MATHEMATICS (MATH)

MATH 1101. Math Education Intervention.
Students benefit from innovative, research-based approaches for learning mathematics, and this course will deliver supplemental mathematical instruction as one such intervention. Students will be assessed using college readiness indicators or other information to determine individualized approaches. The course is designed for students in 1000 level mathematics courses who feel they would benefit from additional course based support. Prerequisite: Departmental Approval. Corequisite: MATH 1312 or MATH 1315 or MATH 1316 or MATH 1319.
1 Credit Hour. 0 Lecture Contact Hours. 24 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Credit/No Credit

MATH 1300. Elementary Algebra.
A course to remediate and review basic academic skills in mathematics, including number concepts, computation, elementary algebra, geometry and mathematical reasoning. Credit earned for this course does not count toward any degree offered by the university.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Developmental/Remedial|Dif Tui- Science & Engineering
Grade Mode: Developmental

MATH 1311. Intermediate Algebra.
This preparatory course for college algebra includes linear equations and inequalities, rational expressions, exponents and radicals, quadratics and word problems. This course is designed for students who've graduated from high school with no more than the minimum mathematics requirements or for students who've been away from mathematics for years. Prerequisites: TSI Assessment Test Score of 345 or more.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Developmental/Remedial|Dif Tui- Science & Engineering|Lab Required
Grade Mode: Developmental

MATH 1312. College Statistics and Algebra.
A course covering linear and quadratic equations, inequalities, functions and their graphs, logarithms, systems of equations, and applications of mathematics. Special emphasis on statistical concepts including linear and quadratic regression, distributions confidence intervals, & hypothesis testing. This course is not intended to substitute for MATH 1315 as a prerequisite. Prerequisite: College Readiness in Mathematics according to the TSI regulations.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1342

MATH 1315. College Algebra.
A course covering linear and quadratic equations, inequalities, word problems, functions, logarithms, systems of equations and other college algebra topics as time permits. Prerequisite: College Readiness in Mathematics according to the TSI regulations.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1314

MATH 1316. Survey of Contemporary Mathematics.
(MATH 1332) A study of the uses of mathematics in society today. Emphasis is on concepts rather than technical details. May not be used as a prerequisite for any other mathematics course. Prerequisite: College Readiness in Mathematics according to TSI regulations.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1332

MATH 1317. Plane Trigonometry.
This is a course covering trigonometric functions, right triangles, radian measure, graphs of trigonometric functions, trigonometric identities, including multiple and half-angle identities, inverse trigonometric functions, trigonometric equations, oblique triangles, and complex numbers. Prerequisite: [MATH 1315 with a grade of "C" or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1316

MATH 1319. Mathematics for Business and Economics I.
Topics from college algebra and finite mathematics which apply to business and economics including applications of equations and inequalities, simple and compound interest and annuities. Prerequisite: College Readiness in Mathematics according to the TSI regulations.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1324

MATH 1329. Mathematics for Business and Economics II.
This course covers topics from finite mathematics and elementary differential calculus which apply to business and economics. Prerequisites: [MATH 1315 or MATH 1319 with a grade of "C" or better] or [ACT Mathematics score of 27 or better] or [SAT Math Section score of 600 or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1325

MATH 2311. Principles of Mathematics I.
This course introduces logical deductive reasoning, number theory, a rational development of the real numbers with the associated number structures and algorithms for the fundamental operations, including historical, philosophical and cultural significance. Prerequisite: MATH 1312 or MATH 1315 or MATH 1319 or MATH 2321 or MATH 2417 any with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1350

MATH 2312. Informal Geometry.
Geometric measuring. Euclidean Geometry, and topics associated with informal geometry, including historical, philosophical, and cultural significance. Prerequisite: MATH 2311 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1351

MATH 2321. Calculus for Life Sciences I.
This course's design mainly addresses the needs of students of life sciences. Topics will include the following while emphasizing life science applications: exponential, logarithmic, trigonometric functions; scientific notation; derivatives and their applications; indefinite and definite integrals, and their applications; and the Fundamental Theorem of Calculus. Prerequisite: [MATH 1315 or MATH 1319 or MATH 1329 or MATH 2417 any with a grade of "C" or better] or [ACT Mathematics score of 24 or better] or [SAT Math Section score of 550 or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 2313

MATH 2328. Elementary Statistics.
This course is an algebra-based introduction to descriptive statistics, random sampling, design of experiments, probability and the Central Limit Theorem. Inferential statistics topics include the foundational concepts for confidence intervals and hypothesis testing for simple experiments. Prerequisite: [MATH 1312 or MATH 1315 or MATH 1319 with a grade of "C" or better] or [MATH 1329 or 2321 or MATH 2417 or MATH 2471 with a grade of "D" or better] or [ACT Mathematics score of 24 or better] or [SAT Math Section score of 550 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 1342

MATH 2331. Calculus for Life Science II.
Topics in this extension of MATH 2321 will include linearization, related rates, techniques and applications of integration, differential equations, probability and continuous distributions, characteristic values and vectors of matrices, discrete dynamical systems, mathematical modeling, and applications. Prerequisite: MATH 2321 with a grade of "C" or better or MATH 2471 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 2358. Discrete Mathematics I.
This course is a study of discrete mathematical structures that are commonly encountered in computing hardware and software. Prerequisite: [MATH 1315 or MATH 1329 with a grade of "C" or better] or [MATH 2417 or MATH 2471 with a grade of "D" of better].
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter
TCCN: MATH 2305

