Walter Payton College Prep

AP Calculus AB Course Outline

Textbook: Calculus from Graphical, Numerical, and Symbolic Points of View (Ostebee & Zorn)

For more information of the College Board's AP Calculus AB learning objectives see the College Board website: https://apstudent.collegeboard.org/apcourse/ap-calculus-ab

Students will learn Calculus through multiple representations - numeric, graphic and symbolic. The graphing calculator will be used to develop conceptual understanding, and traditional paper manipulation will be emphasized. The outline for this course, AP Statistics and AP Calculus is available through the College Board's website (collegeboard.com). All students will be expected to take the AP exam in May. Many colleges will grant *one* semester of Calculus credit for successful completion.

1st Semester: Continuity, Limits, and Derivatives with Applications

2nd Semester: Integrals, The Fundamental Theorem of Calculus, Polynomial Approximation and Series

Chapter 1 - Functions and Derivatives - the Graphical View

- The Idea of a Derivative
- Evaluating limits (not at infinity)
- Estimating Derivatives (average rate of change, instantaneous rate of change)
- Geometry of Derivatives
- Second Derivatives
- Position, Velocity, Acceleration

Chapter 2 - Evaluating Derivatives Symbolically

- Limit definition of derivative
- Derivatives of Power functions and Polynomials
- Using derivatives and Anti-derivatives
    - Stationary points
    - Absolute and relative extrema
    - Points of inflection
- Derivatives of exponential and logarithmic functions
- Derivatives of trigonometric functions

Chapter 3 - New Derivatives from Old

- Product and Quotient Rules
- Chain Rule
- Implicit Functions and Implicit Differentiation
- Inverse Functions and Inverse Trig Functions
- Finding Derivatives and Practicing Anti-derivatives (Guess and Check)

Chapter 4 - Using the Derivative

- Slope Fields
- Limits, Infinity, and L'Hoptial
- Optimization

- Related Rates
- Why Continuity Matters
- The Mean Value Theorem (MVT)

Chapter 5 - The Integral

- The Integral as a Signed Area
- The Area Function
- The Fundamental Theorem of Calculus
- Finding Anti-derivatives with Substitution
- Approximating Sums: The Integral as a Limit

Chapter 6 - Using the Integral

- Measurement and the Definite Integral
- Finding Volumes by Integration
- Work Problems
- Separating Variables: Differential Equations

Chapter 7 - Anti-differentiation Techniques

- Trigonometric Antiderivatives