

MATHEMATICS & STATISTICS - MAT

MAT 105 Finite Mathematics 3 Credits

Introduction to finite (non-calculus) mathematics and its applications: linear, quadratic, exponential and logarithmic functions and equations; systems of linear equations and linear programming; compound interest problems and annuities.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: every fall & spring.

MAT 106 Calculus for the Non-Sciences 3 Credits

Fundamentals of calculus for students in business, or social or behavioral sciences. Credit not allowed if student already has credit for MAT 109 & MAT 110; or MAT 111 or MAT 115.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: every fall, spring, & summer.

MAT 108 College Precalculus 4 Credits

Basic science skills. Ratios. Polynomials and rational, exponential, logarithmic, and trigonometric functions. Solving equations. Graphing functions. Trigonometric identities. Credit not allowed if student already has credit for MAT 109, MAT 111, or MAT 115.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: every fall & spring.

MAT 109 Calculus with Review I 4 Credits

For science and mathematics majors. Calculus, with topics from pre-calculus. Logarithmic and exponential functions, trigonometric functions, limits, differentiation. Credit not allowed if student already has credit for MAT 111 or MAT 115.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: fall.

MAT 110 Calculus with Review II 4 Credits

Continuation of MAT 109. Differentiation, related rates, optimization problems, anti-differentiation, definite integral. Credit not allowed if student already has credit for MAT 111 or MAT 115.

Prerequisite: MAT 109.

Offered: spring.

MAT 111 Calculus I 4 Credits

For science and mathematics majors. Calculus of functions of single variable. Functions, limits, differentiation, continuity, graphing, logarithm, exponential and inverse trigonometric functions, related rates, optimization problems, mean value theorem, l'Hospital's rule, anti-differentiation, definite integral. Credit not allowed if student already has credit for MAT 109 and MAT 110 or for MAT 115.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: fall & spring.

MAT 112 Calculus II 4 Credits

Applications of integration, integration techniques, improper integrals, sequences, series, convergence tests, Taylor's series, applications; parametric and polar curves.

Prerequisite: minimum grade of C- in one of the following MAT 109 & MAT 110, MAT 111 or MAT 115.

Offered: fall & spring.

MAT 115 Calculus for Business 4 Credits

Calculus for business students. Differentiation and integration of functions of one variable. Applications, concepts, examples and problems in economics and business. Credit not allowed if student already has credit for either MAT 109 and MAT 110 or for MAT 111.

Prerequisite: 3 1/2 years of high school mathematics.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: fall.

MAT 121 Mathematics through History 3 Credits

Liberal arts mathematics course. Tracing the development of mathematical ideas globally and through history, with emphasis on problem solving techniques, quantitative thinking, and deductive reasoning.

Prerequisite: 3 years of high school math or equivalent; sophomore standing or higher.

Fulfills College Core: Field 7 (Mathematical Sciences), Global Awareness

Offered: occasionally.

MAT 131 Statistics for Social Sciences 3 Credits

A first course for majors in social or health sciences. Descriptive statistics, calculators, computer programs and introduction to inferential statistics. Credit not allowed if student already has credit for MAT 141 or MAT 351.

Prerequisite: 3 years of high school mathematics or equivalent.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: fall & spring.

MAT 141 Inferential Statistics and Computers for Science 4 Credits

Elementary probability theory, descriptive statistics, hypothesis testing, estimation, correlation and regression. The computer will be used with one of the standard statistical packages. Credit not allowed if student already has credit for MAT 131 or MAT 351.

Prerequisite: 3 1/2 years of high school mathematics.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: every spring.

MAT 150 Mathematics and Politics 3 Credits

Liberal arts course emphasizing applications of math in the social sciences. Covers topics such as voting theory, decisions made by groups, measurement of political power.

Prerequisite: 3 years of high school mathematics or equivalent.

Fulfills College Core: Field 7 (Mathematical Sciences), Justice

Offered: occasionally.

