

# COURSES

## MATHEMATICS (MT)

### MT 0003 (0CR) ELEMENTARY ALGEBRA

A course designed for the student who has not completed the high school curricular requirement for mathematics. This course, together with MT 0123, comprises a complete treatment of the algebraic principles and processes required for the successful study of college algebra. Topics include operations with integers, introductory algebraic concepts, and problem solving. Algebraic concepts include first-degree equations and inequalities, exponents, polynomials and factoring, and rational expressions. There are no formal prerequisites.

### MT 0123 (0CR) INTERMEDIATE ALGEBRA

A second course for the student who has not completed the high school curricular requirement for mathematics. This course completes the treatment of algebraic principles and processes necessary for preparation for college algebra. Topics include intermediate level algebraic concepts and a continuation of problem solving techniques. Algebraic concepts include rational exponents and radicals, second-degree equations and inequalities, linear equations in two variables and functions. Prerequisite: MT 0003.

### MT 1323 (3CR) COLLEGE ALGEBRA

The real number system, coordinate systems, absolute value, inequalities, linear and quadratic functions, polynomial functions, inverse functions, the binomial theorem, progressions, exponential and logarithmic functions, applications. Prerequisite: 1 year of high school algebra and plane geometry or equivalent.

### MT 1613 (3CR) PLANE TRIGONOMETRY

Sets, relations, circular functions and their inverses, graphs of circular functions, trigonometric functions, complex numbers, Demoivre's Theorem, vectors, polar coordinates and graphs. Prerequisite: 1 year of high school algebra and plane geometry equivalent or MT 1323.

### MT 2013 (3CR) ELEMENTARY STATISTICS

Organization and analysis of data, elementary probability, permutations, combinations, the binomial distribution, the normal distributions, random sampling, testing hypothesis. (An elementary 83 course for students in other fields.) Prerequisite: MT 1323 or equivalent.

### MT 2103 (3CR) BUSINESS MATHEMATICS

Interest, periodical payments, linear programming, graphs and statistics. Prerequisite: MT 1323 or equivalent.

### MT 2145 (5CR) CALCULUS I

Theory of functions, Cartesian coordinates, limit theorems, derivatives of algebraic functions, applications, extreme value theory with applications, related rates, Rolle's theorem, the mean value theorem and its extension, curve sketching, and integration. Prerequisite: MT 2524 or equivalent and passing score on placement examination

### **MT 2413 (3CR) MODERN MATHEMATICS I**

Designed specifically for early childhood, elementary, and special education majors. The curriculum will be designed around the National Council of Teachers of Mathematics (NCTM) standards for grades K-4. Topics will include number sense, estimation, whole number computation, properties and measurements of geometric shapes, collection and organization of data, pattern recognition and description, and problem-solving skills. Instructional practices presented will include the use of manipulative materials, computers, calculators, and cooperative learning.

### **MT 2503 (3CR) SOLID GEOMETRY**

Planes in space, loci, polyhedral angles, surfaces and volumes of geometric solids, spherical geometry. Prerequisite: Permission of instructor.

### **MT 2513 (3CR) MODERN MATHEMATICS II**

Designed specifically for early childhood, elementary, and special education majors. The curriculum will be designed around the National Council of Teachers of Mathematics (NCTM) standards for grades 5-8. Topics will include problem solving, communication with mathematics, reasoning, patterns and functions, statistics, probability, linear equations, measurement, and solving problems using geometric shapes. Instructional strategies for this course will include cooperative learning, computers, calculators, and manipulatives. Prerequisite: MT 2413.

### **MT 2524 (3CR) PLANE ANALYTIC GEOMETRY**

Cartesian coordinates, loci, the line, the circle, conic sections, coordinate transformations, tangents, normals, polar coordinates. Prerequisite: MT 1323 and MT 1613 or equivalent, and passing score on placement examination.

### **MT 2603 (3CR) FINITE MATHEMATICS**

Mathematical logic, basic rules of inference, theory of sets, partitioning of sets, Cartesian products, functions, permutations, combinations, the binomial theorem, the binomial distribution, probability, finite stochastic processes. Prerequisite: MT 1323.

