

Mathematics (MATH)

MATH100 Pre-Algebra (3 semester hours)

This course introduces concepts of beginning algebra including the solving of basic algebraic equations that involve integers, fractions, decimals and percents. It also introduces the concepts of polynomials and the graphing of two variable equations. Emphasis is on the fundamentals of beginning algebra to ease the transition into college-level mathematics courses. This course is followed by MATH101, which will introduce intermediate algebra concepts that incorporate the skills covered in MATH100.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH100>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH101 Introduction to College Algebra (3 semester hours)

This course is an introduction to college algebra and is organized into six distinct parts, beginning with a review of basic mathematics skills. It then addresses the language of algebra, the definition, uses, and methods of solving equations and inequalities, exponents and polynomials, factoring, and rational expressions. Practical applications are emphasized throughout the course. This course does not fulfill the mathematics General Education Requirements, but it can be used as elective credit.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH101>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH110 College Algebra (3 semester hours)

This course investigates the concepts of college algebra. The course covers the concepts of algebra, graphing and solution of linear and quadratic equations, inequalities and the solution of systems of linear equations. The course is organized into four distinct parts. The first part of the course covers the basic concepts involved in graphing points and linear equations. The second part of the course investigates the solution and graphing of inequalities and systems of linear equations. The third part of the course concentrates on the manipulation and use of exponential expressions and radicals. The final part of the course considers the solution of quadratic equations and their applications. Practical applications are provided throughout the course. There is careful attention to the presentation of concepts that will become important in the study of analytic geometry, trigonometry and calculus. The course assumes the student has completed MATH101 Introduction to College Algebra or an equivalent course and is completely comfortable with the language of algebra, equations and inequalities, polynomials, factoring, and rational expressions.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH110>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH111 College Trigonometry (3 semester hours)

This is a course in college trigonometry. It builds on earlier college algebra courses such as MATH110, extends the students' studies to trigonometry, and introduces topics in analytical geometry. Practical applications are provided throughout the course. The course begins by reviewing methods of graphing and solving linear and quadratic functions as well as techniques for solving polynomials. It then concentrates on various trigonometric functions, identities and equations as well as the application of trigonometry to real-life situations. The final part of the course includes exponential and logarithmic functions as well as selected topics in analytic geometry including polar coordinates and the conic sections. While there are no prerequisites for MATH111, it is very highly recommended that the student has completed MATH110 College Algebra or an equivalent college-level course.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH111>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH120 Introduction to Statistics (3 semester hours)

This is an introductory statistics course designed to help students achieve a basic understanding of the statistical methods available to analyze and solve the wide variety of problems encountered in workplace environments. The course is designed for students who seek an understanding of how statistics can be applied in areas that require the use of descriptive and inferential statistical methods. The emphasis of the course will be on the proper use and interpretation of statistical techniques. MATH120 is the recommended mathematics general education course for students who will be required to take additional statistics courses such as MATH302 Statistics as part of their program of study.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH120>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH125 Math for Liberal Arts Majors (3 semester hours)

THIS COURSE DOES NOT FULFILL MATH PREREQUISITE REQUIREMENTS IN SCIENCE PROGRAMS. STUDENTS IN AS OR BS PROGRAMS OR IN PROGRAMS THAT REQUIRE MATH302 SHOULD TAKE MATH110 OR HIGHER AS THEIR MATH GEN ED UNLESS CLEARED WITH ACADEMIC ADVISOR FIRST. This course examines various mathematical concepts and problem solving techniques and provides mathematical functional literacy for those majoring in non-technical subject areas such as intelligence, military history, economics, and management. Students will learn how to solve a wide variety of problems from such areas as: mathematical thinking; logic; number theory and real numbers; introduction to algebraic equations, inequalities, and problem solving; functions and graphs; geometry; mathematical systems and matrices; sophisticated counting techniques; consumer math; and an introduction to probability and statistics. This course is principally a problem-solving course where students learn how to solve a wide variety of mathematical problems, rather than a conceptual course where problem solving is not emphasized.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH125>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH200 Analytic Geometry (3 semester hours)

This course introduces students to the concepts of analytic geometry. Some of the most important applications in physical sciences will be presented; however, emphasis is on the fundamentals of analytic geometry as a foundation for the study of calculus. Students may use this course for higher level prerequisite mathematics requirements. Topics include: plane analytic geometry; vectors in the plane; equations of lines, circles, and conic sections; transformation of coordinates; curve sketching of polynomial and rational functions; polar coordinates; parametric equations; and three dimensional vectors. (Prerequisite: MATH111 or equivalent)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH200>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH210 Discrete Mathematics (3 semester hours)

