

MATH - MATHEMATICS (MATH)

Note: The appropriate entry level in mathematics is determined by the student's intended major and a mathematics placement examination given to all entering freshmen. Placement testing is also required for transfer students who have not completed their general education mathematics requirements.

Majors in the natural or computer sciences or mathematics who have completed three years of college preparatory mathematics and have demonstrated competence on the mathematics placement examination; should enroll in Mathematics U121, U126 or U127 as appropriate. Students who need both college algebra and trigonometry have the option of taking Mathematics U121 (with a grade of B or better) or U126, and Mathematics U127. Those who have demonstrated competence in college algebra can take Mathematics U127 to meet the calculus prerequisite. Upon successful completion of one of the precalculus options, students should enroll in Mathematics U141. Those who have completed four years of college preparatory mathematics, including trigonometry, and have demonstrated competence on the mathematics placement examination, should enroll in Mathematics U141.

Students not majoring in the natural or computer sciences, who have successfully completed high school Algebra I and II, and have demonstrated competence on the mathematics placement examination, should enroll as follows: business administration majors in the Mathematics U121, U122 sequence; elementary, early childhood, and special education majors in Mathematics U121, and U231; other majors in a mathematics course determined by their advisors.

MATH U102 Elementary Statistics 3 Credit Hours

The fundamentals of modern statistical methods, descriptive and inferential statistics, probability and sampling; primarily for students in fields other than mathematics who need a working knowledge of statistics.

Prerequisite(s): High school Algebra I and II, or equivalent.

MATH U120 College Mathematics 3 Credit Hours

Linear equations and inequalities, exponential equations, mathematics of finance, fundamental set theory, fundamentals of probability and statistics. This course may not be used to satisfy any prerequisite requirement for higher-numbered mathematics courses.

Prerequisite(s): Appropriate score on placement test and high school Algebra I and II.

MATH U120A College Mathematics with Lab 3 Credit Hours

Linear equations and inequalities, exponential equations, mathematics of finance, fundamental set theory, fundamentals of probability and statistics. This course may not be used to satisfy any prerequisite requirement for higher-numbered mathematics courses.

Prerequisite(s): Appropriate score on placement test and high school Algebra I and II.

MATH U121 College Algebra 3 Credit Hours

Equations and inequalities, graphing, polynomial, rational, exponential, logarithmic, and other functions; matrices and systems of equations.

Only one of MATH U121 and MATH U126 may be used to satisfy a mathematics requirement for general education or major credit. For students who need a more intensive study, an expanded version of college algebra (MATH U121A) is available. MATH U121A is open to students who have an appropriate score on the placement test, have completed MATH U120 with the mandatory lab, or if the student, in consultation with his or her advisor, determines that extra instruction is needed in order to succeed in MATH U121.

Prerequisite(s): appropriate score on placement test and high school Algebra I and II.

Cross-Listed: MATH U121A

MATH U121A College Algebra 3 Credit Hours

Equations and inequalities, graphing, polynomial, rational, exponential, logarithmic, and other functions; matrices and systems of equations.

Only one of MATH U121 and MATH U126 may be used to satisfy a mathematics requirement for general education or major credit.

Prerequisites: Appropriate score on placement test and high school Algebra I and II. For students who need a more intensive study, an expanded version of College Algebra (MATH U121A) is available.

Prerequisite(s): Appropriate score on the placement test, have completed MATH U120A, or if the student, in consultation with her or her advisor, determines that extra instruction is needed in order to succeed in MATH U121.

Cross-Listed: MATH U121

MATH U122 Calculus for Management and Social Sciences 3 Credit Hours

Derivatives and integrals of elementary algebraic, exponential and logarithmic functions; maxima, minima, rate of change, area under a curve, and volume. Problems and examples are drawn from a variety of areas which include economics, psychology, biology, geography, and geology.

Prerequisite(s): MATH U121, or MATH U126; or eligibility for exemption from MATH U121.

MATH U126 Precalculus I 3 Credit Hours

Subsets of the real number line; polynomial, rational, absolute value, exponential and logarithmic relations and functions. Only one of MATH U121 and MATH U126 may be used to satisfy a mathematics requirement for general education or major credit.

Prerequisite(s): Appropriate score on placement test and three years of college preparatory mathematics.

MATH U127 Precalculus II 3 Credit Hours

Trigonometric functions, trigonometric identities, solution of equations and triangles, inverse trigonometric functions, vectors, polar coordinates; analytic geometry.

Prerequisite(s): Appropriate score on placement exam or consent of instructor.

Pre/Corequisite(s): MATH U126.

MATH U141 Calculus I 4 Credit Hours

Limits, continuity, the derivative, differentiation with applications in the natural sciences and engineering, antiderivatives, basic integrals with applications.

