Upper Merion Area School District
Curriculum Information for Parents and Community

Math Department

The secondary Math department in Upper Merion supports students in creating a solid foundation that makes math exciting as they progress through their math journey. Our teachers use a variety of resources to ensure students are engaged and challenged in every math course. A passion is conveyed through teaching that is contagious to create students who are confident in their pursuit of mathematical knowledge.

In high school students have an opportunity to grow as mathematicians and build their confidence through a sequence of exciting math courses ranging from Algebra 1 through Calculus, with an opportunity to explore Statistics at the end of their time in high school. Each year, students will be able to choose either an honors or college prep class, depending on the level of challenge and proficiency they would like in mathematics. In order to graduate, students must successfully complete three full-year courses (or equivalent) in mathematics. Students are encouraged to take four years of mathematics.

Algebra 1B

Students enrolled in Algebra 1B extend their learning from Algebra 1A to ensure a solid algebra foundation. The course starts with an exciting dive into data and probability before moving into solving equations (multistep, variables on both sides, proportions, word problems, and absolute value equations). Students transition into studying functions, which include identifying domain and range, using function notation, and using multiple representations of functions (graph, table, equation, verbal). A thorough study of linear equations follows with students working with slope, writing equations in slope-intercept form, standard form, and applying the line of best fit/linear regression among other topics.

Students apply their previous learning to solve systems of equations by graphing, substitution, and elimination. Working with inequalities that have one variable involving solving, graphing, and applying various methods to solve word problems, creates a foundation to move to absolute value inequalities, graphing linear inequalities in two variables, and graphing a system of linear inequalities. During the second semester, students take a deep dive into working with monomials and extend this learning to polynomials and factoring (GCF, trinomials, and special products). Students finish the year with simplifying rational expressions, solving quadratic equations, and using the quadratic formula. The pace of the course allows for additional practice for students as they continue to progress through the study of Algebra. All students will take the Keystone Algebra Exam at the completion of this course.

Keystone Algebra Prep (Semester 3x/Cycle)

Students enrolled in this course are currently taking Algebra 1B and need additional prep to take the Keystone Algebra Exam. Keystone Algebra Prep Class is required for students in Algebra I and Algebra IB who demonstrate a need for additional review prior to the Keystone Algebra Exam so they are in the best position to

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pass the test on their first attempt. Individual student data will be used to identify each student's strengths and areas of need. In addition to preparing for the state-mandated test, the practice of algebraic skills will reinforce the students' learning in their other math classes. Students are scheduled in these courses based on performance on standardized tests, diagnostic tests, and course grades.

Algebra 2
Students will explore advanced mathematical concepts in an exciting way with an emphasis on theory and application. The course includes a study of Quadratic Functions, Polynomial Functions, Radical Functions, Rational Functions, Exponential Functions & Logarithms, Probability & Statistics, and Matrices.

During the first semester, students will study a variety of concepts including: factoring, graphing quadratics, complex numbers, using the quadratic formula, dividing polynomials, analyzing graphs of polynomial functions, solving polynomial equations, and solving for roots and zeros of polynomial functions. Students will finish the first semester learning about operations with radical functions, inverse functions and relations, square root functions, rational exponents, and solving radical equations & inequalities.

In the second semester students will learn about multiplying & dividing rational expressions, adding & subtracting rational expressions, solving rational equations, graphing and solving exponential functions and work with logarithms. Students will continue in the second semester with a study of probability and statistics, including permutations & combinations, compound probability, and adding probabilities. The Algebra 2 experience for students will finish with matrices.

Geometry
This course is a comprehensive study of Euclidean and related Geometries. Students start the year by exploring the world of logic. During the first semester, students will grapple with concepts involving points, lines, planes, angles; basic geometric postulates and theorems; parallel and perpendicular lines; and properties of triangles.

