Department: Mathematics
Course Name: Honors Precalculus

Course Description:
This course is the highest level of mathematics preceding Calculus and prepares students for the algebraic complexities and the analytical nature of AP Calculus BC. This accelerated course requires a review of algebra topics at the beginning of the year. A thorough exploration of trigonometry follows in the second semester as well as an introduction to parametric equations, polar coordinates, vector-valued functions, limits, derivatives, and area under a curve. The ability to synthesize material is extremely important; assessments include conceptual questions and incorporate previously studied material. The course requires the ability to write mathematics and insists on correct notation and vocabulary throughout. The graphing calculator is used for demonstrations by the instructor and for exploration by the student. This course places an emphasis on critical thinking, complex communication, collaboration, creativity, and risk-taking to prepare students for rigorous college work. A TI-84 graphing calculator is required. A course average of a B or higher is expected for continuation to AP Calculus.

Content:
Prerequisites
Functions and their graphs
Polynomial and rational functions
Exponential and logarithmic functions
Trigonometric functions
Analytic trigonometry
Polar and Parametric functions
Vectors
Sequences and Series
Limits and an introduction to Calculus

Skills:
Exponents and radicals, algebraic and rational expressions, equations and inequalities
Graphing functions using appropriate translations and transformations
Combining functions and creating inverses
Explore one-to-one functions and their inverses
Analyzing characteristics of graphs to include average rate of change
Review and understand the characteristics of polynomial functions
Expand on operations with polynomials
Divide polynomials
Graph and find real and complex zeros of algebraic and rational functions
Graph exponential and logarithmic functions
Expand and condense logarithms
Solve exponential and logarithmic equations
Model data as semi-log or log-log plots
Evaluate trigonometric functions of all angles
Graph trigonometric functions
Evaluate and graph inverse trigonometric functions
Model data as sinusoidal functions
Rewrite trigonometric expressions using the fundamental identities and formulas

Solve trigonometric equations
Solve triangles and problems using the Law of Sines and Law of Cosines
Use polar coordinates to graph polar equations
Convert complex numbers to polar form and use DeMoivre's Theorem
Find parametric equations for a curve
Eliminate the parameter to obtain rectangular equations
Use vector properties to model velocity and force
Recognize, write, and use arithmetic and geometric sequences
Use mathematical induction
Find limits graphically, numerically, and analytically
Use the definition of a derivative to find slopes of tangent lines
Find areas of regions using limits of summations

Text and Materials:
Stewart, Redlin, and Watson Precalculus, Mathematics for Calculus 6e (Brooks/Cole Cengage Learning, 6th ed., 2012)
Desmos and Handheld TI84 Graphing Calculator

Methods of Instruction:
Recitation with note taking
Guided individual practice
Interactive questioning
Graphing calculator demonstrations

Methods of Evaluation:
Formative and Summative (formal and informal)
Cumulative semester and final exams