

# DEPARTMENT OF MATHEMATICS

Math/Computer Science Building Room 470  
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The study of mathematics is more than four thousand years old and comprises an enormous body of knowledge. Mathematics remains a very active area of research continually giving rise to new theories and questions. The knowledge accumulated and the questions being considered concern both mathematics itself and its many applications.

Mathematics is a fundamental skill required at some minimal level of all educated people, and required in depth in many professions. The teaching objective of our Department includes the development of reasoning and computations skills, and the preparation of students for careers requiring a significant mathematical background.

## Centers for Excellence

Mathworks, a center for innovation in mathematics and math education, designs and hosts programs for students from kindergarten to high school, conducts research on math curriculum, and provides training for teacher education students as well as current teachers. Mathworks received the 2001 Star Award for Closing the Gaps from the Texas Higher Education Coordinating Board and the 2007 Siemens Founders Award.

## Majors

The department offers the Bachelor of Science with a major in Mathematics with or without teacher certification, the Bachelor of Science with a major in Applied Mathematics, and the Bachelor of Arts with a major in Mathematics.

## Bachelor of Arts (B.A.)

- Major in Mathematics (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/mathematics-ba>)

## Bachelor of Science (B.S.)

- Major in Applied Mathematics (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/applied-bs>)
- Major in Mathematics (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/mathematics-bs>)
- Major in Mathematics (Teacher Certification in Mathematics, Grades 7-12) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/mathematics-teacher-certification-grades-7-12-bs>)

## Minors

- Applied Mathematics (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/applied-minor>)
- Mathematics (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/mathematics-minor>)
- Second Teaching Field in Mathematics (Grades 7-12) (<http://mycatalog.txstate.edu/undergraduate/science-engineering/mathematics/second-teaching-field-mathematics>)

## Courses in 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 to provide students with knowledge and skills needed for college. Prerequisite: Departmental Approval. Corequisite: MATH 1312, MATH 1315, MATH 1316, or MATH 1319.

**1 Credit Hour. 0 Lecture Contact Hours. 24 Lab Contact Hours.**  
**Grade Mode:** Standard Letter

### 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.**  
**Grade Mode:** Standard Letter

### 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|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  
**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  
**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

**Grade Mode:** Standard Letter

**TCCN:** MATH 1332

**MATH 1317. Plane Trigonometry.**

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, Accuplacer College Mathematics score of 86 or more, or Compass College Algebra score of 46 or more.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Mathematics Core 020

**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

**Grade Mode:** Standard Letter

**TCCN:** MATH 1324

**MATH 1329. Mathematics for Business and Economics II.**

Topics from finite mathematics and elementary differential calculus which apply to business and economics. Prerequisites: MATH 1315 or 1319 with a grade of "C" or better, ACT Mathematics score of 27 or more, SAT Mathematics score of 580 or more, SAT Math Section score of 600 or more, Accuplacer College Mathematics score of 86 or more, or Compass College Algebra score of 46 or more.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Mathematics Core 020

**Grade Mode:** Standard Letter

**TCCN:** MATH 1325

**MATH 2311. Principles of Mathematics I.**

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 1315 or MATH 1312; with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**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.**

**Grade Mode:** Standard Letter

**TCCN:** MATH 1351

**MATH 2321. Calculus for Life Sciences I.**

This course is designed to serve the needs of students in the life sciences. Topics will include: graphs, derivatives, exponents and logarithms, scientific notation, sequences, summation, and applications. Prerequisite: MATH 1315 with a grade of "C" or better, ACT Mathematics score of 24 or more, SAT Mathematics score 520 or more, SAT Math Section score of 550 or more, Accuplacer College Mathematics score of 86 or more, or Compass College Algebra score of 46 or more.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Mathematics Core 020

**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. Prerequisites: MATH 1315, MATH 1312, with grades of "C" or better, MATH 2321, MATH 2417, MATH 2471; with a grade of "D" or better, ACT Mathematics score of 24 or more, SAT Mathematics score of 520 or more or SAT Math Section score of 550 or more.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TCCN:** MATH 1342

**MATH 2331. Calculus for Life Science II.**

Topics in this course will include: trigonometric functions, probability, integral calculus, differential equations, and applications. Prerequisites: 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.**

**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. Prerequisites: MATH 1315 with a grade of "C" or better, and MATH 2417 or MATH 2471 with a grade of "D" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Grade Mode:** Standard Letter

**TCCN:** MATH 2305

**MATH 2417. Pre-Calculus Mathematics.**

A survey of functions, trigonometry and analytic geometry to prepare students for calculus. Prerequisites: MATH 1315 with a grade of "C" or better, ACT Mathematics score of 24 or more, SAT Mathematics score of 520 or more, SAT Math Section score of 550 or more, Accuplacer College Mathematics score of 86 or more, or Compass College Algebra score of 46 or more.

**4 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.**

**Course Attribute(s):** Mathematics Core 020|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, ACT Mathematics score of 27 or more, SAT Mathematics score of 580 or more, SAT Math Section score of 600 or more, Accuplacer College Mathematics score of 103 or more, Compass Trigonometry score of 46 or more.

**4 Credit Hours. 2 Lecture Contact Hours. 3 Lab Contact Hours.**

**Course Attribute(s):** Mathematics Core 020|Lab Required

**Grade Mode:** Standard Letter

**TCCN:** MATH 2413

**MATH 2472. Calculus II.**

A continuation of differential and integral calculus 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. 2 Lecture Contact Hours. 3 Lab Contact Hours.**

**Course Attribute(s):** Lab Required

**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|Component Area Core 092

**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.**

**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.**

**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.**

**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.**

**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.**

**Grade Mode:** Standard Letter

**MATH 3330. Introduction to Advanced Mathematics.**

An introduction to the theory of sets, relations, functions, countable and uncountable sets, and other selected topics. Algebraic structure and topological properties of Euclidean Space, and an introduction to metric spaces. Prerequisite: MATH2472 with a grade of "C" or better.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**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.**

**Grade Mode:** Standard Letter

**MATH 3373. Calculus III.**

A course covering sequences and series, vectors, functions of several variables, partial derivatives, multiple integrals, line and surface integrals, and applications. Prerequisite: MATH 2472 with a grade of "C" or higher.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**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.**

**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.**

**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.**

**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.**

**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.**

**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.**

**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):** 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.**

**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.**

**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.**

**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.**

**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.**

**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):** 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.**

**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.**

**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

**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|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|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 3373; MATH 3377.

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Topics|Writing Intensive

**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.**

**Grade Mode:** Standard Letter

**MATH 4382. The Literature and Modern History of Mathematics and Its Applications.**

This course will focus on mathematical articles in recent journals. The articles will be re-written so that the proofs and comments are more easily understood by the casual reader. This embellishment of journal articles will take place in class with the class participating, in groups for outside work and as individual assignments. May not be applied toward a minor in mathematics. Prerequisites: A grade of "C" or better in two of these three: MATH 3380, MATH 4307, or MATH 4330. (WI).

**3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.**

**Course Attribute(s):** Exclude from 3-peat Processing|Writing Intensive

**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.**

**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.**

**Grade Mode:** Standard Letter