MATH 2393. Calculus III.
The course topics include vectors and the geometry of space, functions of several variables, vector-valued functions, partial derivatives, extreme values, multiple integrals, vector fields, line and surface integrals, Green's Theorem, Stokes' Theorem, the Divergence Theorem, and applications of the preceding in the sciences. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TCCN: MATH 2315

MATH 2417. Pre-Calculus Mathematics.
This course is a survey of functions, trigonometry and analytic geometry to prepare students for calculus. Prerequisites: [MATH 1315 or MATH 1319 with a grade of C or better] or [ACT Mathematics score of 24 or better] or [SAT Math Section score of 550 or better] or [Accuplacer College Mathematics score of 86 or better] or [Compass College Algebra score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test of 263 or better].
4 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering|Lab Required
Grade Mode: Standard Letter
TCCN: MATH 2412

MATH 2471. Calculus I.
This is the first course in differential and integral calculus which stresses limits as well as the applications of calculus to the problems of science. Prerequisites: [MATH 2417 with a grade of C or better] or [ACT Mathematics score of 27 or better] or [SAT Math Section score of 600 or better] or [Accuplacer College Mathematics score of 103 or better] or [Compass Trigonometry score of 46 or better] or [Next-Generation Advanced Algebra and Functions Test score of 276 or better].
4 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Mathematics Core 020|Dif Tui- Science & Engineering|Lab Required
Grade Mode: Standard Letter
TCCN: MATH 2413

MATH 2472. Calculus II.
This course is a continuation of the study of differential and integral calculus begun in MATH 2471. Topics include methods of integration, applications to science and engineering, sequences and series, power series representations of functions, and an introduction to partial derivatives. (MULP) Prerequisite: MATH 2471 with a grade of "C" or better.
4 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Component Area Core 090|Mathematics CAO 092|Dif Tui- Science & Engineering|Lab Required|Multicultural Perspective
Grade Mode: Standard Letter
TCCN: MATH 2414

MATH 2473. Integral Calculus with Multivariables and Series.
This course is a continuation of differential and integral calculus. Select topics from Calculus II and Calculus III are covered including methods of integration, sequences and series, and introduction to partial derivatives. Prerequisite: MATH 2471 with a grade of "C" or better.
4 Credit Hours. 3 Lecture Contact Hours. 3 Lab Contact Hours.
Course Attribute(s): Component Area Core 090|Mathematics CAO 092|Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3305. Introduction to Probability and Statistics.
Basic probability models, generating functions and conditional probability, also discrete and continuous, univariate and bivariate distributions of random variables. Concepts of estimation, tests of hypothesis and statistical inference. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3306. Introduction to Statistical Methods.
This calculus-based statistics course covers basic descriptive statistics, concept of probability, binomial and normal probability distributions, sampling distributions, concepts of estimation and hypothesis testing, confidence Intervals, t-test, chi-square tests, simple linear regression, and one-factor analysis of variance. Prerequisites: MATH 2472 with a grade of "C" or better; 2.75 overall GPA. Restricted to Mathematics majors seeking teacher certification.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3315. Modern Geometry.
Modern geometry with an emphasis on the triangle, circle, plane and Euclidian geometry, an historical aspects will be integrated into the course. May not be applied toward a minor in mathematics. Prerequisites: MATH 2321 or MATH 2471 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3323. Differential Equations.
A course covering solutions to the more common types of ordinary differential equations, especially those of first and second order, with emphasis on geometrical and physical interpretations. Prerequisite: MATH 2472 or MATH 2473; with grades of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3325. Number Systems.
Algebraic construction of the natural numbers. Covers the basic vocabulary and proof techniques of abstract algebra, and the structural properties of the natural numbers, integers, rational, real and complex number systems. Prerequisite or Co-requisite: MATH 2471 with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3330. Introduction to Advanced Mathematics.
This course is an introduction to the theory of sets, relations, functions, countable and uncountable sets, and other selected topics and covers algebraic structure and topological properties of Euclidean space and an introduction to metric spaces. Prerequisite: MATH 2471 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3348. Deterministic Operations Research.
This course provides a broad overview of deterministic operations research techniques. Linear programming will be covered including the simplex method, duality and sensitivity analysis. Further selected topics are from integer programming, dynamic programming, scheduling models, game theory, and associated topics. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3375. Engineering Mechanics.
A course covering statics, using a vector approach to mechanics. The course is designed to satisfy the requirements of engineering Colleges. This course cannot be used to satisfy the requirements of Engineering degrees. Prerequisite: PHYS 1430. Prerequisite or Co-requisite: MATH 2472 all with a grade of "D" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3376. Applied Linear Algebra.
This course covers linear algebra, matrix theory, and computational aspects of both. Topics include a variety of methods for solving systems and related properties. Emphasis is placed on topics useful in civil engineering, applied mathematics, and other disciplines, serving as a preparatory course for the finite element method. Students cannot receive credit for both MATH 3376 and MATH 3377. Prerequisite: MATH 2472 or MATH2473, with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3377. Linear Algebra.
An introductory course in linear algebra covering vector spaces, linear transformation, matrices, systems of linear equations, and inner product spaces. Prerequisite: MATH 2472 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3380. Analysis I.
A course covering the introduction to the theory of real functions. Topics include limits, continuity and derivatives and associated topics. Prerequisite: MATH 3330 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3383. Numerical Analysis I.
This course focuses on basic numerical methods in mathematics to the solution of functional problems in fields such as engineering and applied sciences. This course covers instructions in computer arithmetic, solutions of equations, interpolation, numerical differentiation/integration, and applications to scientific and industrial applications. Prerequisite: MATH 2472 with grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 3398. Discrete Mathematics II.
A continuation of discrete Mathematics I. Prerequisite: MATH 2358 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4302. Principles of Mathematics II.
Algebraic reasoning and probability with selected topics from quantitative reasoning, measurement, statistics, and geometry are integrated with middle school pedagogical practices such as inquiry learning and use of technology. Appropriate correlated lessons, writing components, and culturally responsive teaching are incorporated. Prerequisite: MATH 2312 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive
Grade Mode: Standard Letter

