

AP Calculus AB

Scoring Components

SC1	The course teaches all topics associated with Functions, Graphs, and Limits as delineated in the Calculus AB Topic Outline in the AP Calculus course description.
SC2	The course teaches all topics associated with Derivatives as delineated in the Calculus AB Topic Outline in the AP Calculus course description.
SC3	The course teaches all topics associated with Integrals as delineated in the Calculus AB Topic Outline in the AP Calculus course description.
SC4	The course provides students with the opportunity to work with functions represented graphically.
SC5	The course provides students with the opportunity to work with functions represented numerically.
SC6	The course provides students with the opportunity to work with functions represented analytically.
SC7	The course provides students with the opportunity to work with functions represented verbally.
SC98	The course teaches students how to explain solutions to problems orally.
SC9	The course teaches students how to explain solutions to problems in written sentences.
SC10	The course teaches students how to use graphing calculators to help solve problems.
SC11	The course teaches students how to use graphing calculators to experiment.
SC12	The course teaches students how to use graphing calculators to interpret results and support conclusions.

Major Text:

Calculus, 10th edition, Ron Larson and Bruce H. Edwards

AP Calculus AB Course Outline

Unit 1: Limits and Continuity [SC1]

- Rates of Change
- Limits at a point
 - Properties of Limits
 - Two sided
 - One sided
 - From tables
 - From graphs
- Limits involving infinity
 - Asymptotic behavior
 - End behavior
 - Properties of limits
 - Visualizing limits
- Continuity
 - Continuous functions
 - Discontinuous functions
 - Removable discontinuity
 - Jump discontinuity
 - Infinite discontinuity
- Instantaneous Rates of Change

Unit 2: The Derivative [SC2]

- Definition of the derivative
- Differentiability
 - Local linearity
 - Numeric derivatives using the calculator
 - Differentiability and continuity
- Derivatives of Algebraic functions
- Derivative rules when combining functions
- Applications to velocity and acceleration
- Derivatives of trigonometric functions
- The chain rule
 - Leibniz notation
 - Function notation
 - Parametric notation
- Implicit derivatives
 - Differential method
 - y' method
- Derivatives of inverse trigonometric functions
- Derivatives of logarithmic and exponential functions

Unit 3: Applications of the Derivative [SC2]

- Extreme Values
 - Local (relative) extrema
 - Global (absolute) extrema
- Using the Derivative

- Mean Value Theorem (MVT)
- Rolle's Theorem
- Increasing and decreasing functions
- Analysis of graphs using the first and second derivatives
 - Critical values
 - First derivative test for extrema
 - Concavity and points of inflection
 - Second derivative test for extrema
- Optimization problems
- Linearization models
- Related Rates

Unit 4: The Definite Integral [SC3]

- Approximating areas
 - Riemann sums
 - Trapezoidal rule
 - Definite integrals
- The fundamental theorem of calculus (part 1)
- Definite integrals and antiderivatives
 - The average value theorem
- The fundamental theorem of calculus (part 2)

Unit 5: Differential Equations and Mathematical Modeling [SC3]

- Antiderivatives
- Integration using u-substitution
- Separable differential equations
 - Growth and Decay
 - Slope Fields
 - General differential equations

Unit 6: Applications of Definite Integrals [SC3]

- Summing rates of change
- Particle motion
- Areas in the plane
- Volumes
 - Volumes of solids with known cross sections
 - Volumes of solids of revolution
 - Disk method
 - Shell method

Teaching Strategies

- Each topic is presented numerically (as in a table of values or a set of ordered pairs), geometrically, symbolically, and verbally as students learn to communicate the connections among these representations [SC5]
- Justifications of responses and solutions are part of the routine when solving problems. Students are encouraged to express their ideas in carefully written sentences that validate their process and conclusions. [SC9]
- Students make extensive use of the TI-83 calculator. Each student has his/her own calculator.
- Students use program in their calculators to: [SC10, SC11, SC12]
- From the middle of October throughout the rest of the year, students will be assigned free-response questions from AP Released Exams regularly. Each will be graded as it would be at an AP Reading. Students may use a calculator for any question that allowed a calculator when the question appears on the exam, and they may not use a calculator for any question that did not allow a calculator when the question appeared on the exam.
- All tests contain multiple-choice questions, which will be timed at 2-3 minutes per question.
- All tests contain material from previous units. Students are responsible for all material covered to the date of the test.
- Students are encouraged to work cooperatively on in-class worksheets, graded AP problems, and take-home exams [SC8]
- Circular functions, exponential functions, and logarithmic functions are used throughout the course. Students have previously studied these functions, so we deal with the derivatives of these functions early in the course.