

AP Calculus AB/BC – Pacing 2016 – 2017

Note: This is just a brief overview and does not list out every single topic covered. The number of days for each unit could change thought out the year.

FIRST QUARTER- AP Calculus

Unit 1: Limits, Continuity, and Basic Differentiation (15 days)

- Definition of a limit, one-sided limits
- Limits graphically, end behavior as a limit
- Evaluating limits algebraically
- Continuity and Intermediate Value Theorem
- Property of limits
- Definition of a derivative (using limits)
- Equations of tangent line and normal line
- Differentiation rules – sum/difference, power, product, quotient, chain, and basic trig
- Velocity and rates of change

Unit 2: Advanced Differentiation (10 days)

- Implicit differentiation
- Derivatives of inverse functions, including inverse trig functions
- Exponential and logarithmic differentiation
- L'Hôpital's Rule

Unit 3: Applications of Derivatives (15 days)*

- Extreme Value Theorem
- Mean Value and Rolle's Theorem
- 1st Derivative Test to determine if f increasing/decreasing and find max/mins
- 2nd Derivative Test to determine if f is concave up/down and max/mins
- Comparing the graphs of f , f' , and f''
- Linearization
- Optimization
- Related Rates

**Part of Unit 3 may fall into 2nd quarter.*

SECOND QUARTER

Unit 4: Basic Integration (15 days)

- Basic integration rules with "reverse power" rule, trig functions, and initial condition
- U-Substitution with indefinite and definite integrals
- Integration as area under the curve
- Area approximations – Riemann Sums and Trapezoid Rule
- 1st and 2nd Fundamental Theorem of Calculus
- Average value of a function and integration as net change.

Unit 5: Area and Volume (13 days)

- Area between curves.
- Volume of Revolutions using disc, washer, and shell method.
- Volume using cross sections.
- Arc Length

Addition Topics (4-5 days)

- Slope Fields
- Differential Equations

THIRD QUARTER – Start of BC Calculus

Unit 6: Advanced Integration (12 days)

- Integration by parts
- Integration by partial fraction decomposition
- Logistic Growth
- Improper integration (as limits of definite integrals)
- L'Hôpital's Rule revisited

Unit 7: Parametric and Polar Functions (11 days)

- Derivatives of parametric and vector functions.
- Integration of parametric vector functions.
- Position, velocity, acceleration, and speed of a parametric function
- Derivatives of polar function.
- Area of polar curves and between curves.

Unit 8: Infinite Series and Convergence (10 days)

- Intro to series, partial sums, notation, convergence
- Geometric Series and infinite sum
- Telescoping Series and infinite sum
- nth Term Test
- Integral Test and approximate sum (with error bound)
- P-Series Test
- Direct Comparison Test
- Limit Comparison Test
- Alternating Series Test and approximate sum (with error bound)
- Ratio and Root Test

FOURTH QUARTER

Unit 9: Taylor Series (18 days)

- Taylor Polynomials with approximations
- Taylor and Maclaurin Series
- Power Series
- Radius and interval of convergence
- Lagrange error bound
- Euler's Method

Unit 10: AP Review (15 days)

Unit 11: Matrices (10 days)

- Intro to matrices
- Multiply matrices
- Transformations and area using matrices
- Determinants (2x2 and 3x3)
- Solving 3x3 systems with matrices