MATH 4303. Capstone Mathematics for Middle School Teachers.
A rigorous, integrated, analytical perspective of mathematical topics; quantitative reasoning, geometry and measurement, probability and statistics, number theory and algebraic reasoning. May not be applied towards a mathematics minor. Must be taken before student teaching. Prerequisites: Math 2331 or 2472 and Math 3315 with grades of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4304. Capstone Mathematics for Secondary Teachers (of Mathematics).
Basic concepts underlying algebra, geometry, trigonometry, and calculus taught from an advanced standpoint, including historical, philosophical, and cultural significance. May not be applied toward a minor in mathematics. Must be taken before student teaching. Prerequisite: MATH 3315 and MATH 2331 or MATH 2472 with grades of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4305. Probability and Statistics.
A course covering sample spaces, probability of events, binomial and multinomial distributions, random variables, normal approximations, statistical inference, and applications. Prerequisite: MATH 3305 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4306. Fourier Series and Boundary Value Problems.
Advanced solution methods for differential equations; partial differential equations; series approximations, Fourier series; boundary value problems typical of scientific applications. Prerequisite: MATH 3323 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4307. Modern Algebra.
A course covering elementary set theory, structures, functions, and concepts of modern algebra. Prerequisites: MATH 3330 with a grade of "C" or higher and MATH 3325 or 3377 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4311. Introduction to the History of Mathematics.
A survey of the development of major mathematical topics, including geometry, algebra, calculus, and advanced mathematics. Philosophical and cultural aspects will be integrated with the structure, theorems, and applications of mathematics. May not be applied toward a minor in mathematics. Prerequisite: MATH 3315 with a grade of "C" or higher and MATH 2331 or MATH 2472 with a grade of "C" or higher. (WI).
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering|Writing Intensive
Grade Mode: Standard Letter

MATH 4315. Analysis II.
A continuation of MATH 3380. Topics include integration, series and sequences of functions and associated topics. Prerequisite: MATH 3380 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4327. Introduction to Complex Analysis and Its Applications.
This course introduces topics in the theory of functions of a complex variable (contour integrals, series, residues of analytic functions, and conformal mappings) with engineering and science applications. These include solving boundary value problems, locating zeros of analytic functions, analyzing two-dimensional heat and fluid flows, and calculating inverse Laplace transforms. Prerequisite: MATH 2393 and MATH 3323 both with grades of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4330. General Topology.
Topics include introductory treatment of convergence, continuity, compactness, connectedness and fixed points in topological spaces with special emphasis on metric spaces. Prerequisite: MATH 3330 or MATH 3380 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4336. Studies in Applied Mathematics.
Selected topics including Laplace transforms, complex variables, advanced calculus for applications, calculus of variations, integral equations, intermediate differential equations, vector analysis, etc. May be repeated once for credit with a different topic. Prerequisite: Consent of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4337A. Topological Data Analysis.
This research-based course introduces students to computational topology and topological data analysis. In addition to studying existing data studies from the recent scientific literature, students will also analyze a data set they have personally chosen. Students will present their progress and results both orally and in writing. Prerequisite: MATH 3377.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics|Writing Intensive
Grade Mode: Standard Letter

MATH 4337B. Research in Discrete Mathematics.
This course is an introduction to creative mathematical activities. It provides an opportunity to perform research in discrete mathematics, as well as to learn how to present mathematical results both orally and in writing. These skills are essential for those students continuing into graduate studies. Prerequisite: Texas State GPA 3.25; MATH 2358. Corequisite: MATH 3398.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics|Writing Intensive
Grade Mode: Standard Letter

MATH 4337C. Numerical Methods for Ordinary Differential Equations.
This research-based course has students investigate known methods of numerically solving ordinary differential equations (Runge-Kutte, Adams, Predictor-Corrector, etc.). Students will research the effect of variations on these methods by implementing their algorithm modifications in mathematical software and reporting on their results. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics|Writing Intensive
Grade Mode: Standard Letter

MATH 4337D. Topics in Topology and Algebra.
This course introduces students to modern research methods in topology and algebra. Specific topics will vary based on student interest and input, but the basic concepts and methods of algebraic topology (homology and cohomology groups, homotopy groups), homotopy theory, and simplicial methods form the backbone of this course. Prerequisite: MATH 4307 or MATH 4330 with a grade of "C" or better and a minimum 2.0 Texas State GPA.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Dif Tui- Science & Engineering|Topics
Grade Mode: Standard Letter

