Course at a Glance

Plan

The Course at a Glance provides a useful visual organization of the AP Calculus AB and AP Calculus BC curricular components, including:

- Sequence of units, along with approximate weighting and suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year.
- Progression of topics within each unit.
- Spiraling of the big ideas and mathematical practices across units.

Teach

MATHEMATICAL PRACTICES
Mathematical practices spiral throughout the course.

- 1 Implementing Mathematical Processes
- 2 Connecting Representations
- 3 Justification
- 4 Communication and Notation

BIG IDEAS
Big ideas spiral across topics and units.

- CHA Change
- LIM Limits
- FUN Analysis of Functions

BC ONLY
The purple shading represents BC only content.

Assess

Assign the Personal Progress Checks—either as homework or in class—for each unit. Each Personal Progress Check contains formative multiple-choice and free-response questions. The feedback from the Personal Progress Checks shows students the areas where they need to focus.

UNIT 1 Limits and Continuity

AP EXAM WEIGHTING	10–12% AB 4–7% BC
CLASS PERIODS	~22–23 AB ~13–14 BC

CHA 2	1.1	Introducing Calculus: Can Change Occur at an Instant?
LIM 2	1.2	Defining Limits and Using Limit Notation
LIM 2	1.3	Estimating Limit Values from Graphs
LIM 2	1.4	Estimating Limit Values from Tables
LIM 1	1.5	Determining Limits Using Algebraic Properties of Limits
LIM 1	1.6	Determining Limits Using Algebraic Manipulation
LIM 1	1.7	Selecting Procedures for Determining Limits
LIM 3	1.8	Determining Limits Using the Squeeze Theorem
LIM 2	1.9	Connecting Multiple Representations of Limits
LIM 3	1.10	Exploring Types of Discontinuities
LIM 3	1.11	Defining Continuity at a Point
LIM 1	1.12	Confirming Continuity over an Interval
LIM 1	1.13	Removing Discontinuities
LIM 3	1.14	Connecting Infinite Limits and Vertical Asymptotes
LIM 2	1.15	Connecting Limits at Infinity and Horizontal Asymptotes
FUN 3	1.16	Working with the Intermediate Value Theorem (IVT)

Personal Progress Check 1

Multiple-choice: ~45 questions
Free-response: 3 questions (partial)

UNIT 2 Differentiation: Definition and Basic Derivative Rules

AP EXAM WEIGHTING	10–12% AB 4–7% BC
CLASS PERIODS	~13–14 AB ~9–10 BC

CHA 2	2.1	Defining Average and Instantaneous Rates of Change at a Point
CHA 1 4	2.2	Defining the Derivative of a Function and Using Derivative Notation
CHA 1	2.3	Estimating Derivatives of a Function at a Point
FUN 3	2.4	Connecting Differentiability and Continuity: Determining When Derivatives Do and Do Not Exist
FUN 1	2.5	Applying the Power Rule
FUN 1	2.6	Derivative Rules: Constant, Sum, Difference, and Constant Multiple
FUN LIM 1	2.7	Derivatives of cos x, sin x, e^x, and ln x
FUN 1	2.8	The Product Rule
FUN 1	2.9	The Quotient Rule
FUN 1	2.10	Finding the Derivatives of Tangent, Cotangent, Secant, and/or Cosecant Functions

Personal Progress Check 2

Multiple-choice: ~30 questions
Free-response: 3 questions (partial)

NOTE: Partial versions of the free-response questions are provided to prepare students for more complex, full questions that they will encounter on the AP Exam.

