Outline of AP Calculus AB syllabus, effective fall 2016

Summarized from the AP Calculus AB Course and Exam Description including the Curriculum Framework, available at https://secure-media.collegeboard.org/digitalServices/pdf/ap/ap-calculus-ab-and-bc-course-and-exam-description.pdf.

Big Idea 1: Limits

Understanding the behavior of functions

Express limits in correct notation and interpret limits expressed symbolically.
Estimate limits numerically and graphically, determine limits analytically, and use limits to determine function behavior.

Understanding continuity in terms of limits

Analyze functions for continuity and discontinuity.
Use important theorems related to continuity.

Big Idea 2: Derivatives

Determining derivatives in a variety of ways

Define the derivative as the limit of the difference quotient.
Estimate derivative values from tables and graphs.
Calculate derivatives using basic rules, including power, product, quotient, chain, trigonometric, exponential, and logarithmic rules and implicit differentiation.
Find higher-order derivatives.

Using derivatives to understand function behavior

Find important features of functions including monotonicity and concavity, extrema and points of inflection.
Use the relationship between differentiability and continuity

Interpreting derivatives in different contexts, including instantaneous rate of change

Determine units for rates of change.
Use local linearity and tangent lines.
Solve problems involving related rates, optimization, and kinematics.
Decide if a function is the solution to a differential equation and estimate solutions using slope fields.

Understanding how the Mean Value Theorem describes function behavior

Use the Mean Value Theorem to help describe a function on a particular interval.1p

Big Idea 3: Integrals and the Fundamental Theorem of Calculus

Understanding antidifferentiation as the inverse operation for differentiation

Recognize antiderivatives based on derivatives learned earlier.

Understandi2ng definite integrals as the limits of Riemann sums

Interpret limits of Riemann sums as definite integrals and vice versa.
Approximate definite integrals with rectangular and trapezoidal sums
Use areas and properties of integrals to evaluate definite integrals.

Connecting differentiation and integration with the Fundamental Theorem of Calculus

Use definite integrals to define new functions, and analyze those functions (including their derivatives).
Calculate antiderivatives and evaluate definite integrals.
Use *u*-substitution, long division, and completing the square to evaluate more complicated antiderivatives.

Using integrals in a variety of applications

Interpret the integral of a rate of change as the net change of a quantity over the specified interval.
Find the average value of a function.
Use integrals to find distance and displacement.
Find area and volume using integrals.

Solving separable differential equations

Find general and particular solutions to differential equations, including those with real-world interpretations, and deal with their domain restrictions.
Solve differential equations by separation of variables, including those involving exponential growth and decay.
Write a solution of a differential equation in terms of a definite integral.