Prerequisite(s): Appropriate score on placement test and 4 years of college preparatory mathematics including Trigonometry; or grade of C or better in both MATH U126 and MATH U127; or consent of instructor.

MATH U142 Calculus II 4 Credit Hours

Applications of integration, techniques of integration, differential equations, parametric equations, and finite sequences and series.

Prerequisite(s): MATH U141 or its equivalent.

MATH U174 Elements of Discrete Mathematics 3 Credit Hours

Topics in basic logic; proof techniques; sets, relations, and functions; counting; and elementary number theory.

Prerequisite(s): High school Precalculus; or MATH U126 or equivalent; or consent of instructor.

MATH U202 Elementary Statistics II 3 Credit Hours

An expansion of topics taught in the first semester of elementary statistics such as hypothesis testing; inferences; correlation and regression. Additional topics to be covered include: multinomial experiments and contingency tables; analysis of variance; statistical process control; and individual projects.

Prerequisite(s): MATH U102, or ECON U291, or SOCY U201, or PSYC U225.

MATH U231 Basic Concepts of Elementary Mathematics I 3 Credit Hours

The meaning of number, fundamental operations of arithmetic, the structure of the real number system and its subsystems, elementary number theory. Open only to students in early childhood, elementary, middle grades, or special education.

Prerequisite(s): Grade of C or better in MATH U121 or higher, not including statistics; or consent of instructor.

MATH U232 Basic Concepts of Elementary Mathematics II 3 Credit Hours

A continuation of the development of the real number system and its subsystems, basic concepts of probability, and elementary data analysis. Open only to students in early childhood, elementary, middle grades, or special education.

Prerequisite(s): Grade of C or better in MATH U231 or consent of instructor.

MATH U233 Geometry and Measurement 3 Credit Hours

A study of properties and relationships of shape, size, and symmetry in two and three dimensions; explorations of concepts of motion in two and three dimensions through transformations. Open only to students in early childhood, elementary, middle grades, or special education.

Prerequisite(s): Grade of C or better in MATH U231 or higher; or consent of instructor.

MATH U241 Calculus III 4 Credit Hours

Vectors and geometry of space, vector functions, partial derivatives, multiple integration, vector calculus and second order differential equations.

Prerequisite(s): Grade of C or better in MATH U142 or its equivalent; or consent of instructor.

MATH U245 Elementary Differential Equations 3 Credit Hours

Ordinary differential equations of first order, higher order linear equations, Laplace transform methods, series methods; numerical solutions of differential equations; applications to the physical sciences and engineering.

Prerequisite(s): MATH U241.

MATH U255 MATLAB Programming 3 Credit Hours

Programming language and techniques designed specifically for programs that rely on the application of mathematics for solution.

Topics include variables, assignment statements, expressions, vectors and matrices, MATLAB scripts, input and output, selection statements, flow control, program organization, M-files, optimizing M-files, string manipulations, data structures, advanced functions, plotting, symbolic math toolboxes, variable precision arithmetic, and tricks and tips in MATLAB programming.

Prerequisite(s): MATH U141 or consent of instructor.

MATH U315 Statistical Methods I 3 Credit Hours

Review of descriptive statistics, testing statistical hypothesis, introduction to correlation, regression and linear regression models, model building, variable selection and model diagnostics.

Prerequisite(s): MATH U102, or MATH U141, or ECON U291, or SOCY U201, or PSYC U225, or consent of instructor.

MATH U320 Mathematical Modeling 3 Credit Hours

Graphs of functions as models, modeling using proportionality and geometric similarity, model fitting and models requiring optimization, experimental modeling, modeling using the derivative and interactive dynamic systems.

Prerequisite(s): MATH U141.

MATH U340 Mathematical Structures and Proof 3 Credit Hours

Topics in set theory, logic, elementary application of logic, methods of mathematical proofs, equivalence relations and partial orderings, functions and mappings, and number systems.

Prerequisite(s): MATH U142.

MATH U344 Linear Algebra I 3 Credit Hours

Matrices, systems of linear equations, vectors, Euclidean vector spaces, linear transformations, eigenvalues and eigenvectors.

Prerequisite(s): MATH U142 or consent of instructor.

MATH U345 Applied Partial Differential Equations 3 Credit Hours

Basic linear Partial Differential Equations (PDEs) of hyperbolic, parabolic, and elliptic types used in mathematical modeling of physical, chemical, biological and other phenomena, systems, technical devices and financial markets. Selected topics such as the boundary value and initial value problems are covered.

Prerequisite(s): Grade of C or better in MATH U245; or consent of instructor.

