

Course Description

ADVANCED PLACEMENT*: AP Calculus BC

COURSE DESCRIPTION: This is a college level course covering derivatives, integrals, limits, approximation, applications and modeling, and sequences and series.

PREREQUISITES: Knowledge of algebra, geometry, trigonometry, analytic geometry, and elementary functions.

COURSE LENGTH: Two Semesters or Block

REQUIRED TEXT: None

OPTIONAL TEXT: *Calculus with Infotrac* ISBN: 0534437362

SUPPLEMENTAL TEXT: *Calculus Concepts and Contexts*, 2nd Edition, James Stewart, Brooks/Cole, 2001.

REQUIRED MATERIAL: TI 83 Plus Calculator

COURSE OUTLINE:

Semester I

A. FUNCTION & GRAPHS

1. Functions & function notation
2. Absolute Value & Piecewise Defined Functions
3. Inequalities
4. Composition & Combination of Functions
5. Exponential & logarithmic functions
6. Transformation of Functions
7. Trigonometric Functions
8. Polynomial & Rational Functions
9. Vectors & Vector-Valued Functions
10. Polar Coordinates & Graphs
11. Parametric Equations & Conic Sections

B. LIMITS & CONTINUITY

1. Intuitive Definition of a Limit
2. Algebraic Techniques for Finding Limits
3. One-Sided Limits
4. Infinite Limits
5. Limits at Infinity
6. Limits of Special Trigonometric Functions
7. Continuity

C. DERIVATIVES

1. Definition of the Derivative
2. Differentiation Rules
3. The Chain Rule
4. Derivatives of Exponential Functions
5. Derivative of Logarithmic Functions
6. Derivatives of Inverse Functions
7. Differentiability & Continuity
8. Implicit Differentiation
9. Logarithmic Differentiation
10. Parametric Derivatives
11. Differentiation with Polar Curves
12. Limits & Continuity of Vector-Valued Functions

D. APPLICATION OF THE DERIVATIVE

1. Tangent & Normal Lines
2. Position, Velocity, & Acceleration (PVA)
3. Related rates
4. Relative Extrema & the First Derivative Test
5. Concavity & the Second Derivative Test

Semester II

E. ANTI-DERIVATIVES

1. Differential Equations and Slope Fields
2. Antiderivatives
3. The Chain Rule for Antiderivatives
4. Antiderivatives of Exponentials
5. Antiderivatives of Logarithms
6. Antiderivatives of Inverse Trig Functions
7. Integration by Parts
8. Integration by Partial Fractions
9. Trigonometric Substitutions
10. The Definite Integral
11. Fundamental Theorem of Calculus
12. Improper Integrals

F. APPLICATION OF INTEGRALS

1. Net Change and Displacement
2. Volume
3. Separable Differential Equations
4. Numerical Solutions to Differential Equations
5. Logistic Growth
6. Work
7. Arc Length & Surface of revolution
8. Integration of Vector-Valued Functions
9. Parametric Integrals
10. Polar Integrals
11. Other Applications of Definite Integrals

G. INFINITE SEQUENCES AND SERIES

1. Sequences
2. Series
3. Estimating Sums
4. Other Tests for Convergence
5. Power Series
6. Taylor and Maclaurin Series

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