### **MT 3223 (3CR) LINEAR ALGEBRA**

Systems of equations, roots of equations, determinants, matrices, linear dependence and independence, linear transformations. Prerequisite: MT 2145 or equivalent or permission.

### **MT 3313 (3CR) MATHEMATICS CONCEPTS**

Percent, ratio, and proportion, powers and roots, simple equations, equations in more than one unknown, quadratic equations, exponents, and logarithms, variation, plane geometry, trigonometry. Prerequisite: MT 1323 or equivalent.

### **MT 3523 (3CR) SOLID ANALYTIC GEOMETRY**

Coordinate systems in space, the plane, the line, the sphere, forms and classification of quadratic surfaces. Prerequisite: MT 2524.

### **MT 3533 (3CR) INTRODUCTION TO NUMERICAL ANALYSIS**

Computational methods for solving algebraic, transcendental, ordinary differential, and finite difference equations, and summation of series. Prerequisites: MT 2145.

### **MT 3543 (3CR) INTRODUCTION TO NUMBER THEORY**

An exposure to Number Theory, which includes the mathematical treatment of questions related to integers: Well-ordering, different bases, divisibility, primes, and factoring; Pythagorean Triples and the Unit Circle; the fundamental theorem of arithmetic and the division algorithm; Congruencies, Powers, Fermot's Little Theorem, and Euler's Formula; computing  $K$ 'th Roots Moduls  $M$ ; Powers, Roots, and "Unbreakable" Codes; and Diophantine Approximation and Pell's Equation. Prerequisite: MT 2145

### **MT 3624 (4CR) CALCULUS II**

The second course in a three-semester course of unified calculus and analytic geometry including transcendental functions, hyperbolic functions, various methods of integration, areas and volumes as limits, applications of integration, and series. Prerequisite: MT 2145.

### **MT 3633 (3CR) CALCULUS III**

A continuation of Calculus II. Power series, expansion of functions into series with applications, definition and meaning of ordinary partial derivatives, multiple integrals and vector calculus. Prerequisite: MT 3624 or equivalent.

### **MT 4023 (3CR) ADVANCED CALCULUS I**

A rigorous treatment of calculus of one and several variables. Elementary topology of Euclidean spaces, continuity and uniform continuity, differentiation and integration. Prerequisites: MT 2145, MT 3624, and MT 3633.

### **MT 4123 (3CR) COMPLEX VARIABLES**

A study of the complex number system, functions of a complex variable, differentiation, integration, series, residues and poles, conformal mappings, and applications to the physical sciences. Prerequisites: MT 2145, MT 3624, and MT 3633.

### **MT 4233 (3CR) HIGHER ALGEBRA**

Sets, relations, and functions. The rational, real, and complex numbers. Classification and construction of groups, homomorphisms, rings, ideals, integral domains, introduction to fields and vector spaces. Prerequisite: permission of instructor or MT 3223.

### **MT 4323 (3CR) APPLIED MATHEMATICS**

Sets, inequalities and sums, graphs and coordinate geometry, lines, linear programming, determinants and vectors, matrices, probability, statistics, correlation, and introduction to game theory. Prerequisite: MT 3313 or equivalent.

### **MT 4353 (3CR) DISCRETE MATHEMATICS**

Fundamental principles of counting, permutations and combinations, with applications to the physical sciences; enumeration in set theory, the fundamentals of logic, and probability theory; Cartesian products and relations, special functions, the Pigeonhole principle, and Stirling Numbers of the second kind; computer recognition, Zero-One matrices and directed graphs,

partial orders and Hasse Diagrams, equivalence relations and partitions, finite state machines and the Minimization Process; The Well Ordering Principle and Mathematical Induction, the Division Algorithm and prime numbers, the Euclidean Algorithm and the Fundamental Theorem of Arithmetic; The Principle of Inclusion and Exclusion, derangements and arrangements with forbidden positions, Rook Polynomials; Ring Structure and Modular Arithmetic, Ring Homomorphisms and Isomorphisms; Generating Functions, partitions of integers, and the Summation Operator; Finite Fields and Combinatorial Designs, polynomial rings, Latin Squares, finite geometries and affine planes, block designs and projective planes. Prerequisites: MT 2145, MT 3624.

