

MATHEMATICS (NATURAL SCIENCES DIVISION)

MATH-015 ARITHMETIC AND PRE-ALGEBRA (3 cr.) Preparation for MATH 025. Arithmetic with whole numbers, signed numbers, and fractions. Order of operations, variables, simplifying of algebraic expressions. Concrete representations of arithmetic operations and algebraic concepts are emphasized. Particularly appropriate for students who experience anxiety when learning mathematics. Course fee.

MATH-024 BASIC ALGEBRA AND SETS (4 cr.) Brief review of integer and fraction arithmetic. Solving of equations and inequalities in one variable. Writing equations of lines; forms of linear equations. Graphing linear equations and inequalities. Solving systems of linear equations and inequalities. Introduction to linear programming. Exponents and polynomials including factoring. Solving quadratic equations using the zero product property and the quadratic formula. Introduction to functions. Unit analysis. Emphasis on problem solving. Introduction to sets, permutations, and combinations. Pre-requisite: A grade of "C" or better in MATH 015 or satisfactory placement score. Course fee.

MATH-025 BASIC ALGEBRA (3 cr.) Brief review of integer and fraction arithmetic. Solving of equations and inequalities in one variable. Writing equations of lines; forms of linear equations. Graphing linear equations and inequalities. Solving systems of linear equations and inequalities. Introduction to linear programming. Exponents and polynomials including factoring. Solving quadratic equations using the zero product property and the quadratic formula. Introduction to functions. Unit analysis. Emphasis on problem solving. Pre-requisite: A grade of "C" or better in MATH 015 or satisfactory placement score. Course fee.

MATH-025A BASIC ALGEBRA A (2 cr.) The content in this course includes a review of signed number and fraction arithmetic, solving equations in one variable, graphing linear inequalities in two variables, slope, equations of a line, graphing linear inequalities in one variable, and an introduction to relations and functions. Problem solving is emphasized throughout. Pre-requisite: A grade of 'C' or better in MATH 015 or satisfactory placement score.

MATH-025B BASIC ALGEBRA B (2 cr.) The content in this course includes systems of linear equations in two variables, introduction to exponent rules and scientific notation, addition, subtraction, and multiplication of polynomials, factoring polynomials, solving quadratic equations using the zero product property or the quadratic formula, and unit analysis. Problem solving is emphasized throughout the course. Prerequisite: Take MATH 025A.

MATH-108 INTERMEDIATE ALGEBRA (4 cr.) Function emphasis. Full integration of graphing technology and computer algebra system. Systems of linear equations and linear inequalities. Absolute value equations. Polynomials and polynomial functions. Exponential and logarithmic functions. Radical equations and functions. Quadratic equations and functions. Rational equations and functions. Pre-requisite: A Grade of "C" or better in MATH 024 or MATH 025 or satisfactory placement score. Course fee.

MATH-123 MATHEMATICS AS A LIBERAL ART (3 cr.) This course fulfills the skills component of the General Education core. Provides students with a solid foundation in those areas of algebra, geometry, and trigonometry which are currently pervasive in business and the technical and industrial technologies. Special attention is given to applications involving

HVAC, manufacturing, mechanics, welding, drafting, and printing technologies. Mathematical topics include linear and quadratic equations, systems of linear equations, geometry and geometric solids, right and oblique triangle trigonometry, and an introduction to statistics. Cross-listed with MTHPT 123. Pre-requisites: A grade of "C" or better in MATH 024, MATH 025, MTHPT 103, or MTHPT 120, or satisfactory placement score. Course Fee.

MATH-130 FINITE MATHEMATICS (4 cr.) Systems of linear equations and inequalities, elementary matrix algebra, introduction to linear programming, elementary discrete probability and statistics. Emphasis on applications to business, economics and social sciences. Cross-listed with MTHPT 130. Pre-requisite: A Grade of "C" or better in MATH 024 or MATH 025 or MTHPT 103 or satisfactory placement score. Course Fee.

