AP PreCalculus Course Syllabus

Course Description
In this full year AP PreCalculus course, students explore all high school PreCalculus topics as well as advanced Algebra and Geometry concepts. This class requires students to demonstrate fluent understanding of concepts and procedures, reason abstractly and quantitatively to solve problems, communicate reasoning, model with mathematics, and evaluate conclusions. As in all advanced level courses, students are expected to complete work according to given timelines so they are prepared to move through the curriculum at the required pace. Students who successfully complete this course will be prepared for Calculus I. In alignment with the skills detailed in the **Portrait of the Crusader**, students in this course solve problems through innovation, imagination, and self-advocacy, and they seek personal relevance in and ownership of learning to become truly college and career ready.

Assessment Practices
Throughout the course, teachers strive to include varied assessments, including traditional quizzes and tests to measure discrete skills; problem/solution/explanation opportunities where students solve a complex problem and communicate their reasoning; and real-world scenarios where students define the problem, develop a plan, and solve the problem, adjusting as necessary and communicating their reasoning when required. Students practice answering questions modeled after the AP exam throughout the course.

Essential Questions
1. How do we use previous math topics from Algebra and Geometry to discover PreCalculus rules?
2. How do we interpret and analyze real life situations using PreCalculus?
3. How do we integrate technology to support PreCalculus topics ?

Curriculum Framework
Unit/Topic 1: Polynomial and Rational Functions
- Define change in tandem and rates of change
- Apply rates of change in Linear and quadratic functions
- Apply polynomial functions and rates of change
- Find complex zeros of polynomial and rational functions
- Examine end behavior of polynomial and rational functions
- Define rational functions and vertical asymptotes
- Define rational functions with holes
- Write equivalent representations of polynomial and rational expressions
- Define transformations of functions
- Apply function model selection and assumption articulation
- Apply function model construction and application

Unit/Topic 2 : Exponential and Logarithmic Functions
- Explain change in arithmetic and geometric sequences
- Define exponential functions
- Explain change in linear and exponential functions
- Explore exponential function rules
- Apply exponential function context and data modeling
- Apply competing function model validation
- Define composition of functions
- Define inverse and logarithmic functions
- Explore logarithmic function rules
- Solve exponential and logarithmic equations and inequalities
- Apply logarithmic and function context and data modeling
- Apply semi-log plots

Unit/Topic 3 : Trigonometric and Polar Functions
- Define periodic phenomena
- Explore sine, cosine, and tangent functions
- Apply sinusoidal functions
- Define sinusoidal function transformations
- Apply sinusoidal function context and data modeling
- Define inverse trigonometric functions
- Solve trigonometric equations and inequalities
- Graph the secant, cosecant, and cotangent functions
- Define polar coordinates
- Graph polar function
- Explore rates of change in polar functions

Enrichment if time permits: Analytic Trigonometry
- *Verify trigonometric identities*
- *Apply sum and difference formulas*

Unit/Topic 4: Functions Involving Parameters, Vectors, and Matrices
- Define parametric functions
- Apply parametric functions modeling planar motion
- Apply parametric functions and rates of change
- Define parametrically defined circles and lines
- Explain implicitly defined functions
- Define conic sections
- Apply parametrization of implicitly defined functions
- Define vectors
- Determine vector-valued functions
- Define matrices
- Calculate the inverse and determinant of a matrix
- Apply linear transformations and matrices
- Study matrices as functions
- Apply matrices modeling context

Enrichment if time permits:
- *Define and apply double-angle, power-reducing and half-angle formulas*
- *Define and apply product-to-sum and sum-to-product formulas*
- *Solve trigonometric equations*

Resources
- *PreCalculus* (6th Edition) Blitzer
- MyMathLab. (mymathlabforschool.com)
- Graphing Calculator
- Desmos application (ISO/Android or [web](web))

Grading
- 20 % MyMathLab,
- 25% Quizzes
- 25% Student Work
- 30 % Tests