

AP Calculus AB

Grade(s): 11-12

Credit: 1

Prerequisite: Precalculus or Math Analysis

AP Calculus AB explores the topics of limits/continuity, derivatives, and integrals. These ideas are examined using a multilayered approach, including the verbal, numerical, analytical, and graphical analysis of polynomial, rational, trigonometric, exponential, and logarithmic functions and their inverses. The student is expected to relate the connections among these approaches. Students are also required to synthesize knowledge of the topics of the course to solve applications that model physical, social, and/or economic situations. These applications emphasize derivatives as rates of change, local linear approximations, optimizations and curve analysis, and integrals as Riemann sums, area of regions, volume of solids with known cross sections, average value of functions, and rectilinear motions. Emerging technologies are incorporated into the curriculum as they become available. Students have the opportunity to take the AP Calculus AB exam in May with the possibility to earn college credit.

AP Calculus BC

Grade(s): 11-12

Credit: 1

Prerequisite: AP Precalculus, Math Analysis or AP Calculus AB

Advanced Placement Calculus BC is intended for students who have a thorough knowledge of analytic geometry and elementary functions in addition to college-preparatory algebra, geometry, and trigonometry. Although all of the elements of the AP Calculus AB course are included, the course provides a more rigorous treatment of these introductory calculus topics. The course also includes the development of the additional topics required by the College Entrance Examination Board in its syllabus for AP Calculus BC. Among these are advanced integration techniques including integration by parts, partial fractions and improper integrals; Euler's method; logistic model with differential equations; arc length of a curve; parametric, polar, and vector functions; the study of infinite sequences and series with radius of convergence and error bounds; and Taylor polynomials and series. The use of the graphing calculator is fully integrated into instruction and students are expected to confirm and interpret results of problem situations that are solved using available technology. Emerging technologies are incorporated into the curriculum and as they become available. Students have the opportunity to take the AP Calculus BC exam in May with the possibility to receive college credit.

Multivariable Calculus DE

Grade(s): 11-12

Credit: 1

Prerequisite: AP Calculus BC (Students must receive a 4 or higher on the AP exam)

Multivariable Calculus (also known as multivariate calculus) is the extension of calculus in one variable to calculus in several variables. Topics include: Euclidean 3- space; vectors and the dot and cross products; vector functions and their differentiation and integration; normal and bi-normal vectors, curvature and torsion; \mathbb{R}^n space; partial derivatives; surface normal; double in Cartesian and polar coordinates; triple integrals in Cartesian, cylindrical and spherical coordinates; and change of variables in multiple integrals. The course culminates with the development of Green's and Stokes' theorems and the Divergence theorem which lay the foundation for applied mathematics and physics.