MATH 4350. Introduction to Combinatorics.
This course introduces fundamental concepts and results in combinatorics such as counting techniques, binomial coefficients, and recurrence relations; and applications in different fields such as complexity of algorithms and graph theory. Mathematical proofs are an essential part of this course. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4383. Numerical Analysis II.
This course focuses on a broad range of mathematical and computational methods in modeling, analysis, and simulation of scientific and engineering problems. This course covers instructions in numerical analysis, approximation, optimization, differential equations, scientific computation, and applications to scientific and industrial topics. Prerequisites: MATH 3383 and MATH 3323, all with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 4393. Introduction to Finite Element Methods.
This course introduces weak formulations of the partial differential equations and the finite element approximation of this weak form. Theory and computations are balanced. Topics include finite element methods for approximating solutions of partial differential equations and related properties. Emphasis topics are in civil engineering, applied mathematics, and related disciplines. Prerequisite: MATH 3376 or MATH 3377 and MATH 3383; each with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Dif Tui- Science & Engineering
Grade Mode: Standard Letter

MATH 5111. Graduate Assistant Training.
This course is concerned with techniques used in the teaching of mathematics. This course is required as a condition of employment for graduate teaching and instructional assistants. This course does not earn graduate degree credit. Repeatable with different emphasis.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Course Attribute(s): Graduate Assistantship|Exclude from Graduate GPA
Grade Mode: Leveling/Assistantships

MATH 5199B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 5299B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.
2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 5301. Partial Differential Equations.
Theory and application of partial differential equations; derivation of the differential equation; use of vector and Tensor methods; equations of the first order; wave equations; vibrations and normal functions; Fourier series and integral; Cauchy's methods, initial data; methods of Green; potentials; boundary problems; methods of Riemann-Volterra; characteristics. Prerequisites: MATH 3323 and consent of the instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5303. History of Mathematics.
A study of the development of mathematics and of the accomplishments of men and women who contributed to its progress. Cannot be used on a degree plan for M.S. degree. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5304. Topics in Mathematics for the Secondary Teacher.
A study of the current trends and topics found in the secondary school mathematics curriculum with the goal of improving the mathematical background of the secondary teacher. Course content will be flexible and topics will be selected on the basis of student needs and interests. Cannot be used on degree plan for M.S. degree. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5305. Advanced Course in Probability and Statistics.
Advanced topics in probability and statistics. May be repeated once with different emphasis for additional credit. Prerequisite: MATH 3305.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5307. Modern Algebra.
Topics in modern algebra. Material will be adapted to the needs of the class. Prerequisite: MATH 4307 with a grade of "C" or better, or MATH 5384 with a grade of "B" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5311. Foundations of Differential Equations.
A critical study of the foundations of derivation equations, operator spaces, and such basic topics. Recent developments in this field will be investigated and independent investigation will be encouraged. Prerequisite: MATH 2393 and [MATH 3380 or MATH 5382] both with grades of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5312. Functions of a Complex Variable.
Modern developments in the field of a complex variable. Prerequisite: MATH 2393 and MATH 4315 and [MATH 3380 or MATH 5382] all with grades of "C" or better or departmental approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5313. Field Theory.
Topics in field theory, separable extensions, and Galois Theory. Prerequisite: MATH 4307 with a grade of "C" or better, or MATH 5384 with a grade of "B" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5314. Number Theory.
Topics in algebra selected from quadratic forms, elementary number theory, algebraic or analytic number theory, with material adapted to the needs of the class. Prerequisite: MATH 4307 with a grade of "C" or better, or MATH 5384 with a grade of "B" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5315. Mathematical Statistics.
This course discusses theoretical aspects of estimation theory and hypothesis testing procedures, with some of their important applications. The main topics include convergence of random variables, parameter estimation, properties of estimators, interval estimation, sufficiency and applications to the exponential family, hypothesis testing, decision theory, and Bayesian inference. Prerequisite: Instructor approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5317. Problems in Advanced Mathematics.
Open to graduate students on an individual basis by arrangement with the mathematics department. A considerable degree of mathematical maturity is required. May be repeated with different emphasis. This course does not earn graduate degree credit.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from Graduate GPA|Leveling
Grade Mode: Leveling/Assistantships

MATH 5319. The Theory of Integration.
A course in the theory of integration with special emphasis on the Lebesgue integrals. A course in the theory of real variables, with a knowledge of point set theory, is desirable as a background for this course. A considerable amount of mathematical maturity is required. Prerequisite: MATH 4315 with a grade of "C" or better, or departmental approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5329. General Topology.
Point-set topology with an emphasis on general topological spaces; separation axioms, connectivity, the metrization theorem, and the C-W complexes. Prerequisite: MATH 4330 with a grade of "C" or better, or departmental approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5331. Metric Spaces.
Point-set topology with an emphasis on metric spaces and compactness but including a brief introduction to general topological spaces. Prerequisite: MATH 4330 with a grade of "C" or better, or departmental approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5335. Survival Analysis.
This course introduces concepts and methods in the analysis of survival data. Topics include characteristics of survival data; basic functions; parametric models for survival time; maximum likelihood estimation of survival functions; two-sample test techniques; regression analysis with parametric and semi-parametric models; and mathematical and graphical methods for model checking. Prerequisite: Math 5305 with a grade of "B" or better or instructor approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5336. Studies in Applied Mathematics.
Topics selected from optimization and control theory, numerical analysis, calculus of variations, boundary value problems, special functions, or tensor analysis. May be repeated with different emphasis for additional credit. Prerequisites: Six hours of advanced mathematics pertinent to topic and consent of the instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5340. Scientific Computation.
This course will involve the analysis of algorithms from science and mathematics, and the implementation of these algorithms using a computer algebra system. Symbolic numerical and graphical techniques will be studied. Applications will be drawn from science, engineering, and mathematics. A knowledge of differential equations is expected. Prerequisite: Consent of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

