

SYNOPSIS

TITLE: AP CALCULUS AB
COURSE NUMBER:
GRADE LEVEL: 11-12
LENGTH OF COURSE: 36 Weeks

QUARTER 1

In this quarter students develop an understanding of limits as the foundational building block for both derivatives and integration. Also, students use their understanding of limits to explore the meaning of a derivative and instantaneous rate of change. Building on the limit definition of the derivative, students will explore and begin to use the various rules for taking a derivative. One goal of this quarter is to ensure that students are comfortable solving limit and differentiation problems using the Rule of Four (Graphical, algebraic, tabular, and verbal/written approaches).

Unit 1 Limits

Unit 2 Derivatives (Late Transcendentals)

QUARTER 2

In this quarter students expand on their understanding of derivatives and their use in real-world related rates problems. Students explore how to take derivatives of equations that are not mathematical functions using implicit differentiation. Students will take derivatives of an expression with relation to any variable, typically time with related rates problems. Students discover how we can use the first and second derivatives of functions to describe the function's behavior and sketch it accurately. Students will understand how to apply the Existence Theorems (which include the Intermediate Value Theorem, Extreme Value Theorem, Rolle's Theorem, and the Mean Value Theorem) to help problem solve and justify their conclusions.

Unit 3: Implicit Differentiation and related Rates

Unit 4: Applications of Differentiation/Curve Sketching

QUARTER 3

In this quarter students discover the relationship between differentiation and integration as inverse operations. Students learn how to integrate functions and then, using the definite integral, learn how to “accumulate” in various real-world settings. As the quarter progresses they learn the importance of the Fundamental Theorem of Calculus and its many applications. Students will build upon their knowledge of taking derivatives and integrating using transcendental functions. Students see how powerful the chain rule can be and how to apply it to this unit when taking various derivatives. At the culmination of this quarter, students will discover how to “read” a slope field to see how a function (or other equations that are not mathematical functions) behave. Students will also build upon their knowledge of integration, using separation of variables to solve more complicated Differential Equations.

Unit 5: Integration and Accumulation (FTC)

Unit 6: Transcendental Functions

Unit 7: Differential Equations/Slope Fields

QUARTER 4

In this quarter students discover the real power and beauty of calculus in a variety of integration problems. Building upon their knowledge of accumulation (and specifically area under a curve), students will be able to find the area between two curves given two functions. Students also learn to find the volume of a solid when a function (or two functions) is rotated around a horizontal line or vertical line. Using a variety of geometric shapes, students will also be able to find the volume of a solid using known cross-sectional areas. Much time will be spent preparing for the AP® Exam.

Unit 8: Area/Volume of Revolution — Applications of Integration