

Calallen ISD 2025-2026
AP Calculus BC Syllabus

Campus: Calallen High School

Course and/or Grade Level: AP Calculus BC

Course Description: This course continues the examination of topics from AP Precalculus. The idea of limits is developed into the first derivative, mean value theorem, and continues into the idea of integration as the area under a curve. The concepts of power series, Taylor series and parametric equations are developed. The course will be taught using college materials and at a college level and pace. The College Board AP Calculus BC test is given at the end of the course. Two semesters of college credit can be earned with an appropriate score on the AP Calculus BC exam.

Semester 1: August 13 – December 19, 2025

1 st Quarter Topics	2 nd Quarter Topics
Unit 1 – Limits and Continuity • Estimating limits from graphs and tables • Determining limits using properties of limits • Determining limits using algebraic manipulation • Determining limits using the squeeze theorem • Exploring types of discontinuities • Defining continuity at a point • Confirming continuity over an interval • Connecting horizontal and vertical asymptotes with their limits • Working with the Intermediate Value Theorem Unit 2 – Differentiation: Definition and Basic Derivative Rules • Defining average and instantaneous rates of change • Defining the derivative of a function and using derivative notation • Connecting differentiability and continuity • Derivative rules for power functions, constants, sums, differences, and constant multiples	Unit 5 – Analytical Applications of Differentiation • Using the Mean Value Theorem • Global vs. local extrema • Using critical points, the candidates test, and the Extreme Value Theorem to find absolute (global) extrema • Using the First Derivative Test to determine relative (local) extrema • Determining concavity • Using the Second Derivative Test to determine relative (local) extrema • Connecting a function, its first derivative, and its second derivative • Solving optimization problems • Exploring the behaviors of implicit relations Unit 6 – Integration and Accumulation of Change • Exploring accumulations of change • Approximating areas with Riemann sums • Riemann sums, summation notation, and definite integral notation • The Fundamental Theorem of Calculus and accumulation functions

- Derivative rules for trigonometric, exponential, and logarithmic functions - Using the product and quotient rules for finding derivatives. Unit 3 – Differentiation: Composite, Implicit, and Inverse Functions - Differentiating composite functions using the chain rule - Implicit differentiation - Differentiating inverse functions - Differentiating inverse trigonometric functions. Unit 4 – Contextual Applications of Differentiation - Interpreting the meaning of the derivative in contextual situations - Straight-line motion: connecting position, velocity, and acceleration - Solving related rates problems - Approximating values of a function using local linearity and linearization - Using L'Hospital's Rule for Determining Limits of Indeterminate Forms	- The Fundamental Theorem of Calculus and definite integrals - Applying properties of definite integrals - Finding antiderivatives and indefinite integrals: basic rules and notation - Integrating using substitution - Integrating functions using long division and completing the square - Integrating using Integration by Parts - Integrating using linear partial fractions - Evaluating improper integrals
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Semester 2: January 5 – May 29, 2026

3 rd Quarter Topics	4 th Quarter Topics
Unit 7 – Differential Equations - Modeling situations with differential equations - Verifying solutions for differential equations - Sketching slope fields - Reasoning with slope fields - Approximating solutions for differential equations using Euler's Method - Finding general solutions for differential equations using separation of variables - Finding particular solutions using initial conditions and separation of variables - Exponential models with differential equations - Logistic models with differential equations	Unit 10 – Geometric Applications of Integration - Defining convergent and divergent infinite series - Working with geometric series - The n^{th} term test for divergence - The integral test for convergence - The harmonic series and p-series - Comparison tests for convergence - Alternating series test for convergence - The ratio test for convergence - Determining absolute or conditional convergence - Alternating series error bound - Finding Taylor polynomial approximations of functions - Finding the Lagrange error bound

Unit 8 – Applications of Integration - Finding the average value of a function on an interval - Connecting position, velocity, and acceleration using integrals - Using accumulation functions and definite integrals in applied contexts - Finding the area between two curves expressed as functions of x - Finding the area between two curves expressed as functions of y - Finding the area between curves that intersect at more than two points - Finding the volumes of solids that have cross-sections of known shape or area - Using the disc/washer method to find the volumes of solids created by revolving a region around the x- or y-axis - Using the disc/washer method to find the volumes of solids created by revolving a region around other vertical or horizontal axes. - Finding the arc length of a smooth planar curve (i.e., finding distance traveled) Unit 9 – Parametric Equations, Polar Coordinates, and Vector-Valued Functions - Defining and differentiating parametric equations - Finding arc lengths of curves given by parametric equations - Defining and differentiating vector-valued functions - Integrating vector-valued functions - Solving motion problems using parametric and vector-valued functions - Defining polar coordinates and differentiating in polar form - Finding the area of a polar region or the area bounded by a single polar curve - Finding the area of a region bounded by two polar curves.	- Finding the radius and interval of convergence of power series - Finding Taylor or Maclaurin series for a function - Representing functions as power series Review Units 1-10 for the AP Test - Focus on studying the FRQ's from recently released AP Calculus BC tests - Take, score, and go over two full-length AP Calculus BC practice tests
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**Minor adjustment to the schedule may be made based on campus schedules and student needs.*