

The Department's Educational Philosophy

The study of mathematics will enhance the ability of all students to problem solve and to reason. Through a strong standardized departmental program that emphasizes problem solving, communicating, reasoning and proof, making connections, and using representations, students will develop self-confidence and a positive attitude towards mathematics.

Our curriculum matches that of the Massachusetts Mathematics Curriculum Framework, and we are philosophically aligned with the National Council of Teachers of Mathematics Standards.

Guiding Principles

- Mathematical ideas should be explored in ways that stimulate curiosity, create enjoyment of mathematics, and develop depth of understanding.
- Effective mathematics programs focus on problem solving and require teachers who have a deep knowledge of the discipline.
- Technology is an essential tool in a mathematics education, and all students should gain facility in using it where advantageous.
- All students should have a high-quality mathematics program.
- Assessment of student learning in mathematics should take many forms to inform instruction and learning.
- All students should understand the basic structure of mathematics.
- All students should recognize that the techniques of mathematics are reflections of its theory and structure.
- All students should gain facility in applying mathematical skills and concepts.
- All students should understand the role of inductive and deductive reasoning in mathematic and real life situations.

PRECALCULUS (CP): COURSE #353

Course Frequency: Full-year course, five times per week

Credits Offered: Five

Prerequisites: A final grade of at least 70 in Algebra II

Background to the Curriculum

This course uses the McDougal Littell text, Advanced Mathematics – Precalculus With Discrete Mathematics and Data Analysis, Brown, 2010 edition. Its purpose is to strengthen students' algebra background before beginning the study of trigonometry in semester two. This particular edition has been used since 1993, but earlier editions of the same book were used since the course's inception in 1975. The text is followed closely; however, only about half of the text is studied. The text matches the 2000 edition of the Massachusetts State Frameworks for a Precalculus course and is philosophically aligned with the spirit of the National Council of Teachers of Mathematics curriculum standards. Teachers bring in other material where appropriate or time permits after consultation with the Regional Department Leader.

Core Topics/Questions/Concepts/Skills

Linear, Quadratic, Polynomial Functions

Inequalities in one or two variables

The General Theory of Functions

Exponential and Logarithmic Functions

Trigonometric Functions and their Inverses

Graphing Theory for Trigonometric Functions

Trigonometric Identities – Pythagorean, Sums, Differences, Double Angles

Solving Trigonometric Equations

Triangle Trigonometry

Course-End Learning Objectives

Students will be able to:

- 1] Apply the distance and midpoint formulae.
- 2] Solve a system by algebraic and graphical methods.
- 3] Find equations of parallels and perpendiculars.
- 4] Solve quadratic equations by factoring, completing the square, quadratic formula.
- 5] Find parabola equations, given geometric information.
- 6] Graph quadratic functions.
- 7] Use synthetic division and synthetic substitution.
- 8] Solve and graph linear and quadratic inequalities in one or two variables.
- 9] Solve and graph absolute value equations and inequalities.
- 10] Find domain, range, zeroes of a function.
- 11] Find function composition and inverse.
- 12] Graph higher degree polynomials.
- 13] Simplify expressions with fractional and negative exponents.
- 14] Use the definitions and properties of exponential and logarithmic functions.
- 15] Perform operations on complex numbers.
- 16] Convert radian measure to degree measure and vice versa.
- 17] Evaluate trigonometric functions in degrees or vice versa.
- 18] Graph the sine and cosine functions.
- 19] Simplify trigonometric expressions and prove identities.
- 20] Solve trigonometric equations.
- 21] Graph trigonometric functions using the concept of amplitude and period.
- 22] Use identities for sums, differences, double angles.
- 23] Solve right triangles.
- 24] Find the area of a triangle and related figures.
- 25] Use the Law of Sines and the Law of Cosines to solve scalene triangles.

Assessment

Students are generally assessed by in-class tests and quizzes, which are administered regularly throughout a marking period. The students' attitude, effort, and quality of homework preparation will also impact their term grade to a small degree. Teachers informally assess students every day by asking pivotal questions, as well as questions involving mechanics or concepts, and the students' term grades may be positively affected to a small degree based on their responses.

A standardized midyear examination and final examination are administered to all students in this course in order to assess their long-term retention of the course material.

Technology Learning Objectives Addressed in This Course

(This section is for faculty and administrative reference; students and parents may disregard.)

Course activity: skills &/or topics taught

- 1] Graphing calculators are used at some places in the course for illustration of concepts.

Materials and Resources

Text: Advanced Mathematics – Precalculus With Discrete Mathematics and Data Analysis. Brown, 2010.

Teachers use Algebra II texts for supplementary review exercises. Review materials that match both of the departmental examinations are used by all teachers of the course. Some teachers may employ the software package “Precalculus Plotter Plus” in the Mac Lab.