# Course Outline: Precalculus Honors

## Course Overview:

Precalculus Honors is designed to provide superior mathematics students with a solid foundation for AP Calculus. The course includes the use of technology (in the form of the Texas Instruments TI-83/TI-84 graphing calculators) blended with traditional precalculus topics. This approach emphasizes conceptual understanding while retaining the development of fundamental skills in algebra, trigonometry, analytical geometry, and introductory calculus concepts.

One of the underlying features of the course is the implementation of the "Rule of Four", which allows students to represent mathematical models in four ways: verbally, numerically, graphically, and algebraically. The use of one mode of representation to confirm the results obtained with another mode provides for a powerful learning experience in which students can link key ideas. In addition, should a problem be very difficult (or impossible) to solve using one mode of representation, emphasis on the Rule of Four allows students to consider an alternative model to find a solution.

Examples used throughout the course frequently model real-world phenomena. The modeling of such phenomena (often using actual data) and the Rule of Four allows students to develop a solid conceptual understanding as well as an appreciation and knowledge of how mathematics is used in other fields. The text and supplementary materials provide a variety of problems from many disciplines, including business, economics, finance, biology, medicine, physics, chemistry, studies of populations, and other practical examples and exercises.

The Texas Instruments TI-83/TI-84 graphing calculators will be used throughout the course. These calculators are able to quickly perform a variety of calculations, and provide the user with numerical and graphical displays. This allows the student to focus on the concepts that are being investigated rather than simply mastering the mechanics of tedious calculations.

The Texas Instruments Calculator-Based Laboratory (CBL) is used in conjunction with the TI-83/TI-84 graphing calculators and allows data from various collection devices (motion sensors, voltage probes, thermocouples, light sensors, microphones, etc.) to be input directly into the calculator. A number of labs are included in the curriculum which allow the student to model real world phenomena, thus reinforcing the underlying curricular theme of conceptual understanding through mathematical modeling.

**Resources:**

<u>Textbook</u>:
Demana, Waits, Foley, Kennedy. *Precalculus: Graphical, Numerical, Algebraic*. 6th ed.
Boston: Peason Education, Inc., 2004.

<u>Calculator</u>:
All students are required to have daily access to a Texas Instruments TI-83, TI-83+ or
TI-84 Graphing Calculator.

## Course Outline

**Note:** The number of days per chapter is approximate, and we will
<u>not</u> follow the textbook in this order.

Chapter 1: Functions and Graphs (10 days)

Chapter 2: Polynomial, Power, and Rational Functions (20 days)

Chapter 3: Exponential, Logistic, and Logarithmic Functions (20 days)

Chapter 4: Trigonometric Functions (20 days)

Chapter 6: Vectors, Parametric Equations, and Polar Equations (35 days)
[includes topics from Chapter 8: Analytic Geometry]

Chapter 7: Systems and Matrices (20 days)

Chapter 9: Discrete Mathematics (10 days)

Chapter 10: An Introduction to Calculus: Limits and Derivatives (15 days)

Review for Final Exam (10 days)