MATH U346 Modern Algebra I 3 Credit Hours

Group theory and introduction to rings. Topics include abelian groups, cyclic groups, permutations, group homomorphisms and isomorphisms, Cayley's theorem, normal subgroups, quotient groups, Lagrange's theorem.

Prerequisite(s): MATH U340 or consent of instructor.

MATH U354 Real Analysis I 3 Credit Hours

Ordered field properties of the real number system; completeness; theory of limits of sequences, series and functions; continuity (including uniform continuity); introduction to theory of the derivative.

Prerequisite(s): MATH U340 or consent of instructor.

MATH U374 Theory of Discrete Mathematics 3 Credit Hours

Topics selected from theoretical Boolean algebra, algebraic structures, theory of computing, advanced set theory, and recursive functions.

Prerequisite(s): MATH U142, MATH U174, or consent of instructor.

MATH U395 Internship 1-3 Credit Hours

Supervised practical experience related to the student's major in Mathematics in an elected setting planned in conjunction with the appropriate faculty member. The course may only be applied for a maximum of three hours as an Upper Level Elective.
Prerequisite(s): Junior Standing or consent of instructor.
Typically Offered: Upstate Fall Offering, Upstate Spring Offering, Upstate Summer Offering

MATH U399 Independent Study 1-9 Credit Hours**MATH U444 Elements of Optimization 3 Credit Hours**

The methods of the numerical solutions of optimization problems arising in operational research, logistics, economics, etc. Emphasis is on the simplex and Karmarkar's polynomial-time method.
Prerequisite(s): Grade of C or better in both MATH U241 and MATH U344; or consent of instructor.

MATH U501 History of Mathematics 3 Credit Hours

A survey of the major developments and procedures of mathematics, from its origins to the modern era, relating development with the diverse cultures and the aspects of mathematics they contributed.
Prerequisite(s): MATH U142 or consent of instructor.

MATH U531 Foundations of Geometry 3 Credit Hours

Geometry as a logical system based upon postulates and undefined terms; fundamental concepts and relations of Euclidean geometry developed rigorously on the basis of a set of postulates; some topics from non-Euclidean geometry.
Prerequisite(s): MATH U340 or consent of instructor.

MATH U544 Linear Algebra II 3 Credit Hours

Vector spaces, and subspaces; bases and dimension; change of basis; linear transformations and their matrices; diagonalization; canonical forms; bilinear forms; eigenspaces.
Prerequisite(s): MATH U340 and MATH U344.

MATH U546 Modern Algebra II 3 Credit Hours

Advanced topics in groups, rings and fields. These topics include p-groups, polynomial rings, ideals, integral domains, extension fields, isomorphism theorems for groups and rings.
Prerequisite(s): MATH U346.

MATH U552 Complex Variables 3 Credit Hours

Complex numbers and functions, complex integration, Taylor and Laurent series, residues, and conformal mapping.
Prerequisite(s): MATH U340 or consent of instructor.

MATH U554 Real Analysis II 3 Credit Hours

Further development of the theory of differential and integral calculus including properties of the derivative and integral, Fundamental Theorem of Calculus, sequences and series of functions.
Prerequisite(s): MATH U354.

MATH U560 Numerical Analysis I 3 Credit Hours

Difference calculus; direct and iterative techniques for matrix inversion; eigenvalue problems; numerical solutions of initial value problems in ordinary differential equations; stability; error analysis; laboratory applications.
Prerequisite(s): MATH U245, MATH U344 and programming competency.

MATH U561 Numerical Analysis II 3 Credit Hours

The finite-difference and finite element methods for the numerical solution of basic linear Partial Differential Equations (PDEs) arising in mathematical modeling of physical, chemical, biological and other phenomena, systems, technical devices and financial markets.
Prerequisite(s): Grade of C or better in both MATH U345 and MATH U560; or consent of instructor.

MATH U579 Introduction to Industrial Mathematics 3 Credit Hours

Basic applications of PDEs, numerical methods for PDEs and scientific computing to applied problems arising in the natural sciences, industry, and financial engineering. Emphasis is on the formulation and solution of problems of heat transfer and diffusion equations, Maxwell's equations and differential equations governing the financial derivatives.
Prerequisite(s): Grade of C or better in both MATH U345 and MATH U561; or consent of instructor.

MATH U598 Topics in Mathematics 3 Credit Hours

Intensive study in an area of pure or applied mathematics such as mathematical modeling. Topics are selected to meet current faculty and student interest.
Prerequisite(s): MATH U241 and consent of instructor.

MATH U599 Seminar in Mathematics 3 Credit Hours

Recent developments in pure and applied mathematics at an advanced level; ethical issues; and experience in research and oral presentation.
Prerequisite(s): Senior standing.
Pre/Corequisite(s): MATH U344, MATH U346, and MATH U315.