MATH 5345. Regression Analysis.
This course introduces formulation and statistical methodologies for simple and multiple regression, assessment of model fit, model design, and criteria for selection of optimal regression models. Students will develop skills with the use of statistical packages and the writing of reports analyzing a variety of real-world data. Prerequisite: MATH 2472.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5350. Combinatorics.
This course, covers permutations, combinations, Stirling numbers, chromatic numbers, Ramsey numbers, generating functions, Polya theory, Latin squares and random block design. Prerequisite: MATH 3398 or consent of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5355. Applied and Algorithmic Graph Theory.
This course is designed to emphasize the close tie between the theoretical and algorithmic aspects. The topics may include basic concepts such as connectivity, trees, planarity, coloring of graphs, matchings, and networks. It also covers many algorithms such as Max-flow Min-cut algorithm, maximum matching algorithm, and optimization algorithms for facility location problems in networks. Prerequisite: MATH 5388 or MATH 3398.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5358. Applied Discrete Mathematics.
Boolean algebra, counting techniques, discrete probability, graph theory, and related discrete mathematical structures that are commonly encountered in computer science. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5360. Mathematical Modeling.
This course introduces the process and techniques of mathematical modeling. It covers a variety of application areas from the natural sciences. Emphasis is placed on deterministic systems, stochastic models, and diffusion. Prerequisite: [MATH 2393 and MATH 3323 both with grades of "D" or better and MATH 5301 with a grade of "C" or better] or instructor approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5373. Theory of Functions of Real Variables.
This course will discuss those topics that will enable the student to obtain a better grasp of the fundamental concepts of the calculus of real variables and the more recent developments of this analysis. Prerequisite: MATH 4315 with a grade of "C" or better, or departmental approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5374. Numerical Linear Algebra.
This course introduces tools that mathematical scientists use with vectors and matrices. Applications include least squares and eigenvalue problems, and systems of equations from applied mathematics. The stability of algorithms to perturbations are considered. Theory is balanced with numerically implementing algorithms, in particular for iterative methods for large, sparse systems. Prerequisite: MATH 3377 with a "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5376A. Design and Analysis of Experiments.
This course introduces fundamental concepts in the design of experiments, justification of linear models, randomization and principles of blocking. It also discusses the construction and analysis of basic designs including fractional replication, composite designs, factorial designs, and incomplete block designs. Prerequisite: Approval of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 5376B. Analysis of Variance.
This course introduces basic methods, one-way, two-way ANOVA procedures, and multifactor ANOVA designs. Prerequisite: Approval of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 5376D. Statistical Applications in Genetics and Bioinformatics.
The statistical concepts and methods to be covered include important probability distributions, analysis of variance, regression analysis, hidden Markov model, and Markov Chain Monte Carlo methods. These methods will be used to address important and challenging questions arising in the analysis of large genetic and bioinformatic datasets. Prerequisite: Math4305 or equivalent.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 5376E. Introduction to Data Science.
This course introduces basic concepts and methods in the field of data science. Topics include data wrangling, data exploration and visualization, optimization, deep learning, supervised learning subjects such as nearest-neighbor techniques, regression, Lasso, linear discriminant analysis, logistic regression, tree-based models, neural networks, as well as unsupervised learning subjects such as market basket analysis and cluster analysis, and random forests. The material will be approached with a blend of theory and application, and will include programming in Python, R, or another modern, popular language of the instructor's choice.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 5376F. Introduction to Probability Theory and Models.
This course covers the definitions, constructions, theorems, and techniques to build and analyze probability models. The emphasis of this class is the active construction and analysis of probability models. However, we will develop a rigorous treatment of the requisite abstract theory in service of this goal. Topics include conditional expectation, the convergence of random variables, weak and strong law of large numbers, central limit theorem, random walk, Martingales, and Brownian motion.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 5381. Foundations of Set Theory.
A formal study of the theory of sets, relations, functions, finite and infinite sets, set operations and other selected topics. This course will also train the student in the understanding of mathematical logic and the writing of proofs. Prerequisite:MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5382. Foundation of Real Analysis.
A course covering the foundations of mathematical analysis. Topics include: real numbers, sequences, series, and limits and continuity of functions. Prerequisite: MATH 5381.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5384. Geometric Approach to Abstract Algebra.
Definitions and elementary properties of groups, rings, integral domains, fields and vector spaces with great emphasis on the rings of integers, rational numbers, complex numbers, polynomials, and the interplay between algebra and geometry. Prerequisite: MATH 5381.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5386. Knots and Surfaces, An Introduction to Low-Dimensional Topology.
Knot polynomials and other knot invariants. The topological classification of surfaces and topological invariants of surfaces. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5388. Discrete Mathematics.
This course covers topics from: basic and advanced techniques of counting, recurrence relations, discrete probability and statistics, and applications of graph theory. Prerequisites: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5390. Statistics.
This course will cover not only some of the basic statistical ideas and techniques but also the mathematical and probabilistic underpinnings of these techniques with an emphasis on simulations and modeling. The planning, conducting, analysis, and reporting of experimental data will also be covered. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5392. Survey of Geometries.
A study of topics in geometry including geometrical transformations, the geometry fractals, projective geometry, Euclidean geometry, and non-Euclidean geometry. Prerequisite: MATH 2472 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5393. Numerical Optimization.
This course focuses on optimization methods for a broad range of applications, such as engineering and applied sciences. Subjects are the basic theory of optimization, numerical algorithms to locate points satisfying optimality conditions and to analyze the convergence properties. Prerequisites: MATH 2472 and MATH 3377 and MATH 3383, all with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 5399A. Thesis.
This course represents a student's initial thesis enrollment. No thesis credit is awarded until student has completed the thesis in Mathematics 5399B.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 5399B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 5599B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.
5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 5999B. Thesis.
This course represents a student's continuing thesis enrollment. The student continues to enroll in this course until the thesis is submitted for binding.
9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7111. Seminar in Teaching.
Seminar on individual study projects concerned with selected problems in the teaching of mathematics. This course does not earn graduate degree credit.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Course Attribute(s): Graduate Assistantship|Exclude from Graduate GPA
Grade Mode: Leveling/Assistantships