MATH-130A FINITE MATHEMATICS (2 cr.) Systems of linear equations and inequalities, elementary matrix algebra, introduction to linear programming, elementary discrete probability and statistics. Emphasis on applications to business, economics and social sciences. Pre-requisite: A Grade of "C" or better in MATH 024 or MATH 025 or MTHPT 103 or satisfactory placement score. Course Fee.

MATH-130B FINITE MATHEMATICS (2 cr.) Elementary discrete probability and statistics. Emphasis on applications to business, economics and social sciences. Pre-requisite: MATH 130A.

MATH-137 ALGEBRA, TRIG AND STAT WITH APPLICATION (4 cr.) This course fulfills the skills component of the General Education Core. Cartesian coordinate system, representations of lines, functions of one or more independent variables, polynomial, radical, exponential, and logarithmic equations, matrix algebra, systems of equations, radian and degree measure, right-angle trigonometry, law of sines and cosines, vectors in applied settings, probability theory, and statistics. The course will emphasize technical applications. Pre-requisite: A Grade of "C" or better in MATH 024, MATH 025, MTHPT 103, or MTHPT 120 or satisfactory placement score. Course Fee.

MATH-143 COLLEGE ALGEBRA (3 cr.) Emphasis on the concept of (real-valued) functions as mathematical entities, including domain, range, algebraic operations, composition, inverses, graphing. Polynomial functions, division of polynomials, roots of polynomials, theory of equations, complex numbers, fundamental theorem of algebra. Rational functions and asymptotes. Logarithmic and exponential functions. Multi-level algebraic manipulation of complicated functional expressions-e.g., difference quotients. Conic sections, translation of axes, distance from point to line. Pre-requisite: A Grade of "C" or better in MATH 108 or satisfactory placement score. Course Fee.

MATH-144 TRIGONOMETRY (2 cr.) Right-triangle and circular function approaches to trigonometry. Trigonometric identities. Graphs of trigonometric functions; amplitude, frequency, phase shift. Inverse trigonometric functions and their graphs. Polar coordinates, polar representation of complex numbers. Co-requisite: MATH 143.

MATH-147 PRECALCULUS (5 cr.) The course emphasizes functions, circular trigonometry and multilevel problem solving as preparation for calculus. Functions are treated as mathematical entities, including domain, range, algebraic operations, composition, inverses, and graphing. Polynomial, logarithmic, exponential, trigonometric, inverse trigonometric, radical and rational functions are explored. Algebraic techniques include diversion of polynomials, roots of polynomials, theory of equations and inequalities, complex numbers and DeMoivre's Theorem, the Fundamental Theorem of Algebra and

solving systems of linear and nonlinear equations. Trigonometric identities are derived, proved and applied. Polar coordinates, vectors and oblique triangles are introduced and used in a variety of applications. Analytic geometry focuses on circles, parabolas, distance and midpoints. MATH 147 is equivalent to MATH 143 plus MATH 144. Pre-requisite: A Grade of "C" or better in MATH 108 or satisfactory placement score. Course Fee.

MATH-157 FOUNDATIONS OF ELEMENTARY MATHEMATICS (3 cr.) An overview of the mathematics taught in grades K-8. Topics from set theory, logic, number theory, and functions. Stresses skills and cognitive understanding. Pre-requisite: A Grade of "C" or better in MATH 108 or MATH 137 or satisfactory placement score.

MATH-170 CALCULUS I (4 cr.) Definitions of limit, derivative, antiderivative, definite integral. Computation of the derivative, including logarithmic, exponential, and trigonometric functions. Applications of the derivative, optimization, mean value theorem. The fundamental theorem of calculus, brief introduction to applications of the integral and to computation of antiderivatives. Intended for students in engineering, mathematics, and the sciences. Pre-requisites: A Grade of "C" or better in MATH 143 and MATH 144, or satisfactory placement score.

