

# MATH

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## 2025-2026 COURSE CATALOG



**Department Chair:** Derrick Keister ([dkeister@sch.org](mailto:dkeister@sch.org))

The primary goal of the Mathematics Department is to provide a curriculum that meets the academic needs of each student at Springside Chestnut Hill Academy. The Mathematics Department strives to develop opportunities for students to engage in active inquiry at every course level and to encourage students to achieve their highest mathematical potential.

All students are required to take four years of mathematics and some elect to take one or more additional elective math courses. The typical four-year sequence of mathematics begins with Geometry and extends through Algebra II, Pre-Calculus, Calculus and/or Statistics. Courses in 9th and 10th grade are sectioned into Honors and College Prep while in 11th and 12th grade the classes are sectioned into AP, Honors, and College Prep, allowing for each student to be challenged at an appropriate level. The full range of AP mathematics and statistics courses are also offered in grades 11 and 12, and are taught to the specific AP curriculum. Juniors are required to take the AP Exam or an AP-based final exam at year's end. Seniors may opt out of the AP exam. Students are provided a TI - nSpire CAS graphing calculator for use in all of their mathematics and statistics courses while attending SCH. Students are encouraged to communicate with their math teacher, advisor, college counselor, and parents as they determine the appropriate sequence of courses for their high school program.

## Geometry and Algebra

*Full-year course; 1 credit*

**Prerequisite:** Departmental recommendation

This course serves two purposes: 1) to strengthen and support students' algebraic understanding and reasoning skills, and 2) to introduce and support students' learning of geometry. By the end of the course, students will have reviewed, practiced, and developed their Algebra 1 skills to be fully prepared to take Algebra 2. They will have also developed their ability to reason by building definitions, writing logic statements, physically drawing geometric constructions, and writing proofs. Students arrive at the SCH Upper School from a wide variety of backgrounds, training, and experiences. Thus, this course has been designed to specifically accommodate a wide range of needs by use of blended instruction. It is a class that meets face-to-face and receives much direct instruction. There are also aspects of the class that use online resources to meet students where they are and allow students to work at their own pace on the areas they need the most help with and receive live help from the teacher right when they need it.

## Geometry

*Full-year course; 1 credit*

**Prerequisite:** Departmental recommendation

This yearlong study of geometry will include such fundamental concepts as points, lines, planes, angles, polygons, and perpendicular and parallel lines. The properties of triangles and triangle inequalities will be studied in depth. Right triangles, congruent and similar polygons, properties of quadrilaterals, coordinate geometry, right triangle trigonometry, and calculating areas and volumes of various 2D and 3D figures will also be studied extensively. Students use inductive reasoning to explore and discover geometric ideas

via computer software and hands-on experiences. Students will use deductive reasoning, including informal and formal proofs, to solve various kinds of problems. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT.

## Honors Geometry

*Full-year course; 1 credit*

**Prerequisite:** Departmental approval

The main topics in this geometry course are points, lines, planes, angles, polygons, perpendicular and parallel lines, and the fundamental axioms of geometry. In addition, topics include right triangles, congruent and similar polygons, properties of quadrilaterals, coordinate geometry, special right triangles, circles, triangle trigonometry, and properties of three-dimensional figures. Students use geometric ideas to solve problems, find relationships in complex drawings, and construct formal proofs. The ultimate goal is for students to think deductively. To be successful in the course, students must gain a mastery of the facts, see the connections among concepts, and synthesize interrelated ideas to present cogent arguments for their solutions to problems. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT.

## Algebra 2

*Full-year course; 1 credit*

**Prerequisite:** Successful completion of Geometry & Algebra OR Geometry.

This course begins with a review and extension of topics presented in Algebra 1. Topics include linear, quadratic, and other polynomial functions, with an overview of solving systems of equations. Students will investigate the complex number system. The study of Rational, Radical, and Exponential functions will be included as time permits. The numerical, graphing, and other features of the graphing calculator are used to explore and extend the skills and concepts covered. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT.

