MATHEMATICS (MAT)

MAT-0098: Basics of Mathematics (3 hours)
Building number sense with problem solving, estimation, mental mathematics, whole number operations, integers, fractions, decimals, variables and geometry. Not to be taken to satisfy basic curriculum, concentration, major or minor requirements. This course may not be used for elective credit. Required of and limited to students who fail to meet departmental standards on the department's placement exam. Co-requisite: MAT-0099. Offered Pass/Fail only. Fee: Required.

MAT-0099: Basics of Mathematics Recitation (0 hours)
Additional practice in the topics of MAT-0098. Co-requisite: MAT-0098. Offered Pass/Fail only.

MAT-0100: Fundamentals of Math (3 hours)
Problem solving, real numbers, algebraic expressions, equations and inequalities, graphs, linear functions, systems of equations, exponents, polynomials, radicals, quadratic functions. Designed as preparation for students to move into any of the following: MAT-1411, MAT-1412, or MAT-1550. Not to be taken to satisfy general education, concentration, major, or minor requirements. May not be used for elective credit. Must register concurrently for MAT-0101, a 1 hour, 0-credit recitation session as determined by placement. This course replaces MAT-1000.

MAT-0101: Fundamentals of Mathematics Recitation (0 hours)
Additional practice in the topics of MAT-0100. Offered on a Pass/Fail basis only. Must register concurrently with MAT-0100. This course replaces MAT-1001.

MAT-0110: Advanced Intermediate Algebra (3 hours)
Problem solving; linear quadratic, exponential, and logarithmic functions; graphs; systems of equations; polynomial and rational expressions; introduction to trigonometry. Designed as preparation for MAT-1805. Not to be taken to satisfy general education, specialty area, major, or minor requirements. May not be used for elective credit. Must register concurrently for MAT-0111, a 1 hour, 0-credit recitation session. This course replaces MAT-1010.

MAT-0111: Advanced Intermediate Algebra Recitation (0 hours)
Additional practice in the topics of MAT-0110. Offered on a Pass/Fail basis only. Must register concurrently with MAT-0110. This course replaces MAT-1011.

MAT-1400: Descriptive Statistics (1 hour)
Introduction to basic statistical concepts including frequency distributions, central tendency, variations, normal curve, correlations and regression with applications. Students may not receive credit for this course and MAT-2000, MAT-1412, ECO-4310. Prerequisite: C or higher in MAT-0100 or higher or departmental placement.

MAT-1411: Mathematics for Teachers: Number and Measurement (3 hours)
Basic mathematical concepts such as sets, numeration, number systems, number theory, measurement, geometry and problem solving. Prerequisite: C or higher in MAT-0100 or MAT-0110 or departmental placement. Fee: Required.

MAT-1412: Mathematics for Early Childhood Teachers: Geometry, Statistics, Functions (3 hours)
The real number system, coordinate geometry, probability and statistics. Students may only receive credit in one of the following courses: MAT-1412, MAT-1550 or MAT-1812. Fee: Required. Prerequisite: C or higher in MAT-0100 or MAT-0110 or departmental placement.

MAT-1550: Finite Mathematics (3 hours)
Review of basic algebra, introduction to matrices, counting principles, elementary probability and statistics. Application of these skills to problem solving. May not be taken by students with credit in MAT-1412. Prerequisite: C or higher in MAT-0100 or departmental placement. Fee: Required.

MAT-1805: College Algebra (3 hours)
Real and complex numbers, the elementary functions; polynomial, rational, exponential, logarithmic and systems of linear equations and the skills needed for calculus. Fee: Required. Prerequisite: C or higher in MAT-0110.

MAT-1812: Math for Elementary & Middle Grades Teachers: Geometry, Statistics, Function (3 hours)
The real numbers, proportional reasoning, applications of algebra, coordinate place and solid geometry, probability and statistics. Students may only receive credit in one of the following courses: MAT-1412, MAT-1550 or MAT-1812. Prerequisite: Departmental placement or a C or higher in MAT-1805 and either a C or higher in MAT-1411 or current enrollment in MAT 1411. Fee required .

MAT-1820: Pre-Calculus (3 hours)
Topics in trigonometry, systems of equations and inequalities, analytic geometry, sequences and series, introduction to calculus. Prerequisite: C or higher in MAT-1805 or departmental placement. Fee: Required.

MAT-2000: Statistics (3 hours)
Introduction to basic statistical concepts including frequency distributions, central tendency, variations, normal curve, correlations and regression with application to statistical inference. Fee: Required. Prerequisite: C or higher in MAT-1805 or departmental placement.

MAT-2100: Discrete Mathematics (3 hours)
An introduction to the analysis of discrete collections: sets, counting, recursion, graph theory, algorithms and combinatorics. Prerequisite: C or higher in MAT-1805 or departmental placement. Cross-listed with CSC-2100. Fee: Required.