MATH-175 CALCULUS II (4 cr.) Applications of the integral, symbolic and numerical techniques of integration, inverse transcendental functions. Sequences and series, with an emphasis on power series and approximation. Pre-requisite: A Grade of "C" or better in MATH 170

MATH-186 DISCRETE MATHEMATICS (3 cr.) Topics such as sets, functions, algorithms, logic, Boolean algebra are included. This course consists of numerous topics which are particularly valuable to students pursuing a computer science minor. Pre-requisite: A Grade of "C" or better in MATH 108 or satisfactory placement score.

MATH-190 DIRECTED STUDY IN MATH (1-12 cr.)

MATH-192 SPECIAL TOPICS IN MATHEMATICS (1-12 cr.)

MATH-254 STATISTICAL METHODS FOR THE SCIENCES (4 cr.) Biometry is designed to develop an ability to use descriptive statistics as it is applied to the life sciences. A student will learn to generate confidence intervals, test hypotheses, create mathematical models and perform regression analysis. Computer assisted methods will be used throughout. Pre-requisite: A Grade of "C" or better in Math 108 or satisfactory placement score.

MATH-257 FOUNDATION OF ELEMENTARY MATHEMATICS II (3 cr.) Continuation of MATH 157. Emphasis on conceptual understanding, and communication of mathematical principles. Content emphasis on probability, statistics, geometry, and algebraic structures. Pre-requisite: A Grade of "C" or better in MATH 157

MATH-275 CALCULUS III (4 cr.) Vector algebra and geometry, functions of several variables, partial and directional derivatives, gradient, chain rule, optimization, multiple and iterated integrals. Parametric curves and surfaces in 3-space, vector fields, divergence and curl, line and surface integrals. Green's, Stoke's and divergence theorems. Pre-requisite: A Grade of "C" or better in MATH 175

MATH-285 EUCLIDEAN GEOMETRY (3 cr.) This course is designed to prepare teachers of middle and high school geometry. The course emphasizes classic geometric proof and

application of geometric theorems. Topics include parallel lines, triangles, quadrilaterals, circles, and polygons. Pre-requisite: A grade of 'C' or better in MATH 143, MATH 157, or MATH 186, or satisfactory placement score.

MATH-290 DIRECTED STUDY IN MATHEMATICS (1-3 cr.) Pre-requisite: A Grade of "C" or better in MATH 170 or permission of the division.

MATH-291 WORKSHOP IN MATHEMATICS (1-3 cr.)

MATH-292 SPECIAL TOPICS IN MATHEMATICS (1-3 cr.)

MATH-295 PRACTICUM IN MATHEMATICS (1-2 cr.) Tutoring in the mathematics laboratory or functioning as a teacher's aide in a lower division mathematics course. Pre-requisite: Approval of the division chair. May be repeated for a total of 4 credits.

MATH-296 COOPERATIVE EDUCATION IN MATH (1-12 cr.)

MATH-299 RESEARCH ASSISTANTSHIP (1-12 cr.)

MATH-300 INTRODUCTION TO MATHEMATICAL REASONING (3 cr.) Introductory topics in mathematics- logic, set theory, properties of the real line- number theory, induction, mappings, rigorous treatment of limits of sequences. Emphasis is on the concept of theorem and proof. Pre-requisite: A Grade of "C" or better in MATH 175

MATH-320 PROBABILITY AND STATISTICS (3 cr.) Sample spaces, random variables, central limit theorems, stochastic processes, estimation and testing of hypotheses. Pre-requisite: A Grade of "C" or better in MATH 175

MATH-340 LINEAR ALGEBRA (3 cr.) Systems of linear equations, Gaussian elimination, matrices vector spaces, linear independence, basis, dimension, inner products, orthogonal projections, orthonormal bases. Determinants, eigenvalues and eigenvectors. Positive definite matrices. Pre-requisite: A Grade of "C" or better in MATH 175

MATH-345 ORDINARY DIFFERENTIAL EQUATIONS (3 cr.) Separation of variables, variations of parameters-methods of characteristic roots, undetermined coefficients-systems of differential equations. Laplace transform, and power series. Pre-requisite: A Grade of "C" or better in MATH 340.