## Honors Algebra 2

*Full-year course; 1 credit*

**Prerequisite:** A or better in Geometry, Departmental approval

This course covers linear, quadratic, polynomial, rational, exponential, and logarithmic functions. In addition, students study complex numbers, radicals, and systems of equations and matrices. To be successful, students must be able to analyze functions numerically, symbolically, and graphically. The numeric and graphing features of the graphing calculator are used to explore and extend the skills and concepts covered. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT. Students are required to have a graphing calculator.

## Honors Accelerated Algebra 2 / Trigonometry

*Full-year course; 1 credit*

**Prerequisite:** A or better in Honors Geometry, Departmental approval

This course covers the same curriculum as the Algebra 2/Trig Honors above; however, students will be expected to analyze concepts at a more abstract level and move through the material at a faster pace and includes the study of trigonometric functions and their graphs. Students will analyze functions numerically, symbolically, and graphically. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT. The numeric and graphing features of the graphing calculator are used to explore and extend the skills and concepts covered.

## Precalculus/ Trigonometry

*Full-year course; 1 credit*

**Prerequisites:** Successful completion of Algebra 2 and Geometry

Precalculus is an introduction to the language and concepts of Calculus. Student understanding of functional analysis will be extended within the study of polynomial, rational, exponential, logarithmic, and trigonometric functions. Students will be looking at these functions from a numeric, algebraic, and graphic standpoint. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT.

## Honors Precalculus/Trigonometry

*Full-year course; 1 credit*

**Prerequisite:** B or better in Honors Algebra 2/Trig, Departmental approval

Honors Precalculus/Trigonometry is a thorough preparation for Honors Calculus. In this course, functional analysis will be stressed. Topics include polynomial, exponential, logarithmic, trigonometric functions, and conic sections. The year concludes with a unit of study on Limits and Continuity. Students are required to have a graphing calculator. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT. The numeric, graphing, and other features of the graphing calculator are used to explore and extend the skills and concepts covered.

## Honors Pre-BC Calculus

*Full-year course; 1 credit*

**Prerequisite:** B or better in Honors Accelerated Algebra II/ Trigonometry, Departmental approval

Pre-BC Calculus is a yearlong class in functions and limits that develops the theoretical underpinnings of calculus. The first semester expands upon what is learned in Accelerated Honors Algebra II/ Trigonometry with the reviewing of Trigonometry;

learning its analytical uses Sequences, Series, and Mathematical Induction, and Conic Sections. and. The second semester rigorously develops mathematical relationships defined with vectors, parametric curves, and polar equations. Formal notions of limits of sequences and functions, as well as the theory of continuous functions (functional analysis) follow. Differential calculus for single-valued functions of real variables rounds out the second semester.

## Differential Calculus

*Full-year course; 1 credit*

**Prerequisite:** Successful completion of Precalculus

Differential Calculus begins with a review of linear, absolute value, non-linear, rational, and piecewise defined functions. Calculus topics include limits, derivatives, and applications of the derivative. A variety of real-life applications taken from fields such as business, life sciences, economics, and physics are used throughout this course. As students move through the curriculum, they see concepts and problems that are related to questions on the SAT.

## Honors Calculus

*Full-year course; 1 credit*

**Prerequisite:** B- or better in Honors Precalculus/Trigonometry, Departmental approval

In Honors Calculus, the theory of elementary functions and real-world applications of mathematics will be studied. Differential calculus and an introduction to integral calculus plus the applications of each will be explored. The course focuses on polynomial, rational, power, exponential, and logarithmic functions.

## AP Calculus (AB)

*Full-year course; 1 credit*

Summer work is required.

**Prerequisites:** A- or better in Honors Precalculus/Trigonometry, Departmental approval

AP Calculus AB includes both the theory of elementary functions and real-world applications. Differential and integral calculus plus their applications will be studied in preparation for the Calculus AB exam. In addition to polynomial, rational, power, exponential, and logarithmic functions, this course also includes work with trigonometric functions. Juniors are required to take the AB level of the AP Exam or an AP-based final exam at year's end. Seniors may opt out of the AP exam.

