Mathematics (MATH)

Courses

MATH 104Q. Introduction to Logic. 1 Unit.
An introduction to the informal and formal principles, techniques, and skills that are necessary for distinguishing correct from incorrect reasoning. Offered each semester. Cross-listed as PHIL 104Q.

MATH 110Q. Elementary Mathematics. 1 Unit.
Elementary mathematics is a content course, not a course in methods of teaching. Through this course, student will explore and track the development of numbers, from early (pre-school) concepts to additive, multiplicative, and fractional reasoning, and into elementary algebra, geometry and measurement, and statistical methods. Offered annually, either fall or spring semester.

MATH 111Q. Finite Mathematics. 1 Unit.
A survey of some important areas of modern, applicable mathematics. Topics will include a selection from the following: matrices and linear systems, linear programming, probability, Markov Chains, financial mathematics, graph theory, voting systems and apportionment, and statistics. Offered each semester. Offered every fall or spring semester.

MATH 112Q. Mathematical Game Theory. 1 Unit.
An introduction to the mathematics of competitive decision making, including games of strategy, games of chance, and classical zero-sum game theory. Topics include game trees, backward induction, base two arithmetic, Nim values of combinatorial games, probability, expected value, matrices, domination, and mixed and pure strategies, and graphical and oddment solutions to zero-sum games. Offered based on student demand.

MATH 113Q. Chaos and Fractals in Nature. 1 Unit.
This course will investigate chaotic behavior in physical systems, and use mathematics to describe that behavior. Some of the first evidence of chaotic behavior in nature came from a study of a mathematical model of the earth's climate. Since then, it has been discovered that chaotic behavior occurs in many physical systems, including chemical and biological systems. Fractals have turned out to be a very valuable way to describe chaotic systems geometrically. Offered based on student demand.

MATH 114Q. Elementary Graph Theory. 1 Unit.
A gentle introduction to graph theory and discrete math, with emphasis on understanding the major results, and using them to do applications from various fields. Topics include connectivity, planarity, adjacency matrices, Eulerian and Hamiltonian graphs, trees, isomorphism, duality, coloring problems, directed graphs, matching problems, and network flows. Offered annually, either fall or spring semester.

MATH 115Q. Great Ideas in Mathematics. 1 Unit.
A survey of mathematics from the Ancient Greeks to the modern day through looking at its great ideas and theorems. Topics vary, but may include the Pythagorean Theorem and Euclidean geometry, number theory, Cardano's solution of the cubic, Newton's discovery of the calculus, mathematical modeling, abstraction and proof, and probability and statistics. Offered every spring semester.

MATH 116Q. Introduction to Cryptology. 1 Unit.
This course gives a historical overview of Cryptology and the mathematics behind it. Cryptology is the science of making (and breaking) secret codes. From the oldest recorded codes (taken from hieroglyphic engravings) to the modern encryption schemes necessary to secure information in a global community, Cryptology has become an intrinsic part of our culture. This course will examine not only the mathematics behind Cryptology, but its cultural and historical impact. Topics will include matrix methods for securing data, substitutional ciphers, transpositional codes, Vigenere ciphers, Data Encryption Standard (DES), and public key encryption. The mathematics encountered as a consequence of the Cryptology schemes studied will include matrix algebra, modular arithmetic, permutations, statistics, probability theory, and elementary number theory. Offered annually, either fall or spring semester.

MATH 117Q. Quantitative Analysis for Business. 1 Unit.
This course provides an introduction using quantitative skills, statistical techniques, and software tools to solve business problems and support business decisions. Topics include probability, measures of central tendency, variability and relative standing, expected value, normal distribution, and financial mathematics.

MATH 122Q. Calculus for Business Decisions. 1 Unit.
This course covers tools necessary to apply the science of decision-making in the business environment. Students working in teams give oral and written presentations on key projects taken from real world business problems. Quantitative reasoning topics include the following: Graphing Functions; Demand, Revenue, Cost and Profit; Trend Lines, Differentiation; Optimization; and Integration. Students integrate the use of technology with excel spreadsheets, power point presentations, and software packages. Prerequisites: Math Placement Testing required for entry. Offered every fall or spring semester.

MATH 125Q. Introduction to Mathematical and Statistical Modeling. 1 Unit.
An introduction to some mathematical techniques used to explore, model and analyze phenomena in the sciences. Topics include probability, descriptive and inferential statistics, hypothesis testing, regression, and linear systems. Offered every fall or spring semester.

