**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