## AP Calculus (BC)

*Full-year course; 1 credit*

**Prerequisites:** B or better in Honors Pre-BC Calculus, Departmental approval

BC Calculus picks up where Pre-BC Calculus left off. It is a yearlong class that rigorously develops differential and integral calculus for all piecewise-smooth functions of a single real variable, including Cauchy limits, the derivative and its applications, and the Riemann integral and its applications. In addition, several topics in real analysis, including the completeness of the real line, are introduced as time allows. Participation in this class requires an excellent mastery of algebraic and transcendental functions and a formal notion of limits, continuity, and derivatives of algebraic functions. Students without the correct prerequisites will require extensive independent summer work and the special permission of the department. Juniors are required to take the BC level of the AP Exam or an AP-based final exam at year's end. Seniors may opt out of the AP exam.

## Honors Linear Algebra

*Elective; Fall Semester; 1/2 credit*

**Prerequisites:** B or better in Honors Algebra II, Departmental Recommendation

This Honors course offers students an introduction to linear algebra. Students will learn techniques to solve simultaneous linear equations and will distinguish among systems with no solutions, many solutions, and a unique solution. These systems will lead students to investigate matrices, inverse matrices, and determinants. In addition to algebraic approaches, students will also represent and solve equations graphically. Other topics include diagonalization and Markov Chains.

## Honors Discrete Math

*Elective; Spring Semester; 1/2 credit*

**Prerequisites:** B or better in Honors Algebra, Departmental Recommendation

Honors Discrete Math runs in alternate years opposite H Multivariable Calculus. This course will cover a variety of discrete math topics, including game theory, graph theory, combinatorics, theory of probability, dimensionality, and cryptography. Exact topics covered are driven by student inquiry and passion, both individually and as a group.

## Statistics and Financial Literacy

*Full year course; 1 credit*

**Prerequisite:** Successful completion of PreCalculus/Trigonometry

Interpreting data and making informed financial decisions is something that no future citizen can avoid. We begin collecting and using data at very early ages to understand sports, business trends, and weather predictions. Financial decisions that we make early on in our lives can have positive and adverse effects on our quality of life as older adults. In this full year course, you will become critical consumers of data while learning how to leverage this data and other mathematical concepts to make informed financial decisions. Within these contexts, you will engage with the financial topics of taxes, bank accounts, budgeting, investing, credit, paying for college, and insurance by leveraging key mathematical concepts and skills from algebra, functions, modeling, correlation, probability, and descriptive and inferential statistics.

## Honors Statistics

*Elective; full-year course; 1 credit*

Summer work is required.

**Prerequisites:** B+ or better in Algebra II. Students should be highly motivated and curious about the world of statistics.

Understanding and interpreting data are critical skills for 21st century learners. The Honors Statistics course will provide students with the requisite skills to navigate the sea of data in an organized and scholarly manner. Using an investigative approach to learning, the course will introduce and then develop a method of analyzing data with an emphasis on descriptive and inferential topics. Key concepts such as significance, generalization, and causation will be studied. Students will use technology tools to work with data sets drawn from various disciplines and also gather data using accepted and appropriate data collection methods.

## AP Statistics

*Elective; full-year course; 1 credit*

Summer work is required.

**Prerequisites:** Minimum 550 on both PSAT Math and PSAT Evidence-Based Reading & Writing, departmental approval

AP Statistics introduces students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. Students are exposed to four broad conceptual themes: 1) exploring data: describing patterns and departures from patterns; 2) sampling and experimentation: planning and conducting a study; 3) anticipating patterns: exploring random phenomena using probability and simulation; and 4) statistical inference: estimating population parameters and testing hypotheses. Students interested in AP Statistics should possess a strong work ethic, as substantial new vocabulary and calculator procedures will be introduced; the ability to work collaboratively as well as independently; and a desire to master the AP curriculum to succeed on the AP examination in May. Juniors are required to take the AP Exam or an AP-based final exam at year's end. Seniors may opt out of the AP exam.