This course introduces students to the fundamental concepts of discrete mathematics. The course provides a foundation for the development of many computer related concepts and more advanced mathematical concepts found in electrical engineering or computer science courses. Important applications in the computer science and engineering disciplines will be presented. Topics include: fundamentals (basic tools for discrete math); logic; methods of proof; graphs and sets; functions; relations and equivalences; recursive relations; polynomial sequences; induction; combinatorics; counting; and probability. (Prerequisites: MATH110, MATH111, or MATH225)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH210>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH220 Linear Algebra (3 semester hours)

This course presents vectors, matrices, determinants, eigenvalues, and eigenvectors; and how these concepts may be used and applied. The emphasis of the course will be on understanding the concepts and methods of linear algebra, as well as solving problems and understanding how linear algebra is used in real world applications. (Prerequisite: MATH225)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH220>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH225 Calculus (3 semester hours)

This is the first course of a three-part Calculus sequence to prepare students for advanced work in mathematical fields including, but not limited to the engineering, computer science and economics fields. It introduces the student to the basic concepts and techniques of differential calculus. Topics include a pre-Calculus review (functions, graphing), limits, derivatives, computations (Power rule, Product Rule, Quotient Rule and Chain Rule), special functions (trigonometric, exponential and logarithmic), implicit differentiation, applications of differentiation (approximations, optimization and related rates), and curve sketching. (Prerequisite: MATH111 or equivalent)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH225>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH226 Calculus II (3 semester hours)

This is the second course of a three part Calculus sequence. It is designed to extend the concepts learned in Calculus I to the concepts and techniques of integral calculus. Topics include the basics of integration (anti-derivatives, substitution, and the Fundamental Theorem), applications of integration (motion, area), L'Hopital's Rule (indeterminate quotients, indeterminate forms), elementary function inverses (inverse functions, Calculus of inverses, trigonometry function inverses, Calculus of these inverses), techniques of integration (tables, powers of Sine and Cosine, other Trigonometric powers, by parts, trigonometric substitution, and numerical analysis), improper integrals, integral applications (average value, volumes by cross-sections, disk & washers, shells, arc lengths, and work). (Prerequisite: MATH225)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH226>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH227 Calculus III (3 semester hours)

This is the third course of a three part Calculus sequence. It is designed to extend the concepts learned in Calculus II to sequences and series (convergence tests, Taylor and Maclaurin Series, Power Series), differential equations (separable, homogeneous, growth and decay), parametric and polar equations (including slope and area), and vector Calculus (dot product, cross product, equations of lines and planes, vector functions, derivatives, velocity and acceleration). (Prerequisite: MATH226)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH227>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH239 Data Analysis and Presentation (3 semester hours)

This applied course introduces students to a variety of techniques for organizing, analyzing and presenting large data sets. Topics to be covered include descriptive statistics with graphics and sample estimation. Emphasis is placed on real-world applications such as those found in the social and physical sciences. Students will become familiar with statistical software packages. (Prerequisite: MATH220)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH239>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH240 Differential Equations (3 semester hours)

MATH240 is introduction to differential equations. It is designed to introduce students to the basic concepts and techniques of differential equations. The course covers the standard materials addressed in the first semester of college differential equations to include: first and second order differential equations, Laplace transforms and differential equations with variable coefficients. Problems have been selected to illustrate the applications of these techniques across a wide range of areas of science, technology, and economics. It is essential for engineering, science, and economics. Increasingly, applications in business management and related fields also employ the calculus. (Prerequisite: MATH227 or equivalent)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH240>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH302 Statistics (3 semester hours)

This is an interactive course designed to help students achieve a greater understanding of the statistical methods and models available to analyze and solve the wide variety of problems encountered in business, science, medicine, education, the social sciences, and other disciplines. Successful completion of this course will provide students with a working knowledge of the principles of both descriptive and inferential statistics, probability, averages and variations, normal probability distributions, sampling distributions, confidence intervals, statistical hypothesis tests, and correlation and regression analyses. The emphasis of the course will be on the proper use of statistical techniques and their application in real life -- not on mathematical proofs. This course will use Microsoft Excel for some of the work. Students should have a basic familiarity with Excel and have access to this software application. MATH120 is the recommended mathematics general education course for students who will be required to take additional statistics courses such as MATH302 Statistics as part of their program of study. (Prerequisites: MATH110, MATH111, MATH120, or MATH225)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH302>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH303 Probability and Statistics for Engineers and Scientists (3 semester hours)