MATH 130. Calculus I with Review Part I. 1 Unit.
This course is designed for students who enter Stetson with insufficient pre-calculus background for the standard calculus sequence. The combination of MATH 130 and MATH 131Q covers the same calculus material as MATH 141Q, including limits, continuity, differentiation, and applications of derivatives, and includes a review of pre-calculus material including trigonometry, with an emphasis on applications in the sciences. Must be taken in combination with MATH 131Q for Q credit. Math Placement Testing required for entry. Offered every fall or spring semester.

MATH 131Q. Calculus I with Review Part 2. 1 Unit.
Designed for students who enter Stetson with insufficient pre-calculus background for the standard calculus sequence. The combination of MATH 130 and MATH 131Q covers the same calculus material as MATH 141Q, including limits, continuity, differentiation, and applications of derivatives, anti-differentiation, the definite integral and the Fundamental Theorem of Calculus, and includes a review of pre-calculus material including trigonometry, with an emphasis on applications in the sciences. Prerequisite: MATH 130. Offered every fall or spring semester.

MATH 141Q. Calculus I with Analytic Geometry. 1 Unit.
A first calculus course designed for majors in mathematics and the sciences. Topics include limits, continuity, differentiation, applications of derivatives, the definite integral, and the Fundamental Theorem of Calculus. Math Placement Testing required for entry. Offered every fall or spring semester.

MATH 142Q. Calculus II with Analytic Geometry. 1 Unit.
A continuation of MATH 141Q. Topics include techniques of integration, applications of integration, differential equations, sequences and series, power series, and Taylor's Theorem. Prerequisite: MATH 141Q or MATH 131Q. Offered every fall or spring semester.

MATH 151. Mathematics for Life Sciences. 1 Unit.
This course provides and introduction to a variety of mathematical topics of use in analyzing problems arising in biological sciences. It is designed for students in biology, agriculture, forestry, wildlife, pre-medicine and other pre-health professions. It is designed to provide an overview rather than a detailed introduction to any particular topic. The general aim of the course is to show how mathematical and analytical tools may be used to explore and explain a wide variety of biological phenomena that are not easily understood with verbal reasoning alone. The mathematical models will be used to illustrate answers to biological problems. Prerequisite: Math Placement Testing required for entry.

MATH 180. Math Elective. 0.75 to 1 Units.

MATH 190. Special Topics in Mathematics. 1 Unit.
This is an introductory-level course with varied content designed by faculty to delve into topics that are not typically taught in existing courses. The sophistication and rigor of the content is consistent with courses that are offered in the first year of study in the department.

MATH 211Q. Linear Algebra. 1 Unit.
An introduction to the theory and applications of linear systems and vector spaces. Topics include matrix operations, solving linear systems by elimination, basis and dimension, linear transformations, eigenvalues and eigenvectors, and general vector spaces. Applications from various fields are introduced. Prerequisite: MATH 141Q. Offered every fall or spring semester.

MATH 221Q. Introduction to Logic and Proof. 1 Unit.
This course prepares students to confront the elements of advanced theoretical mathematics: to understand mathematical statements, to read and write proofs, and to appreciate the processes of mathematical creation. Topics include elementary logic, set theory, functions, relations, and induction. Prerequisite: MATH 142Q. Offered every fall semester.

MATH 231. Discrete Structures. 1 Unit.
Potential topics include Boolean algebra and propositional logic, mathematical proofs, finite machines, Turing machines, formal languages, combinatorics, probability. Offered either fall or spring semester. Prerequisite: CSCI 141 and either MATH 141Q or MATH 130 or MATH 125Q.

MATH 243Q. Calculus III with Analytic Geometry. 1 Unit.
An introduction to calculus of more than one variable. Topics include vectors, parametric equations, polar coordinates, partial differentiation, multiple integration, and vector fields. Prerequisite: MATH 142Q. Offered every fall or spring semester.

MATH 285. Independent Study. 0.5 or 1 Units.
A faculty mentored course designed to cover content not addressed by current courses. By design, the study usually includes only one or two students who are led by a faculty member. Occasionally, an independent study may be used to offer an existing course because of extenuating circumstances. The sophistication and rigor of the content is consistent with courses that are offered in the second or third year of study in the department.

MATH 290. Special Topics in Mathematics. 1 Unit.
This is an introductory-level course with varied content designed by faculty to delve into topics that are not typically taught in existing courses. The sophistication and rigor of the content is consistent with courses that are offered in the second or third year of study in the department.

