

# ***AP Calculus AB Course Outline***

## **Unit I Preparation for Calculus**

1. Algebra
2. Functions and Their Graphs
3. Trigonometry
4. Conic Sections
5. A preview of Calculus

## **Unit II Limits and Their Properties**

1. Finding Limits Graphically and Numerically
2. Evaluating Limits Analytically
3. Continuity and One-Sided Limits
4. Limits to Infinity

## **Unit III Differentiation**

1. Derivatives and the Tangent Line
2. Basic Differentiation Rules and Rates of Change
3. The Product and Quotient Rule
4. Higher Order Derivatives
5. The Chain Rule
6. Implicit Differentiation

## **Unit IV Applications of Differentiation**

1. Related Rates
2. Extrema on an Interval
3. Rolle's Theorem and the Mean Value Theorem
4. Increasing and Decreasing Functions (The First Derivative Test)
5. Concavity of a Function (The Second Derivative Test)
6. Sketching the Graph of a Function Using Derivatives
7. Optimization Problems
8. Newton's Method
9. Differentials
10. L'Hopital's Rule

## **Unit V Integration**

1. Antiderivatives and Indefinite Integration
2. Area Under a Curve
3. The Fundamental Theorem of Calculus (Part 1)
4. The Fundamental Theorem of Calculus (Part 2)
5. Integration by Substitution

## **Unit VI Logarithmic, Exponential and Inverse Trigonometric Functions**

1. The Natural Logarithmic Function and Differentiation
2. The Natural Logarithmic Function and Integration
3. Exponential Functions; Differentiation and Integration
4. Differential Equations; Separation of Variables
5. Inverse Trigonometric Functions and Differentiation
6. Inverse Trigonometric Functions and Integration

## **Unit VII Applications of Integration**

1. Area of a Region Between two Curves
2. Volume of a Solid of Revolution; The Disk Method
3. Volume of a Solid of Revolution; The Shell Method
4. Arc Length and Surface of Revolution
5. Work
6. Moments, Centers of Mass, and Centroids
7. Fluid Pressure and Fluid Force

## **Unit VIII Other Integration Techniques (As time permits after the AP Exam)**

1. Basic Integration Rules
2. Integration by Parts
3. Trigonometric Integrals
4. Trigonometric Substitution
5. Partial Fractions