MATH 7188. Seminar in Mathematics Education.
Students are required to attend weekly research seminars in Mathematics Education and to give at least one research presentation in the seminar during the semester. This course is repeatable for credit.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7199A. Dissertation.
Original research and writing in Mathematics Education to be accomplished under direct supervision of the dissertation advisor. While conducting dissertation research and writing, students must be continuously enrolled each long semester.
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7299A. Dissertation.
This course represents a Mathematics Education student's dissertation enrollments. The course can be repeated as necessary. The dissertation credit (18 hours) will not be awarded until the dissertation is submitted for binding. Prerequisite: completion of the core and required concentration courses, or approval of student's dissertation advisor.
2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7301. Studies in Mathematics.
This course provides basic foundations in Mathematics for students entering the doctoral program in Mathematics Education. This course may be repeated. This course does not earn graduate degree credit.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from Graduate GPA|Leveling
Grade Mode: Leveling/Assistantships

MATH 7302. History of Mathematics.
A study of the development of mathematics and of the accomplishments of men and women who contributed to its progress.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7303. Analysis I.
This course covers foundations of modern analysis. Topics include: sequences, LimSup, LimInf, Sigma Algebras of sets that include open and closed sets, sequences of functions, pointwise and uniform convergence, lower and upper semi-continuity, Borel sets, outer measure, and Lebesgue measure. Prerequisite: MATH 4315.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7306. Current Research in Math Education.
This course surveys the various current social, political, and economic trends in local, state, national, and international settings that are related to research in Mathematics Education.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7307. Algebra I.
Applications of Algebra and topics in modern algebra, including permutation groups, symmetry groups, Sylow theorems, and select topics from Ring Theory. Prerequisite: MATH 4307.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7309. Topology I.
A course in point-set topology emphasizing topological spaces, continuous functions, connectedness, compactness, countability, separability, metrizability, CWcomplexes, simplicial complexes, nerves, and dimension theory. Prerequisite: MATH 4330.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7313. Analysis II.
This course covers the theory of integration with special emphasis on Lebesgue integrals. Topics include: Lebesgue integral, Bounded Convergence theorem, differentiation and integration, absolute continuity, and Lp spaces. Prerequisite: Math 7303.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7317. Algebra II.
A study of the important algebraic structures of rings and fields. Topics covered include rings, ideals, modules, polynomial rings, Euclidean algorithm, finite fields, and field extensions. Topics also include an introduction to Galois Theory with an emphasis on the geometric applications. Prerequisite: MATH 7307.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7319. Topology II: Algebraic Topology.
This course covers the fundamental concepts and tools of algebraic topology. Topics include the fundamental group, covering spaces, homotopy type, the higher homotopy groups, singular homology theory, and the computation of homology groups via exact sequences and applications. Prerequisite: MATH 7307 and MATH 7309.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7321. Graph Theory.
Topics in this course include trees, connectivity of graphs, Eulerian graphs, Hamiltonian graphs, planar graphs, graph coloring, matchings, factorizations, digraphs, networks, and network flow problems. Prerequisite: MATH 3398.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7324. Curriculum Design & Analysis.
This course examines, analyzes, and evaluates the various concepts, topics, methods, and techniques that are related to curriculum design in Mathematics Education for grade levels P-16.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7325. Statistics 1.
A study of the mathematical and probabilistic underpinnings of the techniques used in statistical inference. Topics covered include sampling, sampling distributions, confidence intervals, and hypothesis testing with an emphasis on both simulations and derivations. Prerequisite: Math 2321 and Math 3305.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7328. Instructional Techniques & Assessments.
This course examines, analyzes, and evaluates the various concepts, topics, methods, and techniques of instruction in Mathematics Education and the related assessment procedures for each for grade levels P-20.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7331. Combinatorics.
This course is a study of fundamental principles of combinatorics. Topics include: permutations and combinations, the Pigeonhole principle, the principle of inclusion-exclusion, binomial and multinomial theorems, special counting sequences, partitions, posets, extremal set theory, generating functions, recurrence relations, and the Polya theory of counting. Prerequisite: MATH 3398.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7335. Statistics II: Linear Modeling.
A study of the formulation and statistical methodologies for fitting linear models. Topics include the general linear hypothesis, least-squares estimation, Gauss-Markov theorem, assessment of model fit, effects of departures from assumptions, model design, and criteria for selection of optimal regression models. Prerequisite: MATH 3377 and MATH 7325.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7346. Quantitative Research Analysis in Mathematics Education.
This course surveys the various research techniques used in quantitative analysis for mathematics education and covers topics such as experimental design, statistical analysis, and use of appropriate design methodologies to achieve the strongest possible evidence to support or refute a knowledge claim. Prerequisite: MATH 7306 and MATH 7325.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7354. Advanced Qualitative Research.
This course encompasses the techniques and tools needed for the development, investigation, and demonstration of competence in conducting qualitative research in mathematics education. Principles of qualitative data analysis are a significant focus of the course, with particular attention given to specific methods used to code and analyze data. Prerequisite: ED 7352 with a grade of "B" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Standard Letter

