

Advanced Placement® ** 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

REQUIRED TEXT: None

OPTIONAL TEXT: *Calculus with Infotrac*; ISBN# 0534437362

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

REQUIRED MATERIALS: TI 83 Plus calculator

COURSE OUTLINE:

Semester 1

Function and Graphs

- Functions & function notation
- Absolute Value & Piecewise Defined Functions
- Inequalities
- Composition & Combination of Functions
- Exponential & Logarithmic Functions
- Transformation of Functions
- Trigonometric Functions
- Polynomial & Rational Functions
- Vectors & Vector-Valued Functions
- Polar Coordinates & Graphs
- Parametric Equations & Conic Sections

Limits & Continuity

- Intuitive Definition of a Limit
- Algebraic Techniques for Finding Limits
- One-Sided Limits
- Infinite Limits
- Limits at Infinity
- Limits of Special Trigonometric Functions
- Continuity

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Advanced Placement® ** Calculus BC (continued)

COURSE OUTLINE (continued):

Derivatives

- Definition of the Derivative
- Differentiation Rules
- The Chain Rule
- Derivatives of Exponential Functions
- Derivative of Logarithmic Functions
- Derivatives of Inverse Functions
- Differentiability & Continuity
- Implicit Differentiation
- Logarithmic Differentiation
- Parametric Derivatives
- Differentiation with Polar Curves

Limits & Continuity of Vector-Valued Functions

Application of the Derivative

- Tangent & Normal Lines
- Position, Velocity, & Acceleration (PVA)
- Related rates
- Relative Extrema & the First
- Derivative Test
- Concavity & the Second Derivative Test

Semester 2

Anti-Derivatives

- Differential Equations and Slope Fields
- Antiderivatives
- Antiderivatives of Exponentials
- Antiderivatives of Logarithms
- Antiderivatives of Inverse Trig Functions
- Integration by Parts
- Integration by Partial Fractions
- Trigonometric Substitutions
- The Definite Integral
- Fundamental Theorem of Calculus
- Improper Integrals

Application of Integrals

- Net Change and Displacement
- Volume
- Separable Differential Equations
- Numerical Solutions to Differential Equations
- Logistic Growth
- Work
- Arc Length & Surface of revolution
- Integration of Vector-Valued Functions
- Parametric Integrals
- Polar Integrals
- Other Applications of Definite Integrals

Infinite Sequences & Series

- Sequences
- Series
- Estimating Sums
- Other Tests for Convergence
- Power Series
- Taylor and Maclaurin Series

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Applications of Differentiation

- Applications of Differentiation: Introduction
- Extreme and The Mean Value Theorem
- Derivative Tests, Limits, and Graphs
- Optimization, Newton's Method, and Differentials

Semester 1 Exam**Integration**

- Integration: Introduction
- Antiderivatives and Indefinite Integration
- Area, Riemann Sums, and Definite Integrals
- The Fundamental Theorem of Calculus
- Integration by Substitution and Numerical Integration

Logarithmic, Exponential, and other Transcendental Functions

- Logarithmic, Exponential, and other Transcendental Functions: Introduction
- The Natural Logarithmic Function
- Inverse Functions and Exponential Functions
- Inverse Trigonometric Functions
- Hyperbolic Functions

Differential Equations

- Differential Equations: Introduction
- Slope Fields, Euler's Method, and Growth and Decay
- Separation of Variables and First Order Linear Differential Equations

Applications of Integration

- Applications of Integration: Introduction
- Area of a Region Between Two Curves
- Volumes, Arc Lengths, and Surfaces
- Work, Moments, and Fluids

Semester 2 Exam

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