Mathematics (MATH)

Courses numbered 000–099 do not count toward any degree program.

Courses numbered 100 to 299 = lower-division; 300 to 499 = upper-division; 500 to 799 = undergraduate/graduate.

MATH 007. Arithmetic 3 credit hours
A review and study of the basic arithmetical operations for the mature student whose previous training in arithmetic is inadequate for completion of college mathematics courses. Graded Cr/NCr.

MATH 011. Beginning Algebra 5 credit hours
Content consists of algebra topics usually covered in the first year of a standard high school algebra course. Graded Cr/NCr. Not applicable to degree.

MATH 012. Intermediate Algebra 3-5 credit hours
Content consists of topics usually covered in the second year of a standard high school algebra course. Graded Cr/NCr. Prerequisite: MATH 011 or one year of high school algebra, and qualifying score in recent department placement exam. Not applicable to degree.

MATH 013. College Algebra Supplement 2 credit hours
A supplement to MATH 111 to be taken concurrently with designated sections of MATH 111 to allow students 5 contact hours for mastering college algebra. Graded Cr/NCr. Corequisite: MATH 111.

MATH 111. College Algebra 3 credit hours
General education foundation course. A survey of functions, theory of equations and inequalities, complex numbers, and exponential and logarithmic functions. High school geometry is a highly recommended preparatory course. Prerequisites: MATH 012 or two years of high school algebra and qualifying score in recent department placement exam. Credit is allowed in only one of the two courses MATH 111 and 112.

MATH 112. Precalculus Mathematics 5 credit hours
General education foundation course. Functions, theory of equations and inequalities, complex numbers, the trigonometric functions, exponential and logarithmic functions, and other standard topics prerequisite to a beginning study of calculus. Course is not available for credit to students who have received a C or better in MATH 242 or its equivalent. Prerequisites: MATH 012 or two years of high school algebra, one unit of high school geometry, and qualifying score in recent department placement exam. Credit is allowed in only one of the two courses MATH 111 and 112.

MATH 121. Geometry for College Students 3 credit hours
A study of lines, angle relationships, parallel lines, triangles, quadrilaterals, similar triangles, circles, areas of polygons and circles, and some material on surface and solids. Prerequisite: MATH 111 or equivalent with a grade of C or better.

MATH 123. College Trigonometry 3 credit hours
General education foundation course. Studies the trigonometric functions and their applications. Credit in both MATH 123 and 112 is not allowed. Prerequisite: MATH 111 with C or better or equivalent high school preparation and one unit of high school geometry.

MATH 131. Contemporary Mathematics 3 credit hours
General education foundation course for students majoring in nontechnical areas. A collection of applications of mathematics illustrating how contemporary mathematical thinking is used in the decision-making process. Covers topics selected from such areas as the mathematics of social choice, management science, statistics, coding information, and the geometry of growth, shape and symmetry.

Prerequisite: MATH 012 or two years of high school algebra and a qualifying score on a recent departmental placement examination.

MATH 144. Business Calculus 3 credit hours
General education introductory course. A brief but careful introduction to calculus for students of business and economics. Credit in both MATH 144 and 242 is not allowed. Prerequisite: MATH 111 or 112 with a C or better, or equivalent high school preparation.

MATH 150. Workshop in Mathematics 1 credit hour
Topics of interest to particular students and not elsewhere available in the curriculum. May be repeated for a total of 6 hours credit with departmental consent. Prerequisite: departmental consent.

MATH 211. Elementary Linear Algebra 1-3 credit hours
Covers topics in linear algebra together with elementary applications. Prerequisite: One and one-half units of high school algebra or MATH 011.

MATH 224. Calculus I 5 credit hours
General education introductory course. Analytic geometry and the calculus in an interrelated form. Credit in both MATH 242 and 144 is not allowed. Prerequisites: MATH 112 with a C or better, or two units of high school algebra, one unit of high school geometry and one-half unit of high school trigonometry, or MATH 123 and 111 with a C or better in each.