MAT-2200: History of Mathematics (3 hours)
Major trends in mathematics from earliest times to the 17th century. Outstanding contributors. Fee required. Prerequisite: C or higher in MAT-1805 or higher.

MAT-2300: Problem Solving with Number Theory (3 hours)
Problem solving techniques with application to natural phenomena, games and puzzles. Use of principles of number theory to solve problems. Prerequisite: C or higher in MAT-1805 or higher.

MAT-2400: Calculus for Business and Life Sciences (3 hours)
Differential and integral calculus, beginning with limits and including exponential and logarithmic functions. Applications to business and life sciences. Students may not receive credit for this course and Calculus I MAT-2500. College of Business students seeking a Bachelor of Science degree must earn at least a C. Fee: Required. Prerequisite: C or higher in MAT-1805 or departmental placement. Students may not receive credit for MAT-2400 and MAT-2500.

MAT-2500: Calculus I (4 hours)
An introduction to single variable calculus: limits and continuity; differentiation; derivatives of polynomial, rational, trigonometric, logarithmic and exponential functions; the chain rule; implicit differentiation; approximation; higher order derivatives; Rolle's Theorem; mean value theorem; the anti-derivative; and applications. Prerequisite: C or higher in MAT-1820 or departmental placement. Fee: Required. Students may not receive credit for MAT-2400 and MAT-2500 IAI: M1900-1.

MAT-2600: Calculus II (4 hours)
Continuation of single variable calculus: the definite integral; the fundamental theorem of calculus; area and volume; integrals of trigonometric, logarithmic and exponential functions; integration methods; L'Hôpital's rule; improper integrals; sequences and series; convergence tests; Taylor series; polar coordinates; and applications. Fee: Required. Prerequisite: C or higher in MAT-2500 or departmental placement.

MAT-3100: Calculus III (4 hours)
An introduction to multivariable calculus: functions of more than one variable, partial derivatives, the differential, vector calculus, directional derivatives, gradients, multiple integrals and applications. Fee: Required. Prerequisite: C or higher in MAT-2600. IAI: M1900-3.

MAT-3200: Differential Equations (3 hours)
Differential equations of the first and second order, linear equations, variation of parameters, undetermined coefficients, linear independence, the Wronskian, exact equations, separation of variables, solution by Laplace transforms and by power series, numerical methods and applications. Prerequisite: C or higher in MAT-2600.

MAT-3500: Mathematical Proof (3 hours)
An introduction to structured proofs using methods from elementary mathematical logic with the goal of applying these techniques to writing paragraph-style proofs in beginning set theory. Fee: Required. Prerequisite: C or higher in MAT-2100 or MAT-2500.

MAT-3600: Linear Algebra (3 hours)
An introduction to vectors, matrices, matrix operations, inverse of a matrix, systems of linear equations, determinant, rank, linear independence and dependence, vector spaces and subspaces, basis and dimension, inner products, linear transformations, range and kernel, eigenvalues and eigenvectors. Fee: Required Prerequisite: C or higher in MAT-2500.

MAT-3700: College Geometry (3 hours)
An introduction to the development of Euclidean and non-Euclidean geometries and their axiomatizations. Fee: Required. Prerequisite: C or higher in MAT-1820 or MAT-2500 or higher.

MAT-4300: Number Theory (3 hours)
Properties of integers, division algorithms, prime numbers, Diophantine equations, congruences, multiplicative functions and applications. Prerequisite: C or higher in MAT-3500.

MAT-4610: Group Theory (3 hours)
An introduction to the fundamental topics of group theory: groups, subgroups, homomorphisms and isomorphisms. Prerequisite: C or higher in MAT-3500. Fee: Required.

MAT-4730: Probability Theory (3 hours)
Topics from discrete and continuous probability; random variables, functions of random variables, discrete and continuous probability distributions, limit theorem and applications. Prerequisite: C or higher in MAT-2600.

MAT-4740: Mathematical Statistics (3 hours)
Topics from statistics; statistical estimation, point and interval estimators, hypothesis testing, most powerful tests and likelihood ratio tests, regression and correlation, analysis of variance, categorical data analysis, nonparametric statistics, and applications. Prerequisite: C or higher in MAT-4730.

MAT-4810: Real Analysis (3 hours)
Introduction to the basic concepts of classical analysis: sets, sequences, limits of functions, continuity, differentiation, Riemann integration and infinite series. Prerequisite: C or higher in MAT-3100 and MAT-3500.

MAT-4820: Complex Analysis (3 hours)
Algebra, geometry and calculus with complex numbers. Transformations of the complex plane, analytical functions, Cauchy theory of integration, power series and residue theory. Prerequisite: C or higher in MAT-3100 and MAT-3500.

MAT-4950: Independent Study in Mathematics (1-6 hours)

MAT-4991: Internship in Mathematics (1-3 hours)
Supervised mathematics-related work experience under the guidance of faculty and the organization's staff. Prerequisite: 24 hours of coursework in mathematics and consent of instructor.