MATHEMATICS (MATH)

MATH 010 - MATHEMATICAL FOUNDATIONS
This class covers the fundamentals of arithmetic and algebra: Whole numbers; Fractions; Decimals; Ratios; Rates; Percents; Measurement; Geometry; Statistics; Real numbers; Variables; Solving linear equations; Graphing Linear equations. This course is taken concurrently with either MATH 110 or MATH 105 and focuses on skills needed for success in subsequent math courses. Course does not count toward required credit hours for undergraduate degrees; it is considered 3-credits for purposes of billing and determining student full-time/part-time status. Credits: 3
Course Notes: Must be taken concurrently with either Math 105 or Math 110.

MATH 095 - DEVELOPMENTAL MATHEMATICS
This class covers the fundamentals of arithmetic and algebra: Whole numbers; Fractions; Decimals; Ratios; Rates; Percents; Measurement; Geometry; Statistics; Real numbers; Variables; Solving linear equations; Graphing Linear equations; Solving systems of linear equations; Algebra with polynomials; Factoring polynomials; Solving Quadratic equations. The focus will be on concepts, skills, and abilities needed for success in subsequent math courses. This course is a prerequisite for Math 110, 105, 115, and 116. This course is self-paced with individualized assistance. Course does not count toward required credit hours for undergraduate degrees; it is considered 3-credits for purposes of billing and determining student full-time/part-time status. Credits: 3

MATH 096 - DEVELOPMENTAL MATH FOR COLLEGE ALGEBRA
This class covers the fundamentals of arithmetic and algebra: Whole numbers; Fractions; Decimals; Ratios; Rates; Percents; Measurement; Geometry; Statistics; Real numbers; Variables; Solving linear equations; Graphing Linear equations; Solving systems of linear equations; Algebra with polynomials; Factoring polynomials; Rational Expressions; Algebra with Rational expressions; Roots; and Radicals. The focus will be on concepts, skills, and abilities needed for success in subsequent math courses. This course is a prerequisite for Math 121. This course is self-paced with individualized assistance. Course does not count toward required credit hours for undergraduate degrees; it is considered 3-credits for purposes of billing and determining student full-time/part-time status. Credits: 3

MATH 105 - FOUNDATIONS OF ARITHMETIC
This course helps prospective elementary teachers prepare for the Common Core State Standards. Topics include: sets, counting, problem solving, and number system development; Rationals, decimals, and irrationals; Number theory; Algorithms of arithmetic. Credits: 3
Course Notes: Prerequisites: MATH 095 or MATH 096, RUA placement score

MATH 110 - QUANTITATIVE LITERACY
The goals of this course are to create confident and critical users of quantitative information, to be able to describe and interpret quantitative information and arguments, and to apply mathematical tools to analysis of data on social issues. Topics include absolute and relative quantities, percentages, rates, and ratios, linear and exponential functions, making and interpreting graphs, and financial mathematics. Credits: 3
Course Notes: Prerequisites: MATH 095 or MATH 096, or Compass-Algebra with min score of 37, or ACCM Placement of QL or ACCM with min score of 41.

MATH 115 - QUANTITATIVE & SPATIAL REASONING
This course helps prospective elementary, middle school, and early childhood teachers prepare for the Common Core State Standards. Topics include: Geometry, measurement, probability, statistics, data analysis, and problem solving. Credits: 3
Prerequisites: MATH 095 or MATH 096 or Compass-Algebra with min score of 37
Course Notes: Prerequisites: MATH 095 or MATH 096, or Compass-Algebra with min score of 37, or ACCM score of 41 or higher.

MATH 116 - FINITE MATHEMATICS
This course is intended for business majors to expand their mathematical skills and apply them in real world situations. Linear equations and applications; functions and graphs; solving systems of linear equations; matrices; graphing of linear inequalities; Linear Programming; finance problems including simple and compound interest; sets; combinatorial methods; probability with applications. Credits: 3
Prerequisites: MATH 095 or MATH 096 or MATH 100 or MATH 103 or Compass-Algebra with min score of 37 or MATH 101
Course Notes: Prerequisites: MATH 095 or MATH 096, Compass algebra with a min score of 37, or ACCM score of 41 or higher.

