

# AP Calculus (BC) Course Outline 2021-2022

(2.5 hours/week, totally 70 hours)

## Chapter 1 Limits and Continuity

(Lesson 1 - 2)

- 1.1 Definitions of Limits
- 1.2 Continuity
- 1.3 Limits Properties
- 1.4 Other Basic Limits
- 1.5 Asymptotes

## Chapter 2 Differentiation

(Lesson 3 - 4)

- 2.1 Definition of Derivative
- 2.2 Differentiation Rules
- 2.3 Implicit Differentiation
- 2.4 Estimating a Derivative
- 2.5 Derivative of the Inverse of a Function

## Chapter 3 Applications of Differential Calculus

(Lesson 5 -7)

- 3.1 Slope; Critical Points, Tangents and Normals
- 3.2 Increasing and Decreasing Functions
- 3.3 Maximum, Minimum, and Inflection Points
- 3.4 Curve Sketching
- 3.5 Optimization Problems
- 3.6 Local Linear Approximations
- 3.7 Motion along a Curve: Velocity and Acceleration
- 3.8 Related Rates
- 3.9 Slope of a Polar Curve

## Chapter 4 Antiderivatives and the Definite Integral

(Lesson 8 - 10)

- 4.1 Antiderivatives
- 4.2 Area
- 4.3 Definition of Definite Integral and Properties of Definite Integral
- 4.4 The Mean Value Theorem for Definite Integral
- 4.5 The Fundamental Theorem of Calculus

**Chapter 5 Applications of the Definite Integral and Polar Coordinates (Lesson 11 - 14)**

- 5.1 Area and Solids of Revolution
- 5.2 Volumes Using Cylindrical Shells and Volumes by Slicing
- 5.3 Arc Length and Work
- 5.4 Polar Coordinates

**Chapter 6 Additional Techniques of Integration (Lesson 15 – 18)**

- 6.1 Integration by Parts
- 6.2 Trigonometric Substitutions
- 6.3 Partial Fractions and Quadratic Expressions
- 6.4 Miscellaneous Substitutions

**Test 1**

**Chapter 7 Differential Equations (Lesson 19 – 20)**

- 7.1 Basic Definitions
- 7.2 Slope Fields
- 7.3 Derivatives of Implicitly Defined Functions
- 7.4 Euler's Method
- 7.5 Solving First-order Differential Equations
- 7.6 Exponential Growth and Decay

**Chapter 8 Indeterminate Forms and Improper Integrals (Lesson 21 – 22)**

- 8.1 The Indeterminate Form  $0/0$  and  $\infty/\infty$
- 8.2 Integral with Infinite Limits of Integration
- 8.3 Integrals with Discontinuous Integrands
- 8.4 Taylor's Formula

**Chapter 9 Infinite Series (Lesson 23 - 25)**

- 9.1 Infinite Sequences
- 9.2 Convergent or Divergent Infinite Series
- 9.3 Positive Term Series and Alternating Series
- 9.4 Absolute Convergence
- 9.5 Power Series and Power Series Representations of Functions

**Review, Mock Test One or/and Mock Test Two (Lesson 26 – 28)**