MATH 301. Number Theory. 1 Unit.
This course studies elementary properties of integers, including divisibility, factorization, and primality. Topics include congruencies, the Chinese Remainder Theorem, Diophantine equations, divisibility tests, theorems of Fermat, Wilson, and Euler, residue classes, quadratic reciprocity, multiplicative functions, and applications to cryptography. Prerequisite: MATH 221Q. Offered based on student demand.

MATH 312. Advanced Linear Algebra. 1 Unit.
A continuation of MATH 211Q, this course is an axiomatic theory of vector spaces. Topics include general vector spaces, inner product spaces, linear mappings, the Rank-Nullity Theorem, representations of mappings, dual spaces, and diagonalization. Prerequisites: MATH 211Q and MATH 221Q. Offered every two years.

MATH 321. Ordinary Differential Equations. 1 Unit.
An introduction to the study of equations involving derivatives. Topics include first and second order differential equations, existence and uniqueness of solutions, separation of variables, variation of parameters, linear and non-linear systems, solution by generalized eigenvectors, phase portraits, linearization, numerical methods, potential functions, gradient systems, limit cycles and chaotic systems, and mathematical modeling with differential equations. Prerequisites: MATH 211Q and MATH 243Q. Offered annually, either fall or spring semester.

MATH 331. Combinatorics and Graph Theory. 1 Unit.
This course studies techniques of enumeration and graph theory. Topics include binomial coefficients, recursion, generating functions, Burnside's Lemma, Eulerian and Hamiltonian graphs, trees, planarity, duality, graph coloring, graph algorithms, and various practical applications. Cross-listed as CSCI 331. Prerequisite: CSCI 211 or MATH 221Q. Offered every two years.

MATH 341. Mathematical Modeling and Computer Simulation. 1 Unit.
An introduction to the development of mathematical models, and the use of computers towards that goal. Topics include model construction, regression, empirical modeling, difference equations and dynamical systems, probabilistic modeling, and Monte Carlo simulation. Cross-listed as CSCI 341. Prerequisites: MATH 142Q, MATH 211Q, and either CSCI 141 or CSCI 261. Offered every two years.

MATH 343V. Five Equations that Changed the World. 1 Unit.
This course focuses on Stetson's Ethical or Spiritual Inquiry value. This course will explore the role of mathematics in science and in the world in which we live by studying five famous scientists and their powerful and important breakthroughs, expressed as equations ("mathematical poetry"). Behind these discoveries lie the dramas of jealousy, fame, war, and debate. Through assigned readings, class discussions, and writing projects, the course will go behind the scenes and look at the political conflicts, social upheaval, religious sanctions, family tragedies, and personal ambitions that led to each man's special place in history. Students will then be given the task of selecting a sixth discovery to add the next chapter to the story. Junior Seminar.

MATH 351. Operations Research. 1 Unit.
An introduction to deterministic optimization. Topics may include linear programming and the simplex method, integer programming, goal programming, dynamic programming, duality, the transportation problem, network analysis, and game theory. Prerequisites: MATH 142Q, MATH 211Q, and either CSCI 141 or CSCI 261. Offered every two years.

MATH 361. Numerical Analysis. 1 Unit.
A study and analysis of common numerical methods used in applied mathematics. Topics include solutions of non-linear equations, the solutions of systems of linear equations, interpolation, numerical integration, and the numerical solution of differential equations. Prerequisites: MATH 142Q and MATH 211Q, and either CSCI 141 or CSCI 261. Cross-listed as CSCI 361. Offered every two years.

MATH 371. Probability: An Introduction to the Study of Randomness. 1 Unit.
Topics include discrete and continuous probability distributions, conditional probability, independence, combinatorial probability, expected value and variance, and laws of large numbers. Prerequisite: MATH 243Q. Offered every two years.

MATH 372. Mathematical Statistics. 1 Unit.
A theoretical introduction to statistics, including point estimation, confidence intervals, and hypothesis tests. Topics include goodness of fit tests, contingency tables, regression, correlation, analysis of variance, non-parametric tests, and the use of the t, F, Z, and chi-squared distributions to draw inferences about means and variances of one or two populations. Emphasis is on deriving the statistical tests, as well as using them to draw conclusions. Prerequisite: MATH 371. Offered every two years.

MATH 385. Independent Study. 0.5 or 1 Units.
A faculty mentored course designed to cover content not addressed by current courses. By design, the study usually includes only one or two students who are led by a faculty member. Occasionally, an independent study may be used to offer an existing course because of extenuating circumstances. The sophistication and rigor of the content is consistent with courses that are offered in the third or fourth year of study in the department.

