



Mathematics Department Statement of Philosophy

SPCPA provides a rich and rigorous mathematics curriculum that prepares students for rewarding post-secondary experiences. Courses offered include Math 9, Geometry, Algebra 2, Pre-Calculus, Calculus, CIS Modeling and Prediction, and Discrete Mathematics. All courses are carefully aligned to the Minnesota Academic Standards in Mathematics. Furthermore, instruction and assignments are designed to aid students in improving their testing skills. A goal of SPCPA's Math Department is that all students are prepared for the numerous standardized tests that they will encounter as they progress through high school and beyond. A rich and rigorous mathematics education is about becoming an effective problem solver. This entails evaluating given information, accessing prior knowledge and intertwining these to move toward a potential solution. Attaining such abilities requires students to become driven, independent, competent and confident in their math abilities. SPCPA's math teachers strive to create a welcoming environment in which each of these features for success can grow and prosper. The Math Department is committed to students and their future success.

Mathematics Department Curriculum

Graduation Requirement: 3 Years

Math 9

This first year high school math course reviews important goals and objectives students must master to be successful in future math courses. In addition, Math 9 highlights solving equations, factoring, and working with linear equations/inequalities. In this course students will learn the basics of graphing, working with variables, evaluating expressions with exponents, and manipulating mathematical expressions.

Geometry

The geometry course provides a basic understanding of classical Euclidean geometry by presenting the properties and applications of: (1) points, lines, planes, (2) the study of angles formed by parallel and perpendicular lines, (3) the construction of angles and triangles using a straight edge and compass, (4) polygons, which includes triangles (obtuse, isosceles, equilateral, right, etc.), and quadrilaterals (parallelogram, rhombus, trapezoid, rectangle, square), (5) congruence and similarity, (6) transformations (translation, reflection, dilation, and rotation) (6) properties and applications of circles, and (7) solid geometry. Along with Euclidean geometry, the course includes coordinate geometry, which examines classical Euclidean geometry using the Cartesian coordinate system. Students will explore various types of proofs such as the paragraph proof and the standard two-column proof.

Prerequisite: Math 9 or Equivalent

Algebra II

This Advanced Algebra course emphasizes facility with algebraic expressions and forms, especially linear and quadratic forms, powers, and roots, and functions based on these concepts. Students will study exponential, logarithmic, trigonometric, and other special functions as tools for modeling real-world situations. This course will also cover probability and statistics this semester. The topics covered in this course prepare students for the standardized MCA-II in the spring of a student's junior year of high school.

Prerequisite: Geometry or Equivalent

Discrete Math

This course is designed to introduce students to Discrete Math and its importance in making decisions in today's world. In Discrete Math, the following topics are studied: Election Theory, fair division, matrix operations and applications, graphs and their applications, more graphs, subgraphs, and trees, counting and probability, and matrices. The use of the graphing calculator in Discrete Math is considered an integral part of the course.

Prerequisite: Algebra II or Equivalent

Precalculus

This course is a survey of topics in Mathematics that will prepare you for Calculus, and also help you review for the MCA-II. Students will understand and apply concepts of Trigonometry, Vectors, Matrices, Probability, Statistics, and Limits.

Prerequisite: Algebra II or Equivalent

Calculus I

Calculus, while difficult, is extremely useful. Its applications range from Physics to Economics. While this is not a formal AP course, it will cover enough material to prepare students for the Calculus AB test, should they choose to take it. First semester, students will review functions and limits, and then learn the process and application of differentiation. Second semester, students will learn about Riemann Sums, Integration and its many applications.

Prerequisite: Precalculus or Equivalent

Calculus II

This course will begin by reviewing the topics covered in Calculus I. This course will delve more deeply into the application of derivatives and integrals. While this is not a formal AP course, students will be encouraged to take the Calculus exam after completing this course.

College in the Schools – Mathematics

Students enrolled in the College in the Schools program will have concurrent enrollment at both SPCPA and the University of Minnesota where upon satisfactorily completing the course, students will receive social studies credit at SPCPA and the U of M.

eCIS Mathematical Modeling and Prediction

(Semester 1 Only)

Mathematical Modeling and Prediction (PSTL 1006)

(3.0 University of Minnesota Credits)

PSTL 1006 introduces students to the art of mathematical prediction through algebraic modeling and elementary probability theory. The class covers techniques of representing the behavior of real-world data with algebraic equations, including linear, polynomial, exponential and logarithmic functions. Students also learn basic probability theory including counting methods and conditional probability. The class emphasizes the use of traditional algebraic methods and technologies such as graphing calculators and Excel spreadsheets to find equations that accurately represent the behavior of real-world data. There are several modeling assignments throughout the semester in which students develop mathematical strategies for solving realistic problems. The emphasis on real-world problem-solving applications, delivered through non-traditional teaching methods, creates a challenging class in which students compare and evaluate mathematical arguments on a daily basis. Students improve their ability to communicate and evaluate mathematical reasoning.

Prerequisites: Junior or Senior; Algebra II or Equivalent; Application Process