# MATHEMATICS (MATH)

**MATH 100 Mathematics Review 0 sem. hrs.**
Refresher course in basic mathematics with goal of providing a good foundation for further study/use of mathematics. Topics include operations on integers, fractions and decimals; exponents and order of operation; ratios, proportions and percents; basic algebraic and geometric formulas. Credit, although tabulated within the 120 hours required for graduation, does not satisfy any part of the core curriculum requirements. By placement only. Offered every semester.

**MATH 104 Algebra II 3 sem. hrs.**
Real numbers, variable expressions, solving equations and applications of equations, polynomials, factoring, algebraic fractions, graphs and linear equations, systems of linear equations, inequalities, radical expressions, quadratic equations. Prerequisite for 104: By placement or successful completion of MATH ALX. Offered every Spring and Fall.

**MATH 107 Mathematics I for Educators 3 sem. hrs.**
Problem solving techniques, sets, development of and operations with the real number system, including whole numbers, fractions and decimals, number theory, algebra, probability, statistics, geometry, measurement, applications to early childhood and intervention specialist teaching, NCTM standards. Offered every Fall and Spring.
Prerequisite: one year of high school algebra.

**MATH 108 Mathematics II for Educators 3 sem. hrs.**
Problem solving techniques, sets, development of and operations with the real number system, including whole numbers, fractions and decimals, number theory, algebra, probability, statistics, geometry, measurement, applications to early childhood and intervention specialist teaching, NCTM standards. Offered every semester.
Prerequisite: MATH 107.

**MATH 110 Math in the World 3 sem. hrs.**
Explores a broad spectrum of mathematical topics with an emphasis on the many practical uses of mathematics in our society. This is a course in mathematical literacy, not manipulative techniques. Topics are selected from the environment, politics, polling, social ethics, choice and decision making, technology, management, statistics, size, shape and art. Offered upon request.

**MATH 121 Intro to Stats and Analytics 3 sem. hrs.**
This course is an introduction to statistics using Excel. Topics include: descriptive statistics, measures of central tendency and dispersion, testing of statistical hypothesis, and some analytical modeling. Excel application can also include interest rate calculations for investments and loans.
Prerequisite: MATH ALX placement.

**MATH 155 Elementary Functions I 3 sem. hrs.**
Algebraic foundations, functions and graphs, polynomial functions, rational functions, exponential functions, logarithms and logarithmic functions, complex numbers. Offered every semester.

**MATH 156 Elementary Functions II 3 sem. hrs.**
Course deals almost exclusively with trigonometric functions. Basic trigonometry, trigonometric identities, trigonometric equations, and inverse trigonometric functions. Offered every semester.
Prerequisite: MATH 155 with a grade of C or better.

**MATH 160 Euclidean Geometry 3 sem. hrs.**
Axiomatic and transformational geometry, originated by Euclid, modified by Descartes and others. Points, lines, angles, parallels, planes, space, triangles, polygons, circles, measurement, congruency, similarity, area, volume, coordinates, isometries, constructions. Emphasis on deductive reasoning. Use of ancient tools and modern technology. Foundation for teaching of geometry and further study of modern geometries. Offered upon request.
Prerequisite: MATH ALX or placement.

**MATH 210A Calculus I 3 sem. hrs.**
Introduction to limits and differentiation, differentiation formulas, application of differentiation, optimization, and L'Hospital's Rule. Offered every Fall.
Prerequisite: MATH 156 with a grade of C or better, or placement.

**MATH 211 Calculus II 3 sem. hrs.**
Introduction to integration, the fundamental Theorem of Calculus, methods of integration, application of integration, improper integrals, and numerical integration. Offered every Fall.
Prerequisite: MATH 210A with a grade of C or better.

**MATH 220 Finite Mathematics 3 sem. hrs.**
Systems of linear equations; Matrices including basic operations and inverse of a square matrix; Systems of linear inequalities; Linear programming including the simplex method; Logic and Sets; Basic Counting Principles; Permutatuions and Combinations; Elementary probability theory including equiprobable models, conditional probability and Bayes' theorem; Markov Chains including regular Markov Chains and absorbing Markov Chains. Offered upon request.
Prerequisite: MATH 104 or placement.

**MATH 221 Statistics 3 sem. hrs.**
Elementary theory of probability and statistics, frequency distributions, binomial distributions, normal distributions, means, variances, standard deviations, sampling, confidence limits, testing of hypotheses, applications drawn from real world situations. Does not count toward the 33 hours required for a major in Mathematics. . Offered every semester.
Prerequisite: MATH 104 or placement.

**MATH 230 Discrete Patterns I 3 sem. hrs.**
Algorithms and Combinatorics. Logic, circuits, Karnaugh maps. Proofs, including quantified statements and mathematical induction. Relations, graphs, trees. Languages and finite-state machines. Offered upon request.
Prerequisite: MATH 155 or equivalent with permission.

**MATH 231 Discrete Patterns II 3 sem. hrs.**
Algorithms and Combinatorics. Logic, circuits, Karnaugh maps. Proofs, including quantified statements and mathematical induction. Relations, graphs, trees. Languages and finite-state machines. Offered upon request.
Prerequisite: MATH 230 with a "C" or better.

**MATH 310A Calculus III 3 sem. hrs.**
Sequences and series: tests for convergence, power series, Taylor's Theorem. Parametric curves and their calculus. Offered every Spring.
Prerequisite: MATH 211 with a grade of C or better, or placement.

