

AP Calculus AB

511

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Office Hours: Daily 7am – 7:25, 6th Period Conference, 2:30 – 2:50

Course Description:

This course is the culmination of a high school mathematics program. Included is a study of analytic geometry, derivatives, and integration. For the student who is intent on mathematical or scientific studies, it provides a running start and opens many doors normally closed to college freshmen. Summer assignments must be completed. They will be assessed the cost of the test in their fill mailed home in September.

Course Pre-Requisite

A grade of A or B+ in Honors PreCalculus with teacher recommendation is needed to enroll in AP Calculus.

Major Text: Larson, Hostetler and Edwards. *Calculus of a Single Variable*. 8th Edition
Boston/New York: Houghton Mifflin Company, 2006

Calculator: TI 83, TI 83 Plus, TI 84

Approach: Each topic is approached in an analytical, graphical, and tabular method. Other technology includes the use of the Smartboard and its functions.

Assessment:

- * Inquiry Based Experiments or Projects
- Formative Assessments
- Mid – Term Summative Assessment
- End of course Summative Assessment
- Information Evaluation Skills
- Final grades are based on total points for the entire quarter.

School wide grading scale is used as stated in the Program Planning Guide.

Course Content:

Chapter P: Preparation for Calculus (*summer review packet*)

- P.1 Graphs and Models
- P.2 Linear Models and Rates of Change
- P.3 Functions and Their Graphs
- P.4 Fitting Models to Data

Chapter 1: Limits and Their Properties (*2 weeks*)

- 1.1 A Preview of Calculus

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- 1.2 Finding Limits Graphically and Numerically
 - *Estimating Limits using Graphs and Tables on Calculator
 - *Formal Definition of Limit
- 1.3 Evaluating Limits Analytically
 - *Evaluate Algebraically
 - *Evaluate using the Squeeze Theorem
- 1.4 Continuity and One-Sided Limits
 - *Use Properties of Continuity
 - *Understand and use the Intermediate Value Theorem
- 1.5 Infinite Limits
 - *Find vertical asymptotes of a graph

Chapter 2: Differentiation (4 weeks)

- 2.1 The Derivative and the Tangent Line Problem
 - *Limit Definition of Derivatives
- 2.2 Basic Differentiation Rules and Rates of Change
- 2.3 Product and Quotient Rules and Higher-Order Derivatives
- 2.4 The Chain Rule
- 2.5 Implicit Differentiation
- 2.6 Related Rates
 - *Use related to solve real-life problems

Chapter 3: Applications of Differentiation (3 weeks)

- 3.1 Extrema on an Interval
- 3.2 Rolle's Theorem and the Mean Value Theorem
- 3.3 Increasing and Decreasing Functions and the First Derivative Test
- 3.4 Concavity and the Second Derivative Test
- 3.5 Limits at Infinity
 - *Determine Horizontal Asymptotes
- 3.6 Curve Sketching
- 3.7 Optimization Problems
 - *Solve applied minimum and maximum problems
- 3.8 Newton's Method
- 3.9 Differentials

Chapter 4: Integration (3 weeks)

- 4.1 Antiderivatives and Indefinite Integration
 - *Write General Solutions
 - *Find particular solutions of Differential Equations
- 4.2 Area
 - *Use Sigma Notation and Limit Definition
- 4.3 Riemann Sums and Definite Integrals
- 4.4 The Fundamental Theorem of Calculus
 - *Use the Mean Value Theorem for Integrals
 - *Find Average Value over a closed integral
 - *Use Second Fundamental Theorem of Calculus

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- 4.5 Integration by Substitution
- 4.6 Numerical Integration
 - *Trapezoidal Rule
 - *Simpson's Rule

- Chapter 5: Logarithmic, Exponential, and Other Transcendental Functions (3 weeks)**
 - 5.1 The Natural Logarithmic Function: Differentiation
 - 5.2 The Natural Logarithmic Function: Integration
 - *Use Log Rule for integration of rational functions
 - 5.3 Inverse Functions
 - 5.4 Exponential Functions: Differentiation and Integration
 - 5.5 Bases Other Than e and Applications
 - *Model compound interest and exponential growth
 - 5.6 Inverse Trigonometric Functions: Differentiation
 - 5.7 Inverse Trigonometric Functions: Integration

- Chapter 6: Differential Equations (2 weeks)**
 - 6.1 Slope Fields
 - 6.2 Differential Equations: Growth and Decay
 - 6.3 Separation of Variables
 - 6.4 First-Order Linear Differential Equations

- Chapter 7: Applications of Integration (2 weeks)**
 - 7.1 Area of a Region Between Two Curves
 - *Accumulation Process and integration
 - 7.2 Volume: The Disc and Washer Method
 - *Known cross sections method
 - 7.3 Volume: The Shell Method
 - 7.4 Arc Length and Surfaces of Revolution

- Chapter 8: Integration Techniques and L'Hopital's Rule (1 week)**
 - 8.2 Integration by Parts
 - 8.7 Indeterminate Forms and L'Hopital's Rule

- Review and Preparation for the AP Exam (remaining 3-5 weeks)**