MATH 7356B. Advanced Qualitative Research.
This course encompasses investigation, development, and demonstration of competence, design, and execution for mathematics education problems in qualitative research. Prerequisite: ED 7352 or CI 7352.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7356C. Action Research in Mathematics Education.
This course examines underlying theory and issues in action research model and the development of action research projects. Prerequisites: MATH 7346 or ED 7352.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7358. Advanced Quantitative Research in Mathematics Education.
This course surveys the various research techniques used in quantitative analysis for mathematics education and covers topics such as experimental design, statistical analysis, and the use of appropriate design methodologies to achieve the most substantial evidence to support or refute a knowledge claim. Prerequisite: MATH 7346 with a grade of "B" or better or permission of instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7361. Seminar in Advanced Mathematics.
Material in course will vary with the interest of students and faculty. A detailed study of subject matter may be chosen from advanced areas of analysis; algebra; topology and geometry; applied mathematics; and probability and statistics. This course is repeatable for credit when subject matter varies.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7366A. Teaching Post-Secondary Students (Developmental Math, Service Courses, and Majors).
This course examines how to develop and teach post-secondary students. The course references the recommendations of government agencies and professional organizations and allows for the investigation of research-based models. Prerequisites: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7366B. Teaching K-12 Students (Elementary, Middle School, and High School).
This course examines how to develop and teach K-12 students. The course references the recommendations of government agencies and professional organizations and allows for the investigation of research-based models. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7366C. Teaching Teachers (In-Service; Pre-Service).
This course examines how to prepare teachers of mathematics. The course references the recommendations of government agencies and professional organizations and allows for the investigation of research-based models. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7366D. Teaching Specialized Content.
This course will be an in-depth study of a specialized content area in mathematics with an emphasis on teaching. The specific content area will vary by instructor. Examples include Euclidean Simplex Geometry and Discrete Probability Spaces with Implications for Public School Curriculum.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7366E. Developmental Mathematics Curriculum.
This course surveys the research, development, and evaluation of the scope and sequence of developmental mathematics curriculum. The course references the recommendations of government agencies and professional organizations and allows for the investigation of research-based models.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7366F. Research in Undergraduate Mathematics Education I.
Students will develop the requisite knowledge to become a good consumer of Research in Undergraduate Mathematics Education (RUME) research. The course will cover the theoretical underpinnings of current and historic RUME research. Students will develop the knowledge to understand relevant theoretical stances and the role they play in research. Prerequisite: Math 7306 or permission from the instructor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7366G. Research in Undergraduate Mathematics Education II.
In this course, students will develop necessary knowledge to design/conduct RUME research via a topic-driven look at current RUME research. Core topics include proof, analysis/calculus, abstract algebra, linear algebra, and differential equations. Students will develop a depth of knowledge related to these topics and engage in research design and development. Prerequisite: MATH7306 and MATH7366F.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7371A. Advanced Graph Theory.
Topics in this course include Turan's problems, Ramsey theory, random graph theory, extremal graph theory, algebraic graph theory, domination of graphs, distance problems, and applications. Prerequisite: MATH 7321.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371B. Advanced Combinatorics.
Topics in this course include Block designs, Latin squares, combinatorial optimization problems, coding theory, matroids, difference sets, and finite geometry. Prerequisite: MATH 7331.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371C. Combinatorial Number Theory.
A study of fundamental techniques in combinatorial number theory. Topics will include Waring's problem, additive number theory, and probabilistic methods in number theory. Prerequisite: MATH 7331.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371D. Discrete Optimization.
A study of some fundamental techniques in discrete optimization. Topics include discrete optimization, linear programming, integer programming, integer nonlinear programming, dynamic programming, location problem, scheduling problem, transportation problem, postman problem, traveling salesman problem, matroids, and NP-completeness. Prerequisites: MATH 7321 and 7331.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371E. Algorithms and Complexity.
A study of some fundamental concepts of computability and complexity. Topics include polynomially bounded problems, NP-complete problems, exponentially hard problems, undecidable problems, and reducibility. Prerequisite: MATH 7331.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371F. Probabilistic Methods in Discrete Mathematics.
A study of some fundamental probabilistic techniques used to solve problems in graph theory, combinatorics, combinatorial number theory, combinatorial geometry, and algorithm. Topics include linearity of expectation, alterations, second moment, local lemma, correlation inequalities, martingales, Poisson paradigm, and pseudo-randomness. Prerequisites: MATH 7321 and 7331.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371G. Applied Discrete Mathematics.
This course introduces fundamental concepts in logic, Boolean algebra, and binomial coefficients; and applications in different fields such as complexity of algorithms and network theory. Prerequisites: MATH 2472 and MATH 4307, all with a grade of "C" or better, or with departmental approval.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7371H. Combinatorial Networks.
Combinatorial Networks is an area of study of certain types of networks using combinatorial methods extensively. This course introduces fundamental basics as well as the latest development in this area of research. Prerequisite: MATH 5307/7307 with a grade of "C" or higher.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7375C. Time Series Analysis.
A study of the theory of time-dependent data. The analysis includes modeling, estimation, and testing; alternating between the time domain; using autoregressive and moving average models and the frequency domain; and using spectral analysis. Prerequisite: MATH 7335.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7375D. Advanced linear Modeling.
The course provides an extension of regression methodology to more general settings where standard assumptions for ordinary least squares are violated. Topics include generalized least squares, robust regression, bootstrap, regression in the presence of autocorrelated errors, generalized linear models, and logistic and Poisson regression. Prerequisite: MATH 7335.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7378A. Problem Solving, Reasoning, and Proof.
A study of the fundamental concepts of problem solving, logic, set theory, and mathematical proof and applications of these concepts in mathematics curriculum for grades P-20. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7378B. Connecting and Communicating Math.
This course examines one of the basic principles involved in mathematics education: Connecting and Communicating Mathematics. This fundamental theme will be reviewed, researched, and discussed. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7378C. Representing Fundamental Math Ideas (Function, Data Analysis, and Enumeration).
This course examines the basic principles involved in mathematics education. The process of representing fundamental mathematical ideas will be reviewed, researched, and discussed. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7378D. Math Technologies.
This course examines the basic principles involved in mathematics education: Technology. This fundamental theme will be reviewed, researched, and discussed. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7378E. Developmental Mathematics Perspectives.
This course examines developmental mathematics-specific strands including technological course support and placement tools/decisions. Issues related to the first mathematics core course required of undergraduates will aslo be addressed.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Topics
Grade Mode: Standard Letter