**MATH 311A Calculus IV 3 sem. hrs.**
Multidimensional calculus: functions of several variables, vector functions, line integrals, Green's theorem, Stokes' theorem. Offered every Spring.
Prerequisite: MATH 310A with a grade of C or better.

**MATH 313 TH2: Linear Algebra I 3 sem. hrs.**
Concepts, algorithms, proofs and applications over these topics: systems of linear equations, matrices, determinants, finite-dimensional vector spaces, eigenvalues, orthogonality, quadratic forms. Related topics may be included such as complex numbers, base transformation, linear programming, and finite-state Markov chains. Offered every fall.
Prerequisite: MATH 207 or permission of the instructor; MATH 313 is required for the Mathematics major and strongly recommended for the Computer Science major.

**MATH 314 Linear Algebra II 3 sem. hrs.**
Concepts, algorithms, proofs and applications over these topics: systems of linear equations, matrices, determinants, finite-dimensional vector spaces, eigenvalues, orthogonality, quadratic forms. Related topics may be included such as complex numbers, base transformation, linear programming, and finite-state Markov chains. MATH 313 is required for the Mathematics major and strongly recommended for the Computer Science major. Offered upon request.
Prerequisite: Grade of "C" or better in MATH 313.

**MATH 321 Prob/Statistical Infer I 3 sem. hrs.**
Introduction to classical probability theory including sample spaces, events, discrete and continuous probability distributions. Prerequisite for 321: MATH 307 with a grade of C or better. Offered every spring semester.

**MATH 322 Prob/Statistical Infer II 3 sem. hrs.**
Introduction to classical statistics, hypothesis testing, confidence intervals and non-parametric statistics. Prerequisite for 322: MATH 321 with a grade of "C" or better. Offered every Spring.

**MATH 340 Theory of Interest 3 sem. hrs.**
Measurement of interest, simple and compound interest, present andaccumulated value, amortization, sinking funds, bonds and other securities and practical applications. Offered upon request.
Prerequisite: for MATH 208 with a grade of "C" or better.

**MATH 341 Intro to Financial Math 3 sem. hrs.**
Advanced topics on bonds and other securities; yield rates, cash flow analysis; the term structure of interest rates; duration, convexity and immunization; and introduction of options and other derivatives. Offered upon request.
Prerequisite: MATH 340 with a grade of "C" or better.

**MATH 390 Internship 1-3 sem. hrs.**
Interns receive practical learning experience outside the academic setting. This involves structured activities with an internship mentor and faculty mentor working with you to help you gain practical experience in applied mathematics in a corporate or organizational setting. A final report or presentation will be involved. Requires permission of the Director of Mathematics and agreement of the relevant authority on the employer's side. May not be repeated. Offered by arrangement.

**MATH 399 Special Topics 3-5 sem. hrs.**
To fill special student needs or take advantage of a visiting professor or serve as an experimental offering of a contemplated regular course. May be repeated as new topics are presented. With permission of department chair.

**MATH 402 Introduction Modern Geometry 3 sem. hrs.**
Study of axiomatic and transformational geometires selected from finite geometry, Euclidean geometry, projective geometry, non-Euclidean geometries, fractal geometry, and topology. Offered upon request.
Prerequisite: MATH 313 with a grade of "C" or better.

**MATH 410 Elem Differential Equations 3 sem. hrs.**
Equations of first and second orders, linear equations with constant coefficients, solutions in series, numerical approximations. Offered every Fall.
Prerequisite: MATH 313, 307 with a grade of "C" or better.

**MATH 421 Introduction Modern Algebra I 3 sem. hrs.**
Theoretical, axiomatic approach to algebraic structures. Mappings, equivalence relations, groups, homomorphisms, rings, ideals. Offered upon request.
Prerequisite: MATH 313 and 307 with a grade of "C" or better.

**MATH 431 App Regression&Time Series Ana 3 sem. hrs.**
Applied Regression Analysis emphasizes the concepts and the analysis of data sets. It provides a review of the key concepts in simple linear regression, matrix operations, and multiple regression. Methods and criteria for selecting regression variables and geometric interpretations are discussed. Polynomial, trigonometric, analysis of variance, nonlinear, time series, logistic, random effects, and mixed effects models are also discussed. Detailed case studies and exercises based on real data sets are used to reinforce the concepts.

**MATH 450 Math Seminar 1 sem. hr.**
Reading of mathematical papers or monographs and presentations of subjects at baccalaureate level. Disseminating and writing of level appropriate proofs. Must be taken three times to satisfy the major requirements. Offered upon request.

**MATH 490 Independent Study/Research 3 sem. hrs.**
With permission of the Division Chair and Vice President for Academic Affairs. By arrangement.

**MATH ALX Math ALX 1 sem. hr.**
Refresher online course in basic mathematics with goal of providing a good foundation for further study/use of mathematics. Topics include operations on integers, fractions and decimals; exponents and order of operation; ratios, proportions and percents; basic algebraic and geometric formulas. Real numbers, variable expressions, solving equations and applications of equations, polynomials, factoring, algebraic fractions, graphs and linear equations, systems of linear equations, inequalities, radical expressions, quadratic equations. Credit, although tabulated within the 120 hours required for graduation, does not satisfy any part of the core curriculum requirements. Must be completed to register for additional math courses. Offered through ALEKS.