### **MT 4423 (3CR) MATHEMATICAL STATISTICS I**

The algebraic development of formulas used in statistical methods, frequency curves, curve fitting, correlation, probability, the binomial distribution, the Poisson distribution, random sampling, large sample theory, testing hypotheses, small methods, Chi-squared distribution, analysis of variance. Prerequisites: MT 2413 and MT 2145 or permission.

### **MT 4433 (3CR) MATHEMATICAL STATISTICS II (Statistical Inference)**

Purposes and nature of statistical inference; estimation of population parameters; one and two-sample tests of hypotheses; the role of probability in hypothesis testing; introduction to linear regression analysis and curve fitting; analysis of variance; correlation analysis; multiple linear regression and nonlinear regression models; orthogonal designs; model selection; one-factor experiments; randomized complete block designs; factorial experiments (two or more factors); non-parametric statistics. Prerequisites: MT 4423; MT 2145.

### **MT 4543 (3CR) COLLEGE GEOMETRY**

The real number system, Euclidean completeness, the Archimedean postulate, incidence theorems, betweenness, plane and space separation, angular measure, congruence, geometric inequalities, parallelism, similarity, non-Euclidean geometrics, Saccheri quadrilaterals, areas of polygonal regions, circles and spheres, solid mensuration (volumes). Prerequisites: permission of instructor and MT 1323.

### **M 4643 (3CR) DIFFERENTIAL EQUATIONS**

Equations of the first order, singular solutions, linear equations of the second order, linear equations with constant coefficients, exact equations, total differential equations. Prerequisites: MT 3633 and MT 3223 or equivalent or permission.

### **MT 4653 (3CR) SEMINAR IN MATHEMATICS**

Seminar includes detailed reports on selected high-level topics in both theoretical and applied mathematics. Students majoring in the department are required to report on at least one topic of a moderate degree of difficulty as a demonstration of their resourcefulness, ability, and achievement in the field of mathematics. Prerequisite: permission of instructor.

### **MT 4583 (3CR) MATHEMATICAL MODELING**

Problem identification, model selection, model solution and validation are explored. Mathematical models are formulated for problems arising in various areas including formulating models using differential equations, linear programming, and stochastic models as

some examples. Prerequisites: MT 4423, MT 4433, MT 4643 and MT 3223.

### **MT 4743 (3CR) HISTORY OF MATHEMATICS**

Development of an historical perspective of various topics in mathematics such as arithmetic, algebra, geometry, calculus, probability, number theory, set theory and analysis.

Prerequisites: MT 1613—Trigonometry, MT 2013—Elementary Statistics, MT 2145—Calculus & Analytic Geometry I, MT 3624—Calculus & Analytic Geometry II.

### **MT 4843 (3CR) METHODS OF TEACHING MATHEMATICS IN SECONDARY SCHOOLS**

This course is designed to prepare teachers for the complex task of teaching mathematics in a secondary classroom. It will offer the student a sense of the rich history of mathematics as a human endeavor through focusing on questions such as what mathematics is and how it has developed in various cultures as a significant human activity. Students will be provided with opportunities to gain experience preparing problem-centered lessons for the secondary school setting, focusing on the content and methodology appropriate for secondary school mathematics. In addition, student characteristics and learning styles, issues of equity and diversity, and constructivist theories of learning will be discussed. Of particular interest are issues associated with inquiry mathematics and changing teacher practices to include a problem-rich mathematics environment, which includes the use of technology. Methods of assessment will be integrated with concerns for content and teaching strategies. Prerequisites: MT 1323—College Algebra, 1613—Trigonometry, MT 2013—Elementary Statistics, MT 2145—Calculus I, MT 3624—Calculus II, and MT 4543—College Geometry.