

MATHEMATICS (MATH)

MATH 010 - MATHEMATICAL FOUNDATIONS

This class covers the fundamentals of arithmetic and algebra: Whole numbers; Fractions; Decimals; Ratios; Rates; Percents; Proportional Reasoning; Measurement; 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 these 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 or as a prerequisite to MATH 021

MATH 021 - ALGEBRAIC FOUNDATIONS

This class covers the fundamentals of 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. This course is taken concurrently with either MATH 121 and focuses on skills needed for success in College Algebra. 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

Prerequisites: MATH 121 (may be taken concurrently)

Course Notes: Must be taken concurrently with Math 121

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 or concurrent enrollment in Math 010.

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 010 or MATH 095 or MATH 096 MathPrep or placement by RUA or ACT or SAT.

MATH 110R - INTER ALGEBRA

INTER ALGEBRA

Credits: 3

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 placement by RUA, or ACT, or SAT or concurrent enrollment in Math 021.

MATH 122 - TRIGONOMETRY AND PRECALCULUS

Review of exponential and logarithmic functions. Trigonometric functions and their properties; trigonometric identities and applications. Vectors and complex numbers. Polar coordinates. Systems of linear equations.

Credits: 3

Prerequisites: MATH 121

Course Notes: RUA placement score or SAT/ACT placement scores or MathPrep.

MATH 160 - MATH PHARMACY

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Credits: 3

MATH 170 - MATH NURSING

This course is designed to assist nursing students in the mastery of drug dosage calculations across the lifespan, a necessary competency for the safe and accurate administration of medications. A variety of methods will be used to teach drug dosage calculation including dimensional analysis and the ratio-proportion method.

Credits: 3

Course Notes: Must be a Nursing major.

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 110 or MATH 116 or MATH 121

Course Notes: Cross-listed with ECON 234 and SOC 291. RUA placement score or SAT/ACT placement scores.

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 (may be taken concurrently)

Course Notes: RUA placement score or SAT/ACT placement scores or MathPrep.

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 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: and one programming course required for students who have not completed MATH 231.

MATH 246 - LINEAR ALGEBRA

Vector spaces; linear transformations and matrices; inner products and orthogonality; eigenvalues; eigenvectors; and diagonalization.

Credits: 3

Prerequisites: MATH 231 or MATH 245 or MATH 290

MATH 290 - INTRODUCTION TO PROOF

Methods of mathematical proof including direct proofs, indirect proofs, mathematical induction, case analysis, and counterexamples. MATH 245 should be taken concurrently.

Credits: 1

Prerequisites: MATH 245 (may be taken concurrently)

Course Notes: Co-rerequisite MATH 245 Discrete Structures Lab.

MATH 305 - SCIENCE OF CHANCE

This course will focus on understanding the different types of probability and their applications to biology, genetics, psychology, gaming, gambling, lottery, etc. Through experience-based learning activities, students will study and apply probability topics such as odds of winning (losing), conditional probability, and making predictions. Graphing calculations and/or a statistical computing package will be utilized.

Credits: 3

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 Cst 309.

Credits: 3

Prerequisites: (MATH 217 or MATH 347) and MATH 246 and CST 150

MATH 311 - BIOSTATS

This course is an introduction to the use of biostatistics in describing and analyzing data as it relates to life sciences, epidemiology and health outcomes analysis. Through experience-based learning activities, students will study and apply measures of central tendency, variation and position, probability distributions, sampling methods, confidence intervals, hypothesis testing and survival analysis with significant utilization of a statistical computing package. (Prerequisite: MAT 170 or MAT 172)

Credits: 3

Prerequisites: MAT 170 or MAT 172

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 320R - STATISTICS

This course is an introduction to the use of statistics in describing and analyzing data. Through experience-based learning activities, students will study and apply collecting, analyzing, interpreting and drawing conclusions from data through graphical measures, measures of central tendency, variation and position, correlation, regression, probability distributions, confidence intervals and hypothesis testing with significant utilization of a statistical computing package. (Prerequisite: MAT 210)

Credits: 3

Prerequisites: MAT 210

MATH 323 - 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 217 or ECON 234 or SOC 291 or MATH 347 or ACSC 347

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 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 366 - CRYPTOGRAPHY

Cryptography provides algorithms and protocols for secure communication over an insecure channel. These tools are also used in many other aspects of information security such as access control or digital signature. Cryptography plays a crucial role in a wide scope of real-world applications, from the classical military and national security applications to email and online banking. The course focuses on concepts and techniques underlying public-key cryptography. Course topics include symmetric cryptosystems, RSA and other public-key cryptosystems, digital signatures, key exchange protocols, secret sharing, identification schemes, etc.

Credits: 3

Prerequisites: MATH 245 and (CST 150 or CSIA 150)

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