MATH 121 - COLLEGE ALGEBRA
This course will strengthen your algebraic skills and prepare you to apply algebraic techniques to future math, science, computer science, and business courses. Topics include: Algebraic operations, equations and inequalities, graphs and functions, polynomial functions, polynomial equations. Exponential and logarithmic functions. Systems of equations. Credits: 3
Course Notes: Math 096 or Compass Algebra with a min score of 45, 2-1/2 HS algebra/geometry or, or ACCM score of 41 or higher.

MATH 122 - TRIGONOMETRY AND PRECALCULUS
Prerequisites: MATH 121 or Compass-College Algebra with min score of 45
Course Notes: Placement Test, or ACCM score of 60 or higher.

MATH 202 - APPLIED CALCULUS FOR HEALTH SCIENCE AND BUSINESS
Real valued functions and their graphs, exponential and logarithmic functions, derivatives, techniques of differentiation, applications of derivatives to science and business, modeling using calculus, optimization, integration with applications. Credits: 3
Prerequisites: MATH 121
Course Notes: or RUA placement. This course does not serve as a prerequisite for Math 232. Credit cannot be given for both this and Math 231.
MATH 217 - ELEMENTARY STATISTICS
This course applies statistical techniques to problems in the social sciences and business. Elementary probability and probability distributions, random variables, expectation and variance; normal probability distributions (binomial distributions, time-permitting). Applications to estimation, confidence intervals, statistical testing of hypotheses, two-sample techniques. Correlation and least squares. Credits: 3
Prerequisites: MATH 116 or Compass-College Algebra with min score of 45 or MATH 121 or MATH 110
Course Notes: Cross-listed with ECON 234 and SOC 291., or ACCM score of 60 or higher.

MATH 218 - ELEMENTARY STATISTICS LAB
The course incorporates collaborative learning, oral and written reports and technology. Emphasizes techniques, exploration and applications rather than derivation. All projects will use real data and conclusions are not predetermined. Topics include methods of summarizing data, statistical inference and regression.
Credits: 1
Attributes: Honors Program
Prerequisites: MATH 217 (may be taken concurrently) and (MATH 110 or MATH 116 or MATH 121)
Course Notes: Must be taken concurrently with MATH 217, ECON 234, or SOC 291.

MATH 231 - CALCULUS I
Functions, limits, continuity, and rates of change are studied numerically, symbolically, and graphically. Definition and rules of differentiation; applications of the derivative to analyzing functions, solving equations, computing extrema, and L'Hopital's rule; antiderivatives. Introduction to integration and the fundamental theorem of calculus.
Credits: 5
Prerequisites: MATH 122 or Compass-Trigonometry with min score of 45 or Math PrEP for Math 122 with min score of 75
Course Notes: ACCM score of 90 or higher.

MATH 232 - CALCULUS II
Integration and the fundamental theorem of calculus. Numerical integration, application and methods of integration; Euler's method; Taylor polynomials, sequences, and series. Application of calculus through a social justice oriented project.
Credits: 5
Prerequisites: MATH 231

MATH 233 - CALCULUS III
Polar and three-dimensional coordinates, vectors, planes, and surfaces; functions of several variables; continuity, partial derivatives, gradients, chain rules, multiple integrals, line integrals.
Credits: 3
Prerequisites: MATH 232

MATH 238 - APPLIED PROBABILITY AND STATISTICS
Elementary probability and probability distributions, counting techniques, random variables, expectation and variance, Bayes' theorem; binomial, normal, and other probability distributions; Selections from the following: comparison of normal means, introduction to ANOVA and regression, correlation, contingency tables and Chi-square tests, and nonparametric methods.
Credits: 3
Prerequisites: MATH 217 or ACSC 348 or MATH 348 or ECON 234 or PSYC 200

MATH 245 - DISCRETE STRUCTURES
Sets, logic and Boolean algebras. Basic counting techniques; number systems; elementary probability; graphs and trees with applications to elementary data structures. Emphasis on algorithms. Mathematics majors should take MATH 290 concurrently.
Credits: 3
Prerequisites: MATH 121 or Compass-College Algebra with min score of 45 or MATH 231
Course Notes: Co-requisite MATH 245 Discrete Structures Lab.