MATH 390. Special Topics in Mathematics. 1 Unit.
A course designed by faculty to delve into topics that are not typically taught in existing courses. The sophistication and rigor of the content is consistent with courses that are offered in the third or fourth year of study in the department. May be repeated for credit with different content.

MATH 391V1. The Nature of Space Time. 1 Unit.
This course focuses on Stetson's Ethical or Spiritual Inquiry Value. This course is a writing and discussion intensive study of the nature and philosophy of space and time. Throughout history humans have yearned to understand where and how they fit into the Universe in which they exist. One of the many manifestations of this quest for greater understanding involves the examination of the fabric of the Universe itself: spacetime. This course will examine historical landmark works as well as the current understanding of spacetime which exists in the interdisciplinary intersection of mathematics, philosophy, religion, and physics. This course will approach the study space and time from the vantage point of ethics and spiritual inquiry. While there is no mathematics prerequisite, this course will involve elements of algebra and geometry. All relevant mathematics needed for an understanding of the material will be provided in the course. Junior Seminar.

MATH 395. Teaching Apprenticeship. 0.5 Units.
Pass/Fail only. The teaching apprenticeship allows a student to work with a professor in the delivery of a course. The student may assist with homework sessions, peer instruction, development of exercises or projects, development of lecture material, or other tasks designated by the professor.

MATH 397. Internship in Mathematics. 0.5 or 1 Units.
Students are expected to complete an internship of varying time length with an outside company or organization. Emphasis is on a relevant learning environment and acquisition of appropriate career skills at a suitable level of authority and responsibility. Prerequisites: Approval of chair and Mathematics faculty supervisor. Enrollment in an internship course requires students to attend an orientation prior to beginning work at their internship site. For more information regarding internship orientations, please contact Career & Professional Development at career@stetson.edu or 386-822-7315.

MATH 401. Real Analysis I. 1 Unit.
A rigorous study of the theory of calculus. Topics include basic topology, sequences, functions, limits, continuity, and differentiation. Prerequisites: MATH 211Q, MATH 221Q, and MATH 243Q. Offered every two years.

MATH 411. Complex Analysis. 1 Unit.
A detailed study of the complex number system and complex functions. Topics include harmonic functions, complex differentiation and integration, the Cauchy Integral Formula, Taylor and Laurent series, residues and poles, and conformal mappings. Prerequisite: MATH 243Q or MATH 221Q. Offered every two years.

MATH 422. Partial Differential Equations. 1 Unit.
A study of partial differential equations, their solutions, and applications. Topics include Fourier series, separation of variables, boundary value problems, existence and uniqueness of solutions, method of characteristics, numerical solutions, and applications including the heat equation, wave equation, and Laplace's equation. Prerequisite: MATH 321. Offered every two years.

MATH 431. Topology. 1 Unit.
A rigorous study of point-set topology, including topics such as open and closed sets, subspaces, continuity and convergence, separation axioms, connectedness, compactness, and product spaces. Prerequisite: MATH 221Q. Offered every two years.

MATH 441. Abstract Algebra I. 1 Unit.
A study of group theory, examples, and applications. Topics include subgroups, homomorphism, direct products, factor groups, Sylow Theorems, Free Groups, select applications. Prerequisites: MATH 211Q and MATH 221Q. Offered every two years.

MATH 485. Independent Study. 0.5 or 1 Units.
A faculty mentored course designed to cover content not addressed by current courses. By design, the study usually includes only one or two students who are led by a faculty member. Occasionally, an independent study may be used to offer an existing course because of extenuating circumstances. The sophistication and rigor of the content is consistent with courses that are offered in the third or fourth year of study in the department.

MATH 490. Special Topics in Mathematics. 1 Unit.
A course designed by faculty to delve into topics that are not typically taught in existing courses. The sophistication and rigor of the content is consistent with courses that are offered in the fourth year of study in the department.

MATH 498. Senior Project I. 1 Unit.
Students will select a mathematical topic, and work on it in collaboration with a faculty member. Students may have to do a literature search, learn computer software, or do independent reading on their topic to facilitate the research process. The student will write a project proposal including any preliminary results, and present the problem and results to the department. Prerequisites: Three 300 or 400 level courses in MATH. Writing Enhanced course.

MATH 499. Senior Project II. 1 Unit.
Students will extend their research project started in MATH 498. The student will write a final paper, and present the results to the department. Prerequisite: MATH 498.