MATH 224H. Calculus I - Honors 5 credit hours
General education introductory course. Analytic geometry and the calculus in an interrelated form. Credit in both MATH 242 and 144 is not allowed. Honors section. Prerequisites: MATH 112 with a C or better or two units of high school algebra, and one unit of high school geometry and one-half unit of high school trigonometry, or MATH 123 and 111 with a C or better in each.

MATH 225. Calculus II 5 credit hours
General education advanced further study course. A continuation of MATH 224. Includes a study of integration and applications and an introduction to infinite series. Prerequisite: MATH 224 with a C or better.

MATH 225H. Calculus II - Honors 5 credit hours
General education advanced further study course. A continuation of MATH 224. Includes a study of integration and applications and an introduction to infinite series. Honors section. Prerequisite: MATH 224 with a C or better.

MATH 251. Technical Calculus 3 credit hours
Standard topics in analytic geometry and calculus, including differentiation and integration, with applications to engineering technology. This course is intended for students in the engineering technology program. Not open to students with credit in MATH 144 or 242. Prerequisite: MATH 112 with a C or better, or MATH 111 and 123 with C or better in each, or equivalent preparation.

MATH 252. Technical Calculus II 3 credit hours
Standard topics in analytic geometry and calculus, including topics in multidimensional calculus and differential equations with applications to engineering technology. This course is intended for students in the engineering technology program. Prerequisite: MATH 251 with a C or better, or MATH 242 with a C or better, or equivalent preparation.

MATH 300. Evolution of Mathematics 3 credit hours
A study of mathematics and mathematicians from antiquity to the present, to see how mathematics has developed from human beings' efforts to understand the world and the extent to which mathematics has molded our civilization and culture. Since mathematics is what mathematicians do, the lives of mathematicians from various ages and countries are studied. Not a mathematical skills course.
MATH 311. Introduction to Linear Algebra  
A study of systems of linear equations, matrices, vectors, eigenvalues and eigenvectors. Prerequisite: MATH 344 or concurrent enrollment. Credit not allowed in both MATH 211 and 311.

MATH 321. Discrete Structures I  3 credit hours  
Cross-listed as CS 321. Provides a mathematical foundation essential to the entire computer science curriculum. Includes propositional and predicate logic, induction, recursion and counting techniques. Prerequisite: MATH 242 or equivalent with a grade point of 2.000 or better.

MATH 322. Discrete Structures II  3 credit hours  
A continuation of MATH 321. Includes relations, graphs, trees, Boolean algebra and automata. Prerequisite: MATH 321.

MATH 344. Calculus III  3 credit hours  
General education advanced further study course. A continuation of MATH 243. Includes a study of multiple integration and partial derivatives. Prerequisite: MATH 243 with a grade point of 2.000 or better.

MATH 344H. Calculus III - Honors  3 credit hours  
General education advanced further study course. A continuation of MATH 243. Includes a study of multiple integration and partial derivatives. Honors section. Prerequisite: MATH 243 with a grade point of 2.000 or better.

MATH 415. An Introduction to Advanced Mathematics  
3 credit hours  
Develops the concept of proof in a setting of mathematical tools needed in advanced courses. Covers topics in number theory, algebra and analysis. Particular attention to equivalence relations, functions, induction and mathematical systems. Prerequisite: MATH 344 with a grade point of 2.000 or better.

MATH 451. Computational Mathematics Using MATLAB  
3 credit hours  
Introduces the use of MATLAB in computational algorithms. A bridge to upper-division courses in numerical methods and applied mathematics. Prerequisite: MATH 243 with a grade point of 2.000 or better.

MATH 480. Individual Projects  
1-5 credit hours  
Repeatable up to 10 hours. Prerequisite: departmental consent.

MATH 480F. Quantum Computing  
3 credit hours  
Theory and mathematics of quantum mechanics as applied to problems in quantum information; simulations of physical implementations and coding.