MATH 280 - MATHEMATICAL MODELING
The modeling process. Model fitting and models requiring optimization; empirical model construction; model analysis and sensitivity; simulation modeling; modeling dynamic behavior.
Credits: 3
Prerequisites: MATH 231

MATH 290 - INTRODUCTION TO PROOF
Individual projects pursued under an instructor's supervision.
Credits: 1-3

MATH 295 - INDEPENDENT STUDY
Individual projects pursued under an instructor's supervision.

MATH 307 - DIFFERENTIAL EQUATION/MODELING
The use and interpretation of differential equations using qualitative methods and computers. First and second order linear equations, with attention to some nonlinear ones; systems of equations; numerical methods; Laplace transforms. An emphasis is placed on modeling.
Credits: 3
Prerequisites: MATH 232

MATH 309 - DATA MINING
Methods of knowledge discovery in massive data, i.e. the study of computer-assisted process of digging through and analyzing enormous data sets and then extracting the 'meaning' of the data by applying mathematical methods. The methods that we study in this course are designed to predict behaviors and future trends based on existing data. Topics include classifications techniques, clusterization techniques, association rule discovery techniques, techniques for improving data quality. See Cat 309.
Credits: 3
Prerequisites: MATH 232

MATH 316 - HISTORY OF MATHEMATICS
Evolution of mathematical ideas from antiquity through the development of calculus; Number systems, Euclidean geometry, Number theory, Roots of polynomials, Calculus.
Credits: 3
Prerequisites: MATH 231
MATH 317 - GEOMETRY
Axiom systems, Classical constructions, Euclidean geometry, Non-Euclidean geometry, Transformations, Use of geometric software packages.
Credits: 3
Prerequisites: MATH 231 or (MATH 245 and MATH 122) or MATH 290

MATH 318 - NUMBER THEORY
Study of integers. Division and Euclidean algorithms, prime numbers, unique factorization; Diophantine equations; congruences; Fermat’s and Euler’s theorems; quadratic reciprocity.
Credits: 3
Prerequisites: MATH 231 or MATH 245 or MATH 290

MATH 320 - INTRODUCTION TO ABSTRACT ALGEBRA
Introduction to group theory; Classification of finitely generated abelian groups; Permutation groups; Applications of groups; Elementary properties of rings, integral domains, and fields.
Credits: 3
Prerequisites: (MATH 246 or ACSC 246) and (MATH 245 or MATH 290)
Course Notes: MATH 245 with LAB required to meet pre-req.

MATH 323 - COOPERATION AND COMPETITION -- GAME THEORY AND APPLICATIONS
Study of the ways in which strategic interactions among autonomous agents produce outcomes with respect to the preferences (or utilities) of those agents. This course covers game-theoretic foundations of cooperative and non-cooperative behavior of independent agents. The course emphasizes applications drawn from artificial intelligence, decision theory, economics, psychology, business management and finance. See Cst 310.
Credits: 3
Prerequisites: (MATH 246 or ACSC 246) and MATH 245 or MATH 290

MATH 328 - LINEAR PROGRAMMING & OPTIMIZATION
Models of optimization with linear constraints and objectives; simplex method and related algorithms; duality and sensitivity; transportation and assignment problems, games, and network flows. Computer use course.
See Cst 328.
Credits: 3
Prerequisites: MATH 246 or ACSC 246

MATH 337 - THEORY OF COMPUTATION
An introduction to the theoretical foundations of computing. The definition and nature of computational problems and algorithms. The properties of problems that are inherently hard to solve and problems that cannot be solved at all. Use of randomness in computation. See Cst 337.
Credits: 3
Prerequisites: MATH 245 or MATH 290 or MATH 246 or ACSC 246