This course in advanced statistics is designed to provide students with a more in-depth understanding of statistics than MATH302. Topics covered include: the principles and applications of descriptive and inferential statistics, probability, common distributions and hypothesis testing. Regression and correlation will also be considered. View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH303>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH305 Real Analysis (3 semester hours)

This course provides a theoretical foundation for single-variable calculus concepts and introduces higher level abstraction of these concepts. Topics include the structure of the real numbers, sequences, continuity, and metric spaces. This course will be run as a seminar that emphasizes mathematical constructs of real analysis and proof writing. (Prerequisites: MATH227, MATH240, and MATH320) View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH305>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH320 Mathematical Modeling (3 semester hours)

This course introduces students to the fundamental concepts of math modeling. It integrates the student's previous experiences with mathematical concepts to provide a variety of practical methods to solve problems. The course covers mathematical concepts such as graphs, inequalities, slopes, linear regression, matrices, operations and applications of matrices, linear programming, sets, Venn diagrams, permutations, combinations, binomial theorem, and an introduction to logic. (Prerequisite: MATH220) View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH320>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH325 Linear Regression I (3 semester hours)

Linear regression models are widely used in business administration, economics, engineering, and the social, health, and biological sciences. Successful applications of these models require a sound understanding of both the underlying theory and the practical problems that are encountered in using the models in real-life situations. In this first course in linear regression students will be exposed to some of the fundamental tools of linear regression. The emphasis will be on using and interpreting linear models. In addition to analyzing given linear models, students will analyze data and create linear regression models as a means to assess and evaluate the extent to which individual or sets of predictor variables influence a particular response. Furthermore, students will use models to forecast outcomes associated with various response variables. Applications from a number of different areas will be examined. (Prerequisites: MATH220 and MATH302) View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH325>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH328 Probability Theory with Applications (3 semester hours)

This course introduces students to the basic concepts and applications of probability theory. An understanding of probability theory is essential to statistics, which is the fundamental basis of how all research is done, from science to medicine to business, marketing, and governmental politics. Probability theory is also essential to such disciplines as mathematics, finance, artificial intelligence, and even legalized gambling (such as state lotteries). Examples of applications problems from these areas are included in the course, with a focus on understanding the concepts and methods of probability theory, as well as solving problems taken from real world applications. (Prerequisite: MATH226) View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH328>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH330 Linear Optimization (3 semester hours)

This course examines various linear optimization concepts and problem solving techniques commonly found in manufacturing, transportation, and military operations. The goal of optimization is to find the best possible solution to a problem given a number of constraints. The emphasis of this course is problem solving. This course includes the construction and analysis of real world problems and the application of various linear optimization techniques to find an optimal solution.

An optimization software package will also be presented and used to solve problems. This course covers a wide range of linear optimization techniques. Topics include linear programming; the simplex algorithm and goal programming; sensitivity analysis and duality; problems in transportation and transshipment; network models; and integer programming. (Prerequisite: MATH220)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH330>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH335 Non Parametric Statistics (3 semester hours)

This course is a non-Calculus treatment of non-parametric tests, probability, confidence intervals, estimation; topics include one- and two-sample problems, one- and two-way analysis of variance, multiple comparisons, and correlation. Students will become familiar with statistical software packages. (Prerequisite: MATH320)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH335>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH340 Multivariate Statistics (3 semester hours)

This course will introduce to students analysis of categorical data, log linear models for two- and higher-dimensional contingency tables, and logistic regression models. Also, students will analyze aspects of multivariate analysis to include random vectors, random sampling, multivariate normal distribution, inferences about the mean vector and MANOVA. (Prerequisites: MATH328 and MATH302)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH340>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH360 Mathematics History and Development (3 semester hours)

This course will introduce students to the historical development of the disciplines of mathematics. Within the discipline of mathematics, we will examine the development of numbers and number systems, geometry and measurement, algebra, probability and statistics, calculus, and discrete mathematics. Throughout this course, students will study the history of mathematics and mathematics education through readings, case studies, and problem sets. (Prerequisite: MATH320)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH360>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH375 Inventory Models and Systems (3 semester hours)

This course introduces students to the basic concepts and application of inventory management, its theory and practice. An understanding of the inventory management theory is essential to operations management, production planning and scheduling, and global supply and demand chain management. Inventory management is the heart of operations management in any industry. On upstream, it will dictate policies and procedures for procurement and material management. Its impact on downstream, especially in meeting the required service level, is a determinant factor in high service level which greatly impacts marketing and financial departments. In this course, we introduce quantitative methods of optimal inventory management in the context of operations management, forecasting, BOM, MPS, and ERP.

