Mathematics

MA 90 Intermediate Mathematics (no course credit)

May be used to satisfy the Preparatory Competency in mathematics prerequisite for mathematics, computer science, accounting, economics courses. Arithmetic of signed numbers, decimals, percents, fractions, topics from the first year of high school algebra. Counts toward full-time student status but not included in grade point average. Does not fulfill the mathematical reasoning requirement of the Wartburg Plan. Fall Term. Prerequisite: One year of high school mathematics.

MA 105 The Mathematics of Games

Exploration into mathematic aspects of various games of strategy and chance including logic, counting techniques, probability, statistics. Mathematical modeling including gathering data, making conjectures, testing strategies of play. Mathematical Reasoning. May Term every third year. Prerequisite: MA 90 competency.

MA 106 Mathematics in Modern Society

Study of contemporary mathematics and its role in modern society. Emphasis on the use of mathematical models in a variety of societal settings. Topics selected to illustrate the essential role mathematics plays in our world, in terms of practicality and inherent interest and beauty. Mathematical Reasoning. Prerequisite: MA 90 competency.

MA 107 Finite Mathematics

Application of mathematics to problems in business management, social science, natural science. Brief algebra review with applications of linear, exponential, logarithmic functions; mathematics of finance involving simple interest, simple discount, compound interest, ordinary annuities; linear systems, matrices, simplex method of solving linear programming problems. Mathematical Reasoning. Prerequisite: MA 90 competency.

MA 110 Structures of Mathematics

Number theory, the rational number system, graphing, measurement, geometry. Designed for prospective elementary school teachers but open to any student satisfying prerequisite. Mathematical Reasoning. Prerequisite: MA 90 competency.

MA 190 Precalculus

For students who wish to study calculus but whose high school mathematics background does not meet prerequisites for calculus. Study and application of algebraic manipulations, functions of various types, solutions of equations and inequalities, trigonometry related to triangles and circular functions. Mathematical Reasoning. Fall Term. Prerequisite: MA 90 competency; two years of high school algebra recommended.

MA 195, 295, 395, 495 Special Topics

Topics and credit vary. See course schedule.

MA 212 Geometry and Measurement

For elementary and middle-school teachers. One-, two-, and three-dimensional geometry and corresponding measurement topics, geometric intuition and insight helpful in problem solving. Winter Term odd years. Prerequisite: One course credit in mathematics, MA 110 recommended.

MA 214 Statistical Methods

Basic terminology, concepts, techniques of describing data and inferring properties of populations (large groups) by using samples (small groups) from those populations. Includes some probability theory and use of calculators and computers to manipulate and analyze data. Mathematical Reasoning. MA 190 or MA 107 or two years of high school algebra with at least B grades recommended. Fall, Winter, May Terms. Prerequisite: MA 90 competency.

MA 250 Applied Calculus

Topics from algebra, differential and integral calculus. Emphasis on functions, difference equations, derivatives, integrals, applications. Mathematical Reasoning. Three years of high school mathematics (including one semester trigonometry) or MA 190 recommended. Prerequisite: MA 90 competency.

MA 251 Foundational Differential Calculus (½ course credit)

Emphasis on fundamental analytic concepts of differential calculus. Three years of high school mathematics (including one semester trigonometry) or MA 190 recommended.

MA 252 Foundational Integral Calculus (½ course credit)

Emphasis on fundamental analytic concepts of integral calculus. Mathematical Reasoning. Prerequisite: MA 251.

MA 255 Multivariable Calculus

Emphasis on functions of several variables, vector calculus, analytic geometry of three dimensions, partial derivatives, multiple integrals. Fall Term. Prerequisites: MA 250, MA 252.

MA 281 Field Experience

Supervised exploratory experience outside the classroom. Application of academic learning to practical experience. Not applicable toward major. P/D/F only. Prerequisites: Second-year standing; 2.5 minimum cumulative grade point average.

MA 300 Foundations of Analysis

Bridge between calculus sequence and advanced mathematics, attempting to foster "mathematical maturity," appreciation of mathematics, competence working with complex mathematical statements, ability to write and comprehend mathematical proofs, skill in thinking and communicating in standard mathematical style and terminology. Winter Term odd years. Prerequisites: Two MA course credits numbered 250 and above.

MA 301 Linear Algebra

Systems of linear equations, linear transformations, determinants, algebra of matrices, theory of finite dimensional vector spaces. Computer use enhances topics. Winter Term. Prerequisites: Two MA course credits numbered 250 and above.

MA 302 Algebraic Structures

Introduction to abstract structures called groups, rings, integral domains, fields, which are extensions of algebra topics studied in high school. Background for graduate studies in mathematics and computer science and preparation for secondary teaching and other math-related careers. Fall Term odd years. Prerequisites: Two MA course credits numbered 250 and above.

