**AP Precalculus Overview (Units & Topics)**

Textbook: *Precalculus 2e* from OpenStax (available free of charge at https://openstax.org/ )

**Semester 1**

***Unit 1: Polynomial & Rational Functions***(Aug. 28 until Oct. 17)

*Textbook:* Chapter 1 Sections 1-3, 5-6; Chapter 2; Chapter 3; Chapter 11 Section 6

*Unit 1A: Linear, Quadratic, & Polynomial Functions* (August 28-Sept. 19)

Function Notation

Domain & Range

Increasing & Decreasing Functions and Concavity

Symmetry of Functions

End Behavior using Limit Notation

Linear Functions and Average Rate of Change

Quadratic Functions

Turning Points and Extrema

Rational Zeroes of Polynomials

Complex Zeroes of Polynomials

*Unit 1B: Rational Functions and Functional Models* (Sept. 15-Oct. 17)

Transformations of Rational Functions

Vertical Asymptotes using Limit Notation

Horizontal Asymptotes and End Behavior

Oblique Asymptotes and Crossing Points

Removable Discontinuities using Limit Notation

Graphs of Rational Functions

Polynomial & Rational Inequalities in One Variable

The Binomial Theorem

General Transformations of Functions & the Function Library

Piecewise Functions

Linear, Quadratic, Polynomial, & Rational Models

Direct & Inverse Variation

***Unit 2: Exponential & Logarithmic Functions***(Oct. 19-Nov. 30)

*Textbook:* Chapter 4; Chapter 11 Sections 1-4

*Unit 2A: Exponential Growth & Decay* (Oct. 19-31)

Sequence Notation and Rates of Change

Arithmetic Sequences

Geometric Sequences

Series Definitions and Summation Notation

Arithmetic Series

Geometric Series

Exponential Functions and Graphs

Transformations of Exponential Functions

Exponential Models

*Unit 2B: Composite Functions & Logarithms* (Nov. 1-30)

Composition of Functions

Inverses of Functions

Graphical Inverse of an Exponential Function

Logarithmic Properties & Simplifying Using Logarithms

Logarithmic Functions and Graphs

Solving Exponential Equations

Solving Logarithmic Equations

Exponential and Logarithmic Inequalities in One Variable

Logarithmic Models

Log-Log and Semi-Log Plots

***Review Interlude: Geometric Trigonometry Review and Semester Review*** (Dec. 1-18)

*Textbook:* Chapter 5 Sections 1 & 4; Chapter 8 Sections 1 & 2

Right Triangle Trigonometric Ratios

Right Triangle Trigonometric Applications

The Law of Sines

The Law of Cosines

The Sine-Area Rule and Heron’s Formula

Trigonometry in the Coordinate Plane

Reference Triangles in the Coordinate Plane

**Semester 1 Exams:** Dec. 19-22

*Winter Break: Dec. 25-Jan. 8*

***Unit 3: Trigonometric and Polar Functions***(Jan. 9-March 8)

*Textbook:* Chapter 5, Chapter 6, Chapter 7, Chapter 8 Sections 3-5

*Unit 3A:The Unit Circle, Trigonometric Functions and Models* (Jan. 9-Feb. 6)

Periodic Functions

Radian and Degree Measure

Arc Length & Angular Velocity

The Unit Circle

Trigonometric Values as Functions

Sinusoidal Functions Using Sine and Cosine

Transformations of Sinusoidal Functions

Graphs of Sinusoidal Functions

Sinusoidal Models

Transformations of Other Trigonometric Functions

Graphs of Other Trigonometric Functions

Inverse Trigonometric Functions

*Unit 3B: Analytic Trigonometry*  (Feb. 7-23)

Reciprocal Identities

Quotient Identities

Pythagorean Identities

Simplifying & Verifying Using Identities

Solving Trigonometric Equations

Cofunction Identities

Even/Odd Identities

Sum & Difference Identities

Double-Angle & Half-Angle Identities

Product-Sum Identities

Algebra Techniques for Trigonometric Equations

Trigonometric Model Applications

*Unit 3C: Polar Functions* (Feb. 26-March 8)

Plotting Polar Points

Converting Between Polar & Rectangular Forms

Graphing Polar Functions

Types of Polar Functions

Rates of Change in Polar Functions

Complex Numbers in Polar Form

Complex Powers and Roots

*Spring Break: March 11-15*

***Unit 4: Conic Sections & Vectors***(March 18 – April 19)

*Textbook:* Chapter 10 Sections 1-3 & 5, Chapter 8 Sections 6-8

*Unit 4A: Conic Sections* (March 18-28)

Circles in Conic Form

Parabolas in Conic Form

Ellipses in Conic Form

Hyperbolas in Conic Form

Graphing a General Conic

Eccentricity of a Conic

Identifying a Rotated Conic

*Unit 4B: Parametric Equations* (April 1-11)

Parametric Equations & Plane Curves

Graphing Parametric Functions

Rates of Change in Parametric Functions

Conics in Parametric Form

Conics in Polar Form

*Unit 4C: Vectors Part 1* (April 12-19)

Defining Vectors

Magnitude, Direction, and Components

Graphing Vectors in the Plane

Vector Addition & Subtraction

Dot Products

***Review Interlude: AP Review*** (April 22-May 10)

Functions Review

Polynomials Review

Mock Exam

Rationals Review

Exponentials Review

Logarithms Review

Rates of Change Review

Function Modeling Review

Trigonometry Review

Polar Review

Review Mock Exam

***AP Precalculus Exam: May 13 (afternoon exam)***

***Unit 5: More Vectors and Miscellaneous Topics*** (May 14-28)

Angles Between Vectors

Vectors in 3D Space

Matrix Review

Cross Products and Their Applications

Vector-Valued Functions

Partial Fraction Decomposition

*Semester 2 Review:* May 29-30

*Semester 2 Exams*: May 31-June 5

*All* dates are subject to change in case of inclement weather or other emergency