MAT 161 Mathematics for Elementary Teachers 3 Credits

Designed to provide a solid foundation for the mathematical topics encountered in elementary schools. The primary goal is to develop a deep understanding of mathematical concepts so future teachers can teach with knowledge and confidence. The main topics are: problem solving processes and strategies, elementary set theory, the theory behind basic arithmetic, number systems, basic probability and statistics, elementary geometry.

Prerequisite: 3 years of high school mathematics or equivalent.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: occasionally.

MAT 162 Mathematics for Middle and High School Teachers 3 Credits

Designed to provide a solid foundation for the mathematical topics encountered in middle and high schools. The primary goal is to develop a deep understanding of these mathematical concepts to allow future teachers to teach with knowledge and confidence.

Prerequisite: 3 yrs. high school mathematics or equivalent.

Fulfills College Core: Field 7 (Mathematical Sciences)

Offered: every spring.

MAT 171 Business Mathematics	3 Credits	MAT 321 Real Analysis	4 Credits
Learn mathematical principles and procedures relevant to making business/finance decisions. Topics include: Simple and compound interests; Annuities and amortized loans; Trade and cash discounts; Markups and markdowns. Learn and use the financial calculator.		Advanced study of limits, continuity, differentiation and integration of functions.	
Prerequisite: High school level mathematics or equivalent.		Prerequisite: minimum grade of C- in MAT 211, MAT 219 & MAT 230.	
Fulfills College Core: Field 7 (Mathematical Sciences)		Offered: fall of odd-numbered years.	
Offered: occasionally.		MAT 331 Geometry	3 Credits
MAT 191 Discrete Mathematics I	4 Credits	Axioms for geometry and their consequences: independence of the parallel postulate. Rudiments of hyperbolic geometry. Geometric transformations.	
Fundamental topics with computer science applications. Topics include integer properties, sets, propositional and predicate logic, elements of combinatorics and counting, elementary discrete probability, and functions and relations.		Prerequisite: MAT 230 (can be taken concurrently).	
Offered: every fall.		Offered: fall of even-numbered years.	
MAT 192 Discrete Mathematics II	4 Credits	MAT 341 Numerical Analysis	3 Credits
Advanced topics with computer science applications. Topics include proofs, graphs, trees, recursion, and a deeper exploration into some of the MAT 191 topics.		The methods used to obtain numerical solutions of functional and differential equations. Polynomial interpolation. Various approximation algorithms.	
Prerequisite: minimum grade of C in MAT 191.		Prerequisite: MAT 219 and CSC 111 & CSC 111L.	
Offered: occasionally.		Offered: spring of even-numbered years.	
MAT 211 Calculus III	4 Credits	MAT 342 Graph Theory	3 Credits
Continuation of MAT 111 and MAT 112. Analytic geometry of 3-dimensional space and calculus of functions of several variables.		This course covers basic constructions on graphs. Complete graphs, bipartite graphs, trees, cycles, and more general graphs are studied along with their combinatorial properties. Euler circuits, Hamilton circuits, spanning trees.	
Prerequisite: minimum grade of C- in MAT 112.		Applications of graphs to optimization problems such as the Traveling Salesperson Problem and Construction of the Minimal Spanning Trees.	
Offered: every fall.		Prerequisite: MAT 111 or MAT 115.	
MAT 219 Linear Algebra	4 Credits	Offered: fall of odd-numbered years.	
Vector spaces and inner product spaces. Linear transformations and matrices. Eigenvectors, eigenvalues, and applications. Orthogonal transformations. Quadratic forms and quadric surfaces.		MAT 345 Climate and Sustainability	3 Credits
Prerequisite: MAT 112 or permission of instructor.		This course, for majors from all the sciences, develops the use of conceptual models in understanding complicated situations, while illustrating the role of scientific arguments in societal debates about climate change and sustainability. Topics include: the Earth's energy balance, historical data for ocean and atmosphere and temperature and their circulation and oscillation patterns, the carbon cycle and biological systems, and handling large data. The increasingly sophisticated examples explored in the course will introduce the use of various areas of mathematics: linear models and networks, calculus-based dynamical systems, statistics and data assessment, and analysis of periodic phenomena. Students will learn about these topics by seeing simple examples of their use. The last part of the course will center on sustainability issues, and connections to global awareness, diversity, ethics, and justice.	
Offered: spring.		Prerequisite: MAT 111, MAT 115, or equivalent. Restriction: seniors only.	
MAT 222 Differential Equations	3 Credits	Fulfills College Core: Core Capstone	
Introduction to the theory and applications of ordinary differential equations.		Offered: occasionally.	
Prerequisite: minimum grade of C- in MAT 211; or passing grade in MAT112 with permission of instructor.		MAT 351 Probability & Statistics I	3 Credits
Offered: spring.		Introduction to the mathematical aspects of modern probability theory and the theory of statistics.	
MAT 230 Logic, Set Theory, and Proofs	4 Credits	Prerequisite: MAT 211.	
Transition from calculus to upper division courses: logic and methods of proof; set theory; relations, orders and functions; number systems; cardinality.		Offered: spring.	
Prerequisite: minimum grade of C- in MAT 112 or permission of instructor.		MAT 352 Probability & Statistics II	3 Credits
Offered: fall.		Continuation of MAT 351. Introduction to the mathematical aspects of modern probability theory and the theory of statistics.	
MAT 301 History of Mathematics	3 Credits	Prerequisite: MAT351.	
Development and interrelations of major areas of mathematics, from ancient to modern times. Emphasis on both historical context and mathematical content. Mathematics as cultural heritage.		Offered: fall of even-numbered years.	
Prerequisite: MAT 111 & MAT 112.		MAT 353 Regression Analysis	3 Credits
Offered: occasionally.		Linear regression and correlation. Covariance, residual sum of squares, residual variance, correlation coefficient, tests of significance for correlation coefficient and for regression coefficients. Non-linear regression.	
MAT 311 Abstract Algebra	4 Credits	Prerequisites: MAT 131, or MAT 141, DAT 211, or or MAT 351, or MAT 352, or permission by the instructor.	
Introduction to the basic structures of abstract algebra; groups, rings, fields.		Offered: spring of odd-numbered years.	
Prerequisite: minimum grade of C- in both MAT 219 and MAT 230.			
Offered: fall.			
MAT 312 Topics in Algebra	3 Credits		
Continuation of MAT 311. Selected topics from groups, rings, integral domains, field extensions and Galois theory.			
Prerequisite: MAT 311.			
Offered: spring of odd-numbered years.			