MATH 481. Cooperative Education  
1-6 credit hours  
Provides practical field experience, under academic supervision, that complements and enhances the student's academic program. Graded Cr/NCr. Prerequisite: departmental consent.

MATH 501. Elementary Mathematics  
5 credit hours  
A study of topics necessary to an understanding of the elementary school curriculum, such as set theory, real numbers and geometry. Not for major or minor credit. Prerequisites: elementary education major and MATH 111 or equivalent with a grade point of 2.000 or better, or departmental consent.

MATH 502. Mathematics for Middle School Teachers  
5 credit hours  
A study of the mathematical knowledge which forms the theoretical foundations of, the applications of, and extensions of middle school mathematics. This capstone course serves to reinforce mathematics skills learned in prerequisite courses and assists students in recognizing the unifying principles within their mathematical experiences.

Prerequisites: MATH 111, 121, 123, 144, 501, and STAT 370 or equivalent with a grade point of 2.000 or better in each.

MATH 511. Linear Algebra  
3 credit hours  
An elementary study of linear algebra, including an examination of linear transformations and matrices over finite dimensional spaces. Prerequisite: MATH 243 with a grade point of 2.000 or better.

MATH 513. Fundamental Concepts of Algebra  
3 credit hours  
 Defines group, ring and field, and studies their properties. Prerequisites: MATH 415 and 511 with a grade point of 2.000 or better, or departmental consent.

MATH 525. Elementary Topology  
3 credit hours  
Studies topological spaces, open and closed sets, bases for topology, continuous mappings, homeomorphisms, connectedness and compactness, Hausdorff and other spaces, with special emphasis on metric spaces. Prerequisite: MATH 415 with a grade point of 2.000 or better.

MATH 530. Applied Combinatorics  
3 credit hours  
Basic counting principles, occupancy problems, generating functions, recurrence relations, principles of inclusion and exclusion, the pigeonhole principle, Fibonacci sequences and elements of graph theory. Prerequisite: MATH 344 with a grade point of 2.000 or better.

MATH 531. Introduction to the History of Mathematics  
3 credit hours  
General education advanced issues and perspectives course. Studies the development of mathematics from antiquity to modern times. Solves problems using the methods of the historical period in which they arose. Requires mathematical skills. Prerequisites: MATH 511 and two additional courses at the 500 level or above, with a grade point of 2.000 or better in each.

MATH 531H. Introduction to the History of Mathematics - Honors  
3 credit hours  
General education advanced issues and perspectives course. Studies the development of mathematics from antiquity to modern times. Solves problems using the methods of the historical period in which they arose. Requires mathematical skills. Honors section. Prerequisites: MATH 511 and two additional courses at the 500 level or above, with a grade point of 2.000 or better in each.

MATH 545. Integration Techniques and Applications  
3 credit hours  
Studies the basic integration techniques used in applied mathematics. Includes the standard vector calculus treatment of line and surface integrals, Green's Theorem, Stokes's Theorem, and the Divergence Theorem. Also includes the study of improper integrals with application to special functions. Prerequisite: MATH 344 with a grade point of 2.000 or better.

MATH 547. Advanced Calculus I  
3 credit hours  
Covers the calculus of Euclidean space including the standard results concerning functions, sequences and limits. Prerequisites: MATH 344 and 415 with a grade point of 2.000 or better in each.

MATH 548. Introduction to Complex Variables  
3 credit hours  
Study of complex numbers, analytic functions, differentiation and integration of complex functions, line integrals, power series, residues and poles, and conformal mapping with applications. Prerequisites: MATH 344 with a grade point of 2.000 or better.

MATH 551. Numerical Methods  
3 credit hours  
Approximating roots of equations, interpolation and approximation, numerical differentiation and integration, and the numerical solution of first order ordinary differential equations. Some computer use.
Prerequisites: MATH 344 and 451 with a grade point of 2.000 or better, or departmental consent.