MA 303 Discrete Structures

Graph theory, combinatorics, applications of sets, algebra. Useful to students in applied mathematics and computer science. Use of results and techniques from these areas to solve a variety of problems in finite mathematics. Additional topics may include recurrence relations, coding theory, finite state machines, Boolean algebra. Fall Term odd years. Prerequisites: Second-year standing; MA 250 or MA 252.

MA 304 Modern Geometries

Rigorous treatment of the foundations of Euclidean geometry and introduction to hyperbolic geometry. Solid axiomatic development of various geometries and introduction of historical and philosophical implications of non-Euclidean geometry. Examination of geometry as a description of the physical world. Recommended for students planning to teach secondary mathematics. Fall Term even years. Prerequisites: Two MA course credits numbered 250 and above.

MA 305 Advanced Calculus

Reinforcement and solidification of learned calculus concepts. Emphasis on a greater depth of understanding. New topics include compactness, uniform continuity, uniform convergence. Winter Term even years. Prerequisites: MA 250, MA 252.

MA 307 Mathematical Modeling

"Real world" mathematical modeling situations. Challenges students to construct and/or select models creatively and analyze how well these models work. Emphasis on importance of using existing models and techniques and the necessity of adequately testing and refining results. May Term every third year. Prerequisites: MA 250, MA 252; MA 301 and CS 120 recommended.

MA 312 Teaching Elementary School Mathematics

Current structures, techniques, resources available to elementary school mathematics teachers. Use of models and manipulatives in small-group teaching experiences in Waverly-Shell Rock schools and in the class. Prerequisite: MA 110.

MA 313 Mathematical Probability and Statistics

Study of theoretical probability distributions that are models of empirical distributions of data generated through counts or measurements. Elementary probability and counting techniques, such as permutations and combinations. Continuous random variables modeling waiting time, lifetimes of components, masses of particles. Fall Term. Prerequisites: MA 250, MA 252.

MA 314 Statistical Applications

Application of statistical techniques currently used in different disciplines. Students will have the opportunity to talk with professionals in a variety of fields, gather data, develop a statistics model, draw conclusions or make predictions in order to assist in developing a solution. May Term every third year. Prerequisite: MA 214 or MA 313.

MA 315 Actuarial Mathematics (½ course credit)

Actuarial applications of calculus and probability. Preparation for career in actuarial sciences and first actuary exam. Frequently used discrete and continuous probability distributions, expectation value, Bayes' Theorum. Jointly distributed random variables. Winter Term odd years. P/D/F only. Prerequisite: MA 313.

MA 371, 372 Internship

Integration of classroom theory with planned and supervised periods of progressively challenging employment related to students' career objectives. Course credit applied toward a major requires department approval. P/D/F only. Possible off-campus costs. Prerequisites: third- or fourth-year standing; MA 255 or MA 301; 2.5 grade point average, cumulative and in major; department approval.

MA 399 Supplemental Instruction: Math (½ course credit)

Teaching practicum in a specific area of study. Student SI leaders participate in leader training, attend classes for which they serve as leaders, prepare and lead study sessions that reinforce course content, model and teach effective study strategies. P/D/F only.

MA 401 Differential Equations

Differential equations as a mathematical modeling technique and a solution technique for solving applied problems. Methods for solving differential equations, related concepts, theory, application. Winter Term even years. Prerequisites: MA 250, MA 252; MA 301 recommended.

MA 402 Advanced Mechanics

Identical with PHY 402. Statics, kinematics, dynamics of particles and rigid bodies, Lagrange's equations, Hamilton's equations, oscillating systems, introduction to the mechanics of deformable bodies. Prerequisites: MA 250, MA 252; PHY 203; MA 401 recommended.

MA 403 Complex Variables

Differentiation and integration for functions of a complex variable and an alternate approach through power series expansions of such functions. Applications include fluid flow, electrostatics, boundary value problems, evaluation of real integrals. Winter Term odd years. Prerequisites: MA 250, MA 252.

MA 409 Numerical Analysis

Solutions of mathematical problems on computers. Emphasis on numerical integration and differentiation. Seminar with student presentations. May Term every third year. Prerequisites: CS 120; MA 250, MA 252, MA 301; MA 255 recommended.

MA 449 Mathematics Seminar

Student presentations on a topic in mathematics. Topic determined by student interest and previous training. Prerequisite: MA 301.

MA 450 Independent Study (variable credit)

Individual study of a student-selected topic approved by faculty sponsor. Prerequisites: MA 255, MA 301.

MA 461 Perspectives in Mathematics

Readings, discussion, papers, presentations on the history and philosophy of mathematics and current ethical and social issues involving mathematics in society. Weekly discussions related to reading. Writing Intensive. Mathematics and mathematics education capstone. Prerequisite: Fourth-year mathematics or mathematics education major, or final Fall Term on campus.

MA 470 Secondary Content Methods: Mathematics

Precedes secondary student teaching with emphasis on introducing, developing, and practicing discipline-specific pedagogy and reviewing general teaching methods. Fall Term even years. Prerequisites: ED 229 and admission to Teacher Education Program.