MAT 354 Experimental Design and Statistical Computing 3 Credits

Analyzing data; one-way/two-way blocking; chi-square, goodness of fit. Statistical computing package; Monte-Carlo simulation-subset selection, central limit theorem; residual plots.

Prerequisite: MAT 351 & MAT 352, or permission of instructor.

Offered: occasionally.

MAT 380 Mathematics Seminar 1 Credit

Mathematics seminar for majors. To be taken for three semesters.

Prerequisite: junior standing.

Offered: fall & spring.

MAT 381 Mathematics Seminar 1 Credit

Mathematics seminar for majors. To be taken for three semesters.

Prerequisite: junior standing.

Offered: fall & spring.

MAT 421 Complex Analysis 3 Credits

Complex numbers, analytic functions and mappings. Cauchy-Riemann equations, harmonic functions, Cauchy's theorem, integral formula and inequalities. Power series, residues, singularities and zeros, Rouché's Theorem.

Prerequisites: MAT 211 and MAT 219, or PHY 335.

Offered: spring of even-numbered years.

MAT 480 Mathematics Seminar 1 Credit

Mathematics seminar for majors. To be taken for three semesters.

Prerequisite: junior standing; MAT 112.

Fulfills College Core: Oral Communication

Offered: fall & spring.

MAT 498 Internship in Mathematics 1-3 Credits

Internship involving non-routine tasks linking academic concepts to practical experience. May be used for free elective credit only. Internships require an application and approval by the associate dean.

Prerequisite: permission of the chair & associate dean.

Offered: occasionally.

MAT 499 Independent Study 1-4 Credits

Study and work with a faculty supervisor. Project to be determined by faculty agreement. Independent studies require an application and approval by the associate dean.

Prerequisite: permission of the instructor, department chair, & associate dean.

Offered: occasionally.