MATH 553. Mathematical Models  3 credit hours
Covers case studies from the fields of engineering technology and the natural and social sciences. Emphasizes the mathematics involved. Each student completes a term project which is the solution of a particular problem approved by the instructor. Prerequisite: Math 344 with a grade point of 2.000 or better, or departmental consent.

MATH 555. Differential Equations I 3 credit hours
A study of first order equations including separation of variables and exact equations, second order equations including the general theory of initial value problems, constant coefficients, undetermined coefficients, variation of parameters and special methods of solution using power series and the Laplace transform methods. A standard course in differential equation for students in the sciences and engineering. Prerequisite: MATH 243 with a grade point of 2.00 or better, or departmental consent.

MATH 555H. Differential Equations I - Honors  3 credit hours
A study of first order equations including separation of variables and exact equations, second order equations including the general theory of initial value problems, constant coefficients, undetermined coefficients, variation of parameters and special methods of solution using power series and the Laplace transform methods. A standard course in differential equation for students in the sciences and engineering. Honors section. Prerequisite: MATH 243 with a grade point of 2.00 or better, or departmental consent.

MATH 580. Selected Topics In Math  1-3 credit hours
Topic chosen from topics not otherwise represented in the curriculum. May be repeated up to a maximum of 6 hours credit with departmental consent. Prerequisite: departmental consent.

MATH 615. Elementary Number Theory  3 credit hours
Studies properties of the integers by elementary means. Prerequisite: MATH 344 with a grade point of 2.00 or better, or departmental consent.

MATH 621. Elementary Geometry  3 credit hours
Studies Euclidean geometry from an advanced point of view. Prerequisite: MATH 344 with a grade point of 2.00 or better, or departmental consent.

MATH 640. Advanced Calculus II  3 credit hours
A continuation of MATH 547. Prerequisites: MATH 511 and 547 with a grade point of 2.00 or better in each.

MATH 655. Differential Equations II  3 credit hours
A continuation of MATH 555 (but with more emphasis on theoretical issues) that covers higher order differential equations, systems of first order equations (including the basics of linear algebra), some numerical methods, and stability and behavior of solutions for large times. Prerequisite: MATH 555 with a grade point of 2.00 or better, or departmental consent.

MATH 657. Optimization Theory  3 credit hours
Introduces selected topics in linear and nonlinear optimization. Develops the revised simplex method along with a careful treatment of duality. Then extends the theory to solve parametric, integer and mixed integer linear programs. Prerequisite: MATH 511 with a grade point of 2.00 or better.

MATH 713. Abstract Algebra I  3 credit hours
Treats the standard basic topics of abstract algebra. Prerequisite: MATH 513 with a grade point of 2.00 or better, or departmental consent.

MATH 720. Modern Geometry  3 credit hours
Examines the fundamental concepts of geometry. Prerequisite: MATH 513 with a grade point of 2.00 or better, or departmental consent.

MATH 725. Topology I  3 credit hours
Studies the results of point set and algebraic topology. Prerequisite: MATH 547 with a grade point of 2.00 or better, or departmental consent.

MATH 743. Ordinary Differential Equations 3 credit hours
Covers existence, uniqueness, stability and other qualitative theories of ordinary differential equations. Prerequisite: MATH 545 or 547 with a grade point of 2.00 or better, or departmental consent.

MATH 753. Partial Differential Equations I  3 credit hours
Studies the results of partial differential equations of all types. Prerequisite: MATH 547 with a grade point of 2.00 or better, or departmental consent.

MATH 755. Partial Differential Equations for Engineers  3 credit hours
Includes analysis of direct and iterative methods for the solution of linear systems, linear least squares problems, Eigenvalue problems, error analysis, and reduction by orthogonal transformations. Prerequisites: MATH 511, 547, 551 with a grade point of 2.00 or better in each, or departmental consent.

MATH 757. Complex Analysis I  3 credit hours
Includes an introduction to vector analysis, line and surface integrals, and complex analysis, contour integrals and the method of residues. Not applicable toward a graduate degree in mathematics. Prerequisite: MATH 555 with a grade point of 2.00 or better.