Pre-Calculus

Pre-Requisites: Algebra I, Geometry, & Algebra II
Credits: 0.5 (per segment)
Estimated Completion Time: 2 segments / 32-36 weeks
Earliest Start Date: March 2014

Description

Students, as mathematic analysts, investigate how advanced mathematics concepts are used to solve problems encountered in operating national parks. As students venture from algebra to trigonometry, they analyze and articulate the real-world application of these concepts. The purpose of this course is to study functions and develop skills necessary for the study of calculus. This course includes algebra, analytical geometry, and trigonometry.

Pre-Calculus is an honors-only course.

Major Topics and Concepts

Segment 1

Functions and Their Graphs

- Introduction to Function
- Graphs of Function
- Shifting, Reflecting and Stretching Graphs
- Combinations of Functions
- Inverse Functions

Polynomial and Rational Functions

- Quadratic Functions
- Polynomial Functions of Higher Degree
- Real Zeros of Polynomial Functions
- Complex Numbers
- The Fundamental Theorem of Algebra
- Writing about Polynomials
- Rational Functions and Asymptotes
- Graphs of Rational Functions

Exponential and Logarithmic Functions

- Exponential Functions and Their Graphs
- Logarithmic Functions and Their Graphs
- Properties of Logarithms
- Solving Exponential and Logarithmic Equations and their Models

Trigonometric Functions

- Radian and Degree Measure
- Trigonometric Functions: The Unit Circle, Any Angle
- Right Triangle Trigonometry
- Trigonometric Function of Any Angle
- Graphs and Analysis of Sine and Cosine Functions
- Graphs of Other Trigonometric Functions
- Inverse Trigonometric Functions
- Applications and Models

Analytic Trigonometry

- Using Fundamental Identities
- Verifying Trigonometric Identities
- Solving Trigonometric Equations: Linear, Factored or Quadratic
- Sum and Difference Formulas
- Multiple Angle Formulas

Segment 2

Additional Topics in Trigonometry

- Laws of Sines and Cosines and Applications
- Vectors in the Plane and 3 Dimensions
- Vectors and Dot Products
- Cross Product of To Vectors
- Complex Numbers in Trigonometric Form and DeMoivre's Theorem for Roots

Sequences, Series, and Poof by Induction

- Sequences and Summation Notation
- Arithmetic and Geometric Sequences
- Mathematical Induction

Topics in Analytic Geometry

- Conic Sections: Parabolas, Ellipses, Hyperbolas
- Conics Collage
- Parametric Equations
- Polar Coordinates and their Graphs

Limits and Introduction to Calculus

- Introduction to Limits
- Evaluating Limits and One-Sided Limits
- Continuity at a Point

Required Materials

Course Objectives

Grading Policy

Besides engaging students in challenging curriculum, the course guides students to reflect on their learning and evaluate their progress through a variety of assessments. Assessments can be in the form of practice lessons, multiple choice questions, writing assignments, projects, research papers, oral assessments, and discussions. The course will use the state-approved grading scale and each course contains a unique end of course assessment. This assessment counts for 20% of the student's overall grade and must be passed with a score of 60% or higher.

Communication Policy

To achieve success, students are expected to submit work in each course weekly. Students can learn at their own pace; however, "any pace" still means that students must make progress in the course every week. To measure learning, students complete self-checks, practice lessons, multiple choice questions, projects, discussion-based assessments, and discussions. Students are expected to maintain regular contact with teachers; the minimum requirement is monthly. When teachers, students, and parents work together, students are successful