

## AP CALCULUS SYLLABUS

	Topic	Textbook Section	AB	BC
<b>Unit 1: Functions</b>	20 Functions to Know & Love	Supplement		
	Discontinuities & asymptotes	Supplement		
	Domain & Range	Supplement		
	Intermediate Value Theorem	1.4 (P.80, #83-94)		
	Parametric Graphs	10.2	X	
	Polar Graphs	10.4	X	

<b>Unit 2: Limits</b>	Evaluate Limits with Graphs	1.2		
	Evaluate Limits with Tables	1.2		
	Evaluate Limits with Algebra a. Plug in b. Factor c. Conjugates	1.3		
	One-sided limits	1.4		
	Limits involving infinity a. As $x \rightarrow \infty$ . b. Answers involving $\infty$	a. 3.5 b. 1.5		
	Average Rates of Change → Approximate average rate of change on a table or graph	Supplement		
	Continuity (defined by limits)	1.4		
	Limit Derivatives a. Slope at a point (instantaneous rate of change) b. General derivative	2.1		
	Relating graphs of $f$ and $f'$	Supplement		
	Differentiability and continuity	Supplement		

<b>Unit 3: Derivative Shortcuts and Basic Applications</b>	Power Rule (include expanding & STDs)	2.2		
	Product Rule	2.3		
	Quotient Rule	2.3		
	Chain Rule	2.4		
	Implicit Differentiation	2.5		
	Trig Derivatives	2.3		
	Exponential Derivatives	5.4 & 5.5		
	Logarithmic Derivatives → Include $y = f(x)^{g(x)}$	5.1 & 5.5		
	Inverse Derivatives (with implicit)	Supplement		
	Inverse Trig Derivatives	5.6		
	Relating $f$ and $f'$ with increase & decrease	Supplement		
	Position, Velocity, & Acceleration a. Direction of Travel b. Total distance vs. displacement c. Speeding up and slowing down	Supplement		

\*Only on the BC Exam, but will be covered in the AB class.

			AB	BC
Unit 3B (BC only)	Parametric Derivatives → Include 2 <sup>nd</sup> derivatives	10.3	X	
	Polar Derivatives	10.3 (convert to parametric)	X	
	Vectors (differentiation only) → As related to position, velocity, and acceleration	Supplement	X	

Unit 4: Applications of Derivatives	Extreme Value Theorem	3.1		
	Mean Value Theorem & Rolle's Theorem	3.2		
	Curve Sketching a. Intercepts b. Discontinuities c. Asymptotes d. Increase/Decrease intervals e. Local Extrema f. Concavity g. Inflection Points	3.6 (summary) a. supplement b. supplement c. supplement d. 3.3 e. 3.3 f. 3.4 g. 3.4		
	Linear Approximation	Supplement		
	Optimization	3.7		
	Related Rates	2.6		
	L'Hopital's Rule a. Product & Quotient Indeterminate b. Power indeterminate forms	8.7		

Unit 5: Integration & Basic Applications of Integration	Polynomial & recognition antiderivatives	4.1		
	Areas: a. Riemann Sums (left, right, and midpoints) b. Trapezoids c. Definite Integral Notation & Properties d. As related to position, velocity, and direction of travel e. Exact areas with geometry f. Exact areas with antiderivatives	a. Supplement b. 4.6 c. 4.3 d. Supplement e. Supplement f. 4.4 (FTC)		
	Fundamental Theorem of Calculus	4.4		
	Integration with $u$ -substitution	4.5 & 8.1		
	Integration with trig identities	8.3		
	*Integration with parts	8.2		
	* Integration with partial fractions (non-repeating linear factors only)	8.5		
	Trig Substitution (not on AP Exam)	8.4		
	Using initial values to find specific antiderivatives	Supplement		
Improper Integrals	8.8	X		

\*Only on the BC Exam, but will be covered in the AB class.

			AB	BC
<b>Unit 6: Applications of integration</b>	Area between two curves	7.1		
	Volumes: a. Disks b. Washers c. Known Cross Sections d. Shells (not on AP Exam)	a. 7.2 b. 7.2 c. 7.2 d. 7.3		
	Areas as related to position & distance (total change)	4.4 (& supplement)		
	Arclength	7.4	X	
	Average Value Theorem	4.4		
	Area “under” parametric & polar curves	10.3 & 10.5	X	

<b>Unit 7: Diff. Equations</b>	Slope Fields	6.1		
	Separable Differential Equations a. Initial Value Problems b. Exponential Growth ( $y' = ky$ )	a. 6.3 b. 6.2 & 6.3		
	Euler’s Method	6.1	X	
	Logistic Differential Equations	6.3	X	

<b>Unit 8: Sequences &amp; Series (BC Only)</b>	Sequences (converge & diverge)	9.1	X	
	Series Defined a. Discuss difference between sequences & series b. Discuss convergence & divergence of series	a. 9.2 b. 9.2	X	
	Divergence Test	9.2	X	
	Geometric Series	9.2	X	
	Harmonic Series	9.3 (part of $p$ -series)	X	
	Integral Test & P-Series → Estimating sums with improper integrals	9.3	X	
	Direct Comparison	9.4	X	
	Limit Comparison	9.4	X	
	Alternating Series Test → Estimating sums of alternating series	9.5	X	
	Absolute vs. Conditional Convergence	9.5	X	
	Ratio Test	9.6	X	
	Root Test	9.6	X	
	Power Series a. Radius & Interval of Convergence b. Differentiation and integration of power series	(supplement also) a. 9.8 b. 9.9	X	
	Taylor & Maclaurin Series a. Formula for coefficients b. Memorized functions $\left( e^x, \cos(x), \sin(x), \frac{1}{1-x}, \arctan(x) \right)$ c. Lagrange error bound	a. 9.10 b. 9.10 c. 9.7	X	
	Summing a Series a. Geometric b. Telescoping c. Recognized Taylor Series	supplement	X	

\*Only on the BC Exam, but will be covered in the AB class.