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH375>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH410 Design of Experiments (3 semester hours)

This course is delivered online and is organized into distinct parts. This course will begin with Design of Experiments (DOE) methodology and statistical inference. The design of single factor, factorial, nested and nested factorial experiments will be taught. Quantitative and qualitative factors will be introduced to simulate real situations that are encountered in operations being explored. Students will learn how to set up and solve fixed, random, and mixed models with two or more factors. Practical applications are provided throughout the course. (Prerequisite: MATH340)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH410>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH412 Graph Theory (3 semester hours)

This course studies set theory, counting techniques such as permutations, combinations, generating functions, partitions and recurrence relations, Polya's theorem, Hamiltonian and Euclidian properties of graphs, matchings, trees, coloring problems and planarity. (Prerequisite: MATH305)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH412>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH415 Operational Simulation (3 semester hours)

This course examines various mathematical concepts and problem solving techniques and introduces discrete system simulation, Monte Carlo methods, discrete event modeling techniques, programming considerations, statistical definitions and concepts, random number generation, and output analysis. This will be a problem-solving course which will emphasize tools that can be used during the analysis phase of real world problems. (Prerequisites: MATH330 and MATH375)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH415>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH418 Topology (3 semester hours)

Topics include definition of a topology, closed sets, relativizations, base and sub-bases of a topology, compact topological spaces, separation axioms, normal spaces, regular spaces, metric spaces, continuous mappings, product spaces, and function spaces. (Prerequisite: MATH305)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH418>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH419 Set Theory (3 semester hours)

This course continues the studies of set theory from MATH 210, Discrete Mathematics. This course expands coverage of logic and induction, sets, functions, recursive definitions, counting techniques and the Inclusion-exclusion principle. (Prerequisite: MATH305)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH419>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH420 Game Theory and Decision Models (3 semester hours)

"A Beautiful Mind" is a movie that helped popularize game theory. It is a biographical film about the life of John Nash who is known for his work in game theory. "Game theory is the study of mathematical models of conflict and cooperation between intelligent and rational decision makers." This course examines game theories and their applications commonly found in economics, business, political science, and law and how to model games to make informed decisions. Topics include dominance solutions, Nash equilibrium, backward induction, subgame perfect equilibrium, repeated games, dynamic games, Bayes-Nash equilibrium, mechanism design, auction theory, and signaling. (Prerequisites: MATH410 and MATH415)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH420>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH431 Linear Regression II (3 semester hours)

Linear regression models are widely used in business administration, economics, engineering, and the social, health, and biological sciences. Successful applications of these models require a sound understanding of both the underlying theory and the practical problems that are encountered in using the models in real-life situations. In this second linear regression course, students will focus on validating and creating linear models as a means to investigate the nature of the relationship between sets of predictor variables and a particular response variable. The emphasis will be on validating the utility and appropriateness of models used in a number of divergent application areas. Validation of regression model building assumptions will also be explored. Diagnostics and remedial measures, including transformations, will be examined. Specialized regression techniques will also be presented. (Prerequisite: MATH325)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH431>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH440 Stochastic Processes (3 semester hours)

The goal of this course is to teach students statistical and stochastic concepts, methods and models through examples, help students relate stochastic models to real life problems, and also encourage students to develop critical thinking skills that will allow them to realize greater success as mathematics major. (Prerequisite: MATH335 AND MATH410 AND MATH431)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH440>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH460 Principles of Applied Mathematics (3 semester hours)

The process of expressing scientific principles, experiments, and conjectures in mathematical terms. Topics include: gathering reliable data, exposing underlying assumptions, variables, relationships, levels, refining of models, and stochastic models. Deterministic versus stochastic models. (Prerequisite: MATH305)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH460>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH470 Measurement Theory (3 semester hours)

This course covers the study of basic topics in analysis with emphasis on methods and measurement. Sequences, series, functions, uniform convergence, continuity, partial differentiation, extreme value problems with constraints, Riemann integrals, line integrals, improper integrals, integrals with parameters, transformations. (Prerequisite: MATH305)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH470>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.

MATH499 Senior Seminar in Mathematics (3 semester hours)

The Capstone course is a senior level course designed to allow the student to review, analyze, and integrate the work the student has completed toward a degree in Mathematics. Students will examine a number of real-world case studies; prepare an approved academic project or paper; and demonstrate mastery of their program of study in a meaningful culmination of their learning. Students must demonstrate that they have taken all other math courses in their degree plan prior to registering for this course. (Prerequisite: Completion of a minimum of 105 hours towards your program)

View the course schedule (<https://www.apus.edu/course-schedule/details.html?c=MATH499>) to find out details about each course including prerequisites, course objectives, course materials, a snapshot of the syllabi, and session dates.