting stationary time series, and multivariate time series. Statistics software will be used for data analysis.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7720: Bayesian Statistics
Mathematics
This course offers a comprehensive exploration of Bayesian statistics and its integration with decision theory, providing students with the tools to make informed decisions under uncertainty. The course covers both the theoretical foundations and practical applications of the Bayesian approach to statistics.
3 credits
Prerequisites
min grade of C in MATH 5852.
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7751: Advanced Statistics I
Mathematics
Math 775 and Math 776 serve as Topics in Statistics courses, and may be repeated once for credit as topics vary. Topics will be selected from but not limited to Bayesian statistics, nonparametric statistics, time series analysis, survival analysis, financial statistics, statistical learning and data mining, robust statistics, and multivariate analysis. Course topics rotate depending on interests of students and faculty.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7752: Advanced Statistics II
Mathematics
Math 775 and Math 776 serve as Topics in Statistics courses, and may be repeated once for credit as topics vary. Topics will be selected from but not limited to Bayesian statistics, nonparametric statistics, time series analysis, survival analysis, financial statistics, statistical learning and data mining, robust statistics, and multivariate analysis. Course topics rotate depending on interests of students and faculty.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7770: Seminar in Statistics
Mathematics
This course is a study of specialized topics within or with connections to the area of statistics, to be chosen by the instructor. May be repeated for credit up to a maximum of 9 credit hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7800: Seminar in Graph Theory
Mathematics
This course is a study of specialized topics within or with connections to the areas of graph theory and/or matroid theory, to be chosen by the instructor. May be repeated for credit up to a maximum of 6 credit hours.
3 credits
Potentially offered with the following Instruction Type(s):
Seminar

MATH 7810: Graph Theory II
Mathematics
Topics in graph theory, including trees, connectivity, matchings, paths, cycles, coverings, planarity, graph colorings, networks and directed graphs. External graph structure, applications, and algorithms will also be studied.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 7820: Graph Theory I
Mathematics
This course primarily covers topics in Matroid theory, including duality, minors, connectivity graphic matroids, representable matroids, and matroid structure. Connections between the class of matroids with the classes of graphs and projective geometries are also studied.
3 credits
Potentially offered with the following Instruction Type(s):
Lecture

MATH 7998A: Dissertation
Mathematics
No grade
1 - 18 credits
Potentially offered with the following Instruction Type(s):
Dissertation