MATH 339 - BASEBALL STATISTICS
Models and research methods developed or adapted for use by baseball statisticians; including descriptive statistics, confidence intervals, hypothesis testing, regression, Bayesian statistics, and Markov chains. Presentation of several tools for teaching statistical concepts using data from baseball.
Credits: 3
Prerequisites: (MATH 246 or ACSC 246) and MATH 217 or ECON 234 or SOC 291 or MATH 347 or ACSC 347
Course Notes: Basis background in Statistics and Linear Algebra, recommended.

MATH 345 - COMBINATORICS
Permutations and combinations; identities involving binomial coefficients; inclusion-exclusion principle; recurrence relations; generating functions; introduction to theory of graphs. See Cst 345.
Credits: 3
Prerequisites: MATH 232 and MATH 245 or MATH 290

MATH 347 - PROBABILITY THEORY
Probability models; random variables; probability distributions; expectation and moment generating functions of random variables; multivariate distributions. See Acsc 347.
Credits: 3
Prerequisites: MATH 233 (may be taken concurrently)
Course Notes: or concurrent.

MATH 348 - MATHEMATICAL STATISTICS
Continuation of Math/Acsc 347. Distributions of functions of random variables, sampling distributions; Central Limit Theorem; point estimators and confidence intervals; hypothesis testing; linear models. See Acsc 348.
Credits: 3
Prerequisites: MATH 347 or ACSC 347

MATH 349 - REGRESSION & TIME SERIES
Simple and multiple linear regression models; time series analysis; applications to forecasting; statistical software. See Acsc 349.
Credits: 3
Prerequisites: (MATH 231 and (MATH 217 or ECON 234 or SOC 291)) or ACSC 348 or MATH 348

MATH 350 - BOOLEAN ALGEBRA & SWITCH THEORY
Credits: 3
Prerequisites: MATH 245 or MATH 290

MATH 352 - ANALYSIS
Theoretical foundations of calculus. The real number system; sequences and series; continuity; uniform continuity; sequences and series of functions; uniform convergence; Riemann integral. At least six hours beyond Math 245 recommended.
Credits: 3
Prerequisites: MATH 233 and MATH 290 and MATH 245
Course Notes: MATH 246 recommended.

MATH 355 - FUNCTIONS OF A COMPLEX VARIABLE
Elementary functions of complex variables; complex differentiation and integration; Cauchy-Goursat theorem; Taylor and Laurent series; singularities and residues; conformal mapping.
Credits: 3
Prerequisites: MATH 233 and MATH 290 and MATH 245

MATH 367 - FINANCIAL MATH
Mathematics of interest, accumulated value, and present value; annuities certain; amortization schedules and sinking funds; bonds and related securities; depreciation; rates of return; spot and forward rates of interest; cashflow duration and immunization; stocks, mutual funds, fixed income. Financial calculator. See ACSC 367.
Credits: 3
Prerequisites: MATH 232
MATH 369 - MODELS FOR LIFE CONTINGENCIES
Survival distributions and life tables; life insurance; life annuities; benefit premium; premium calculation. See Acsc 369.
Credits: 3
Prerequisites: (ACSC 347 or MATH 347) and (ACSC 367 or MATH 367 (may be taken concurrently))
Course Notes: or concurrently.

MATH 389 - SPECIAL TOPICS
Course content varies. May be repeated for up to six semester hours credit.
Credits: 1,3
Prerequisites: MATH 231 or MATH 245

MATH 390 - INDUSTRIAL RESEARCH PROBLEMS
Students work on a semester long research project solving a real world problem from industry using various methods of mathematical modeling. Problems vary by semester.
Credits: 3
Prerequisites: MATH 232
Course Notes: Capstone

MATH 395 - INDEPENDENT STUDY
Individual projects pursued under an instructor's supervision.
Credits: 1-6