MATH-386 POSTULATION GEOMETRY (3 cr.) Postulates of Euclid and Hilbert, nonEuclidian geometry and projective geometry. Understanding of high school geometry is emphasized. Pre-requisite: A Grade of "C" or better in MATH 170

MATH-390 DIRECTED STUDY IN MATHEMATICS (1-3 cr.)

MATH-391 WORKSHOP IN MATHEMATICS (1-3 cr.)

MATH-392 SPECIAL TOPICS IN MATHEMATICS (1-3 cr.)

MATH-395 PRACTICUM IN MATHEMATICS (1-2 cr.)

MATH-396 COOPERATIVE EDUCATION IN MATH (1-12 cr.)

MATH-399 RESEARCH ASSISTANTSHIP (1-12 cr.)

MATH-450 COMPLEX ANALYSIS (3 cr.) Complex numbers and functions, complex derivatives and integrals, residue theory, conformal mappings and uniform convergence. Pre-requisite: A Grade of "C" or better in MATH 300

MATH-460 ABSTRACT ALGEBRA I (3 cr.) Groups, subgroups, permutation groups, homomorphism and quotient groups. Rings, subrings, ideals and quotient rings. Polynomials, integral domains and fields of quotients. Introduction to Galois theory. Pre-requisite: A Grade of "C" or better in MATH 300

MATH-461 ABSTRACT ALGEBRA II (3 cr.) Rings, subrings, ideals and quotient rings. Polynomials, integral domains and fields of quotients. Field extensions and splitting fields. Fundamental Theorem of Galois Theory. Pre-requisite: A Grade of "C" or better in MATH 460

MATH-470 GENERAL TOPOLOGY (3 cr.) An introduction to the fundamental concepts of general topology including set theory, metrics, neighborhoods, bases, subspaces, mappings, continuity, separation axioms, compactness and connectedness. Pre-requisite: A Grade of "C" or better in MATH 300

MATH-480 REAL ANALYSIS I (3 cr.) Axioms for the real numbers. Limits of sequences, limits of functions, continuity, compactness, the derivative and the Riemann integral. Pre-requisite: A Grade of "C" or better in MATH 300

MATH-481 REAL ANALYSIS II (3 cr.) Riemann-Stieltjes integration. Functions of bounded variation. Differentiation and Integration in n-space. Lebesgue integration. Pre-requisite: A Grade of "C" or better in MATH 481.

MATH-490 DIRECTED STUDY IN MATHEMATICS (1-3 cr.) Pre-requisite: A Grade of "C" or better in MATH 170 or permission of the division.

MATH-491 WORKSHOP IN MATHEMATICS (1-3 cr.)

MATH-492 SPECIAL TOPICS IN MATHEMATICS (1-3 cr.)

MATH-495 PRACTICUM IN MATHEMATICS (1-2 cr.) Tutoring in the mathematics laboratory or functioning as a teacher's aide in a lower division mathematics course. Pre-requisite: Approval of the division chair. May be repeated for a total of 4 credits.

MATH-496 COOPERATIVE EDUCATION IN MATH (1-12 cr.)

MATH-499 RESEARCH PROJECT AND SEMINAR IN MATH (1-3 cr.) Students will conduct and communicate the results of a research project in the Natural Sciences Division. Topics may include the historical, philosophical, cultural and environmental aspects, and the processes of natural science. Requirements of students include satisfactory oral presentation and defense of their research and submission of a written report approved by their advisor to the Natural Sciences Division. Prerequisite: NS 398.