MATH 7378F. Research on Mathematical Problem Solving in Secondary Schools.
In this course a careful study is made of elementary techniques for problem solving in a variety of domains, including algebra, number theory, combinatorics, geometry, and logic puzzles. Students will learn these techniques by actually working on a collection of problems in each of these areas. Students will read and examine research about various aspects of problem solving and research in math education that includes both teacher training and student learning.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7378G. Discourse Processes, Traditions, and Analysis in Mathematics Education.
Discourse and discourse analysis have been used to answer research questions across disciplines throughout the humanities and social sciences. This course will focus on theory and methods for the analysis of discourse in mathematical settings. We will learn how different approaches to discourse are used to understand mathematics learning. Prerequisite: MATH 7306.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7378H. Equity in Mathematics Education.
Equity in Mathematics Education is a course examining research on equity issues in mathematics education. These equity issues will range from race, culture, class, and gender as they relate to the teaching, learning, and schooling of mathematics education. We will look at how equity is framed within the field of mathematics education, what has been addressed, and what has not been conceptualized. The course will help students understand the literature in the field, critique the extant research literature, design research, and consider important facets of teaching for various student groups. Prerequisite: MATH 7306 with a grade of "C" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing|Topics
Grade Mode: Standard Letter

MATH 7385. Independent Study in Mathematics.
Student will work directly with a faculty member and develop in-depth knowledge in a specific topic area of mathematics. Topics vary according to student's needs and demands. Repeatable with different emphasis.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7386. Independent Study in Mathematics Education.
Student will work directly with a faculty member and develop in-depth knowledge in a specific topic area of Mathematics Education. Topics vary according to student's needs and demands. Repeatable with different emphasis.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7389. Internship.
Students will work under the supervision of a faculty member to gain practical knowledge in Mathematics Education. Student experience can come from industry, government agencies, or other sources but must directly apply to furthering knowledge of mathematics education or its application.
3 Credit Hours. 0 Lecture Contact Hours. 10 Lab Contact Hours.
Grade Mode: Standard Letter

MATH 7396. Mathematics Education Research Seminar.
Collaborative research projects with faculty through identifying an educational issue, reviewing literature, creating a research question, designing a methodology, analyzing data, drawing conclusions, implications, and creating a draft of a publishable paper. Prerequisite: MATH 7356, and ED 7352 or MATH 7346, all with a grade of "B" or better.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7399A. Dissertation.
This course represents a Mathematics Education student's dissertation enrollments. The course can be repeated as necessary. The dissertation credit (18 hours) will not be awarded until the dissertation is submitted for binding. Prerequisite: completion of the core and required concentration courses, or approval of student's dissertation advisor.
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7599A. Dissertation.
This course represents a Mathematics Education student's dissertation enrollments. The course can be repeated as necessary. The dissertation credit (18 hours) will not be awarded until the dissertation is submitted for binding. Prerequisite: completion of the core and required concentration courses, or approval of student's dissertation advisor.
5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7699A. Dissertation.
This course represents a Mathematics Education student's dissertation enrollments. The course can be repeated as necessary. The dissertation credit (18 hours) will not be awarded until the dissertation is submitted for binding. Prerequisite: completion of the core and required concentration courses, or approval of student's dissertation advisor.
6 Credit Hours. 6 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

MATH 7999A. Dissertation.
This course represents a Mathematics Education student's dissertation enrollments. The course can be repeated as necessary. The dissertation credit (18 hours) will not be awarded until the dissertation is submitted for binding. Prerequisite: completion of the core and required concentration courses, or approval of student's dissertation advisor.
9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit