

MATHEMATICS

Office: Science and Math 178, 537-6141
Faculty: Paul Enersen, Sami Shahin, Sherwin Skar, Wije Wijesiri
Department: Mathematics/Computer Science

The Mathematics program is designed to meet the needs of students desiring careers in business, industry, and teaching as well as preparation for advanced studies at the graduate level. Students majoring in mathematics may apply their technical strengths to second majors in many programs such as accounting, business administration, computer science, and science. The faculty of the Mathematics programs has been selected to provide quality instruction in all branches of mathematics. ALL major and minor programs must have the approval of the student’s advisor and the department faculty. All courses counting toward the major or minor must be completed with a grade of “C-” or better.

Bachelor of Arts: Mathematics (44 credits)

I. Required Courses in Mathematics:

MATH 150	Calculus I.....	5
MATH 151	Calculus II.....	5
MATH 252	Calculus III.....	3
MATH 350	Differential Equations.....	3
MATH 360	Linear Algebra.....	3
MATH 200	Introduction to Statistics.....	3
	OR.....	3
MATH 210	Discrete Mathematics.....	3
MATH 320	Foundations of Mathematics.....	3
MATH 440	Abstract Algebra I.....	3
MATH 450	Advanced Calculus I.....	3
MATH 441	Abstract Algebra II.....	3
	OR.....	3
MATH 451	Advanced Calculus II.....	3
MATH 480	Mathematics Seminar.....	1

II. Additional Courses:

Nine (9) additional credits in MATH courses numbered 200 or above,
 including a maximum of 3 credits from 499 with departmental approval.....9

Total Credits: 44

Bachelor of Science: Mathematics Education (44 credits)

I. Required courses in Mathematics:

MATH 150	Calculus I.....	5
MATH 151	Calculus II.....	5
MATH 252	Calculus III.....	3
MATH 350	Differential Equations.....	3
MATH 360	Linear Algebra.....	3
MATH 200	Introduction to Statistics.....	3
MATH 210	Discrete Mathematics.....	3
MATH 300	Modern Geometry.....	3
MATH 320	Foundations of Mathematics.....	3
MATH 440	Abstract Algebra I.....	3
MATH 450	Advanced Calculus I.....	3
MATH 441	Abstract Algebra II.....	3
	OR.....	3
MATH 451	Advanced Calculus II.....	3
MATH 480	Mathematics Seminar.....	1

Three (3) additional credits in math courses numbered 200 or above,
 including a maximum of 3 credits from 499 with departmental approval.....3

Total Credits: 44

Special Notes:

1. A student must fulfill the professional education requirements for licensure; see Education section.
2. A student should have a “B” (3.00) average in all required mathematics courses before being recommended for admission to the education licensure program.

3. A student should maintain a “B” (3.00) average in all required mathematics courses including a minimum of 22 credits completed before being recommended for student teaching.

Minor: Mathematics (22 credits) (Non-Teaching)

I. Required courses in Mathematics:

MATH 150	Calculus I.....	5
MATH 151	Calculus II.....	5
MATH 252	Calculus III.....	3
MATH 200	Introduction to Statistics.....	3
	OR	3
MATH 210	Discrete Mathematics.....	3

II. Additional Courses:

Six (6) additional credits in MATH courses numbered 200 or higher, excluding 4996

Total Credits: 22

MATHEMATICS COURSES (MATH)

MATH 060 Intermediate Algebra (3 credits)

Algebraic skill-building for students anticipating further courses in mathematics or areas using mathematics. Covers polynomials, roots and powers, lines and solving linear inequalities, and linear, quadratic, and rational equations.

MATH 101 (LAC) Great Ideas of Mathematics (3 credits)

This course seeks to contribute to a student’s appreciation and understanding of mathematics with an investigation of selected historical and current mathematical ideas. Emphasis is placed on the application of these ideas and how they have been used to understand and approach problems in a variety of areas in our world today. The required preparation is MATH 060 or two years of high school mathematics

MATH 103 (LAC) Introduction to Math Modeling (3 credits)

Mathematical models used to solve everyday problems. The required preparation is MATH 060 or two years of high school mathematics.

MATH 110 (LAC) College Algebra (3 credits)

Mathematics topics for students whose backgrounds are insufficient for them to begin their study of mathematics at a higher level. Topics include: equations and inequalities, functions, graphs, polynomials, systems of equations, matrices, and determinants. The required preparation is MATH 060 or two years of high school mathematics, including at least one year of algebra.

MATH 115 (LAC) Finite Mathematics (3 credits)

Solving systems of linear equations, matrix operations, and an introduction to linear programming, including the simplex method, mathematics of finance, counting techniques, and probability. The required preparation is MATH 110 or three years of high school mathematics.

MATH 125 Trigonometry and Special Functions (3 credits)

Trigonometry, both circular functions and right triangle, trigonometric equations, logarithms, exponential functions, and complex numbers. The required preparation is MATH 110 or three years of high school mathematics not including trigonometry.

MATH 127 (LAC) Concepts of Mathematics (3 credits)

A study of some fundamental concepts of mathematics. Topics include problem-solving, inductive and deductive

reasoning, sets, relations, and number systems. Some of the topics are discussed in the context of their historical development and their place in the elementary school curriculum.

MATH 128 Mathematics for Elementary Teachers (3 credits)

A study of some important concepts of mathematics. Topics may include problem-solving, geometry, measurement, probability, and statistics. The topics are developed in the context of their place in the elementary school curriculum.

This course is required for all Elementary Education majors. Prerequisite: MATH 127.

MATH 135 PreCalculus (5 credits)

A detailed study of mathematics needed for Calculus. Concepts are presented and explored from symbolic, graphical, and numerical perspectives. Basic concepts covered include polynomial, rational, exponential, logarithmic, and trigonometric functions, complex numbers, linear systems, numerical patterns, sequences and series. The required preparation is MATH 110 or three years of high school mathematics, including two years of algebra.

MATH 140 (LAC) Calculus: A Short Course (3 credits)

A short study of differential and integral calculus with applications. An intuitive approach to calculus is emphasized. The required preparation is MATH 110 or three years of high school mathematics.

MATH 150 (LAC) Calculus I (5 credits)

Differential calculus of elementary functions, including applications. Introduction to integration. Prerequisite: Three years of high school mathematics including trigonometry or MATH 125 or MATH 135 or consent of instructor. The required preparation is MATH 125 or Math 135 or three years of high school mathematics including trigonometry.

MATH 151 (T) Calculus II (5 credits)

Applications of integration. Sequences and series, analytical geometry, parametric equations, polar coordinates, vectors, and geometry of two- and three-space. Prerequisite: MATH 150.

MATH 200 (T) Introduction to Statistics (3 credits)

Introduction to measures of central tendency, measures of dispersion, frequency distributions, large and small samples, testing of hypotheses, and correlation analysis. Use of computer in statistical analysis. The required preparation is MATH 110 or three years of high school mathematics.

MATH 210 (T) Discrete Mathematics (3 credits)

Algebraic, logical, and combinatoric techniques and their applications to various areas including Computer Science. The required preparation is MATH 110 or three years of high school mathematics.

MATH 252 Calculus III (3 credits)

Differential and integral calculus of Euclidean three-space using vector notation. Prerequisite: MATH 151.

MATH 286 Special Topics in Mathematics (1-4 credits)

Prerequisite: consent of instructor and Department of Mathematics/Computer Science.

MATH 292 Honors Credit in Math (1-4 credits)

An independent study course designed primarily for Honors Program students. This course allows more in depth or comprehensive study or research by certain students concurrently enrolled in at least one other Mathematics course. Prerequisites: consent of instructor and the Department of Mathematics/Computer Science.

MATH 300 Modern Geometry (3 credits)

The postulation systems of geometry, including Euclidean and non-Euclidean geometries, projective and affine geometry. Prerequisite: MATH 151.

MATH 305 History of Mathematics (3 credits)

Lives and contributions of mathematicians and the development of ideas and branches of mathematics. Prerequisites: MATH 151.

MATH 310 Number Theory (3 credits)

The integers, including Peano postulates, divisibility, congruencies, Diophantine equations, and continued fractions. Prerequisite: MATH 151 or consent of instructor.

MATH 315 Combinatorics (3 credits)

A survey of some of the techniques of combinatorial mathematics and their application. Topics include connectivity, planarity and colorability of graphs, graph isomorphisms, enumeration techniques, recurrence relations, and generating functions. Many of the topics are extensions of those introduced in MATH 210: Discrete Mathematics. Prerequisite: Either MATH 210 or MATH 320 and either MATH 140 or MATH 150.

MATH 320 Foundations of Mathematics (3 credits)

The "nature" of mathematics, the axiomatic method, the theory of sets, the real number continuum, and various viewpoints on the foundations of mathematics. Prerequisites: MATH 151.

MATH 330/331 Probability and Statistics I/II (3 credits each)

An introduction to calculus of probabilities and mathematical statistics, including discrete and random variables, mathematical expectation, probability distributions, sampling, hypothesis tests, regression, and correlation. Prerequisites: MATH 151 for MATH 330; MATH 330 for MATH 331.

MATH 345 Numerical Analysis (3 credits)

Finite differences and applications; interpolation formulas; inversion of matrices; numerical methods of solution of equations; numerical differentiation and integration. Prerequisites: MATH 151.

MATH 350 Differential Equations (3 credits)

Exact solutions and applications of differential equations. Prerequisite: MATH 151.

MATH 355 Applied Mathematics (3 credits)

Partial differential equations of physics, orthogonal sets of functions, Fourier series, boundary value problems, and applications of these topics. Prerequisites: MATH 252 and MATH 350.

MATH 360 Linear Algebra (3 credits)

Matrices and determinants with applications to vector spaces (linear transformations and eigenvalues) and the solution of systems of linear equations. Prerequisite: MATH 151.

MATH 370 Operations Research (3 credits)

Several types of optimizing techniques, including linear programming, simulations, applications of probability, and dynamic programming. Prerequisite: MATH 151.

MATH 394 Directed Studies in Mathematics (1-4 credits)

Independent study of mathematical topics not ordinarily covered in the established courses. May be repeated. Prerequisite: consent of instructor.

MATH 440/441 Abstract Algebra I/II (3 credits each)

Basic algebraic systems, including groups, rings, fields, and modules. Prerequisites: MATH 252 for MATH 440; MATH 440 for MATH 441.

MATH 450/451 Advanced Calculus I/II (3 credits each)

A theoretical investigation of calculus of several variables, metric spaces, sequences and series of functions; theory of integration. Prerequisite: MATH 252 for MATH 450; MATH 450 for MATH 451.

MATH 460 Complex Analysis (3 credits)

The algebra of complex numbers, analytic functions, mapping properties of the elementary functions, Cauchy's Theorem, Cauchy's integral formula and residues. Prerequisites: MATH 252 and junior or senior standing.

MATH 480 Mathematics Seminar (1 credit)

This course is designed to acquaint the student with current research in mathematics by a review of current mathematical literature sources. Students integrate and synthesize their backgrounds by presenting a problem solving or research project. Repeatable for a total of four credits. Prerequisite: junior or senior standing or approval by the Mathematics and Computer Science faculty.

MATH 486 Advanced Topics in Mathematics (1-4 credits)

Prerequisite: consent of instructor and the Department of Mathematics/Computer Science.

MATH 499 Internship in Mathematics (1-16 credits)

On-the-job supervised experience and study dealing with applications of mathematics. Prerequisites: junior standing and consent of Mathematics and Computer Science Program faculty.

MATH 500 Graduate Seminar: Algebraic Foundation of Mathematics (3 credits)

This course integrates concepts from elements of algebra, abstract algebra and number theory. It extends the concepts first considered at the undergraduate level by using symbolic logic and methods of proof. The theory of algebraic equations, including roots of polynomials, the fundamental theorem of algebra and the solution of third and fourth degree equations is emphasized. Prerequisites: senior standing, abstract algebra, consent of instructor.

MATH 505 Topics in the History of Mathematics (4 credits)

A survey of the history of mathematics. Students will investigate the historical basis for some of the major themes in mathematics including the contributions made by individuals and cultures. Prerequisite: An undergraduate major in mathematics or mathematics education, or consent of instructor.

MATH 510 Topics in Number Theory (4 credits)

Number theory, which is one of the most ancient branches of mathematics and continues to be an active area of research, is the study of integers, the most basic structures of mathematics, and many of their fascinating properties. For example, it has a major recent day application in communications and cryptography. Topics include proof by induction, divisibility, primes, uniqueness of factorization, congruences, Chinese Remainder Theorem, Cryptography, Pythagorean triples and other Diophantine equations, Pell's Equation, primarily testing, factoring methods, primitive roots, perfect numbers, rational versus irrational, and continued fractions, quadratic congruences, and quadratic reciprocity. Prerequisite: An undergraduate major in mathematics or mathematics education, or consent of instructor.

MATH 515 Advanced Topics in Discrete Mathematics (4 credits)

An extension of the usual material presented in an undergraduate course in Discrete Mathematics. Topics will include: coding theory, Polya enumeration, scheduling and bin packing, and combinatorial games. A current computer software package will be utilized to explore these topics. Prerequisite: An undergraduate major in mathematics or mathematics education, or consent of instructor.

MATH 530 Statistics (4 credits)

The course is designed to give students both the theoretical and practical aspects of statistics. Topics include probability distributions of discrete and continuous random variables, mathematical expectations, multivariate distributions, correlations, confidence intervals, hypothesis testing, linear regression, and use of technology. Prerequisite: An undergraduate course in statistics, an undergraduate major in mathematics or mathematics education, or consent of instructor.

MATH 545 Graduate Seminar: Higher Geometry (3 credits)

This course reviews Euclidean, synthetic, analytic, plane and solid geometry, then compares Euclidean geometry to the more recent developments in geometry dealing with non-metric properties. Projective geometry, affine geometry, and topological geometry are used as examples of non-Euclidean systems. Prerequisites: undergraduate course in the modern geometry, senior standing, consent of instructor.

MATH 550 Graduate Seminar: Real Analysis (3 credits)

The objective of this course is to present calculus in a setting of sufficient generality to provide a reasonable foundation in mathematical analysis. The emphasis is on abstraction, concreteness and simplicity. Such important concepts as metric space, compactness, and uniform convergence are explored. Prerequisites: completion of undergraduate calculus sequence, senior standing, consent of instructor.

MATH 600 Graduate Seminar: Math Research Project (3 credits)

Directed research on a selected topic(s) in mathematics and/or mathematics education. Topics pertaining to mathematics education should be consistent with the Standards of the National Council of Teachers of Mathematics (NCTM).