Starting in the second semester, students will learn about quadrilaterals, proportion and similarity in polygons, and explore right triangles with a deep understanding of special right triangles. Students will spend a lot of time focusing on trigonometry and properties of circles to create a solid foundation for PreCalculus. Students will finish the year with a comprehensive study of areas of polygons and circles and the surface area and volume of three-dimensional figures.

Precalculus
Students will enjoy immersing themselves in a myriad of mathematical concepts in Precalculus. The first semester starts with an exploration of functions and their graphs, including the properties of functions, parent functions and their transformations, properties of piecewise functions, and inverse functions. Students will dig deeper into trigonometric functions through the use of the unit circle. The first semester will culminate with graphing trigonometric functions, studying analytic trigonometry, and working with the Law of Sines and Law of Cosines.

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The second semester starts with the study of polynomial and rational functions. Some of the concepts include using synthetic division, remainder and factor theorems, rational root theorem, zeros, end behavior, multiplicities, and asymptotes. Students will transition into learning about exponential and logarithmic functions, sequences, and series. The course culminates in learning about limits, with an introduction to derivatives as students prepare to take Calculus.

Calculus and Applications
This course provides students with the fundamental concepts involved in differential calculus. Students start the year by exploring limits and differentiation. They delve into differentiation by studying the slope of a secant and tangent line, average and instantaneous rates of change, graphing derivatives, and learn a variety of differentiation techniques (constant, power, sum, and difference rules, product and quotient rules, chain rule, trigonometric rules, and exponential and logarithmic rules). Students will learn about applications of differentiation and study implicit differentiation. An introduction to integral calculus finishes out the second semester. This course prepares students to enter into a first year college calculus course.

AP Calculus AB
AP Calculus AB is designed to be the equivalent of a first-semester college calculus course devoted to topics in differential and integral calculus. Students cultivate their understanding of differential and integral calculus through engaging with real-world problems represented graphically, numerically, analytically, and verbally, and using definitions and theorems to build arguments and justify conclusions as they explore concepts like change, limits, and the analysis of functions. (from College Board AP Calculus AB description)

AP Calculus BC
AP Calculus BC is designed to be the equivalent to both first and second semester college calculus courses. AP Calculus BC applies the content and skills learned in AP Calculus AB to parametrically defined curves, polar curves, and vector-valued functions; develops additional integration techniques and applications; and introduces the topics of sequences and series. (from College Board AP Calculus BC description)

Statistics and Mathematical Modeling
This course provides students with the opportunity to use practical applications for the exploration of advanced mathematical topics necessary for post-secondary success. The first part of the course focuses on statistics and probability. Following that, mathematical models will be used to emphasize skills involving algebra, geometry, and other advanced math topics. This course will further promote understanding of statistics, probability, and advanced math topics through integration and manipulation of math concepts and skills into real-world situations and problems. This course was formerly Applications of Advanced Math Topics. Prerequisite: Completion of Geometry and Algebra II.

AP Statistics
The AP Statistics course introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. There are four themes evident in the content, skills, and assessment in the AP Statistics course: exploring data, sampling and experimentation, probability and simulation, and statistical

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inference. Students use technology, investigations, problem solving, and writing as they build conceptual understanding. (from College Board AP Statistics description)

Algebra Concepts
This course is designed to meet the individual needs of identified students in the area of Algebra. A standards-driven, integrated approach focusing on algebra is central to the course. Students will learn to solve equations with two variables, solve absolute value equations, functions, inequalities, slope, and some advanced algebra topics. This course may be repeated as needed to fulfill the Math graduation requirements. Prerequisite: Individualized Education Plan (IEP).

Real-Life Math
This course is designed to make math meaningful by providing students with problems and examples demonstrating its applications in everyday life. This course provides the comprehensive instruction that students need for independent living. It focuses on using math skills in real-life situations for those who have basic computational skills but need practice in applying these skills.

To see our full Program of Studies, look here:
https://hs.umasd.org/info/school-publications/program-of-studies

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