UNIT 3 Differentiation: Composite, Implicit, and Inverse Functions

AP EXAM WEIGHTING	9–13% AB 4–7% BC
CLASS PERIODS	~10–11 AB ~8–9 BC

- FUN 1 — 3.1 The Chain Rule
- FUN 1 — 3.2 Implicit Differentiation
- FUN 3 — 3.3 Differentiating Inverse Functions
- FUN 1 — 3.4 Differentiating Inverse Trigonometric Functions
- FUN 1 — 3.5 Selecting Procedures for Calculating Derivatives
- FUN 1 — 3.6 Calculating Higher-Order Derivatives

Personal Progress Check 3

Multiple-choice: ~15 questions
Free-response: 3 questions
(partial/full)

UNIT 4 Contextual Applications of Differentiation

AP EXAM WEIGHTING	10–15% AB 6–9% BC
CLASS PERIODS	~10–11 AB ~6–7 BC

- CHA 1 — 4.1 Interpreting the Meaning of the Derivative in Context
- CHA 1 — 4.2 Straight-Line Motion: Connecting Position, Velocity, and Acceleration
- CHA 2 — 4.3 Rates of Change in Applied Contexts Other Than Motion
- CHA 1 — 4.4 Introduction to Related Rates
- CHA 3 — 4.5 Solving Related Rates Problems
- CHA 1 — 4.6 Approximating Values of a Function Using Local Linearity and Linearization
- LIM 3 — 4.7 Using L'Hospital's Rule for Determining Limits of Indeterminate Forms

Personal Progress Check 4

Multiple-choice: ~15 questions
Free-response: 3 questions

UNIT 5 Analytical Applications of Differentiation

AP EXAM WEIGHTING	15–18% AB 8–11% BC
CLASS PERIODS	~15–16 AB ~10–11 BC

- FUN 3 — 5.1 Using the Mean Value Theorem
- FUN 3 — 5.2 Extreme Value Theorem, Global Versus Local Extrema, and Critical Points
- FUN 2 — 5.3 Determining Intervals on Which a Function Is Increasing or Decreasing
- FUN 3 — 5.4 Using the First Derivative Test to Determine Relative (Local) Extrema
- FUN 1 — 5.5 Using the Candidates Test to Determine Absolute (Global) Extrema
- FUN 2 — 5.6 Determining Concavity of Functions over Their Domains
- FUN 3 — 5.7 Using the Second Derivative Test to Determine Extrema
- FUN 2 — 5.8 Sketching Graphs of Functions and Their Derivatives
- FUN 2 — 5.9 Connecting a Function, Its First Derivative, and Its Second Derivative
- FUN 2 — 5.10 Introduction to Optimization Problems
- FUN 3 — 5.11 Solving Optimization Problems
- FUN 1 3 — 5.12 Exploring Behaviors of Implicit Relations

Personal Progress Check 5

Multiple-choice: ~35 questions
Free-response: 3 questions

UNIT 6 Integration and Accumulation of Change

AP EXAM WEIGHTING	17–20% AB 17–20% BC
CLASS PERIODS	~18–20 AB ~15–16 BC

CHA 4	6.1	Exploring Accumulations of Change
LIM 1	6.2	Approximating Areas with Riemann Sums
LIM 2	6.3	Riemann Sums, Summation Notation, and Definite Integral Notation
FUN 1	6.4	The Fundamental Theorem of Calculus and Accumulation Functions
FUN 2	6.5	Interpreting the Behavior of Accumulation Functions Involving Area
FUN 3	6.6	Applying Properties of Definite Integrals
FUN 3	6.7	The Fundamental Theorem of Calculus and Definite Integrals
FUN 4	6.8	Finding Antiderivatives and Indefinite Integrals: Basic Rules and Notation
FUN 1	6.9	Integrating Using Substitution
FUN 1	6.10	Integrating Functions Using Long Division and Completing the Square
FUN 1	6.11	Integrating Using Integration by Parts BC ONLY
FUN 1	6.12	Using Linear Partial Fractions BC ONLY
LIM 1	6.13	Evaluating Improper Integrals BC ONLY
FUN 1	6.14	Selecting Techniques for Antidifferentiation

Personal Progress Check 6

Multiple-choice:
- ~25 questions (AB)
- ~35 questions (BC)

Free-response: 3 questions

UNIT 7 Differential Equations

AP EXAM WEIGHTING	6–12% AB 6–9% BC
CLASS PERIODS	~8–9 AB ~9–10 BC

FUN 2	7.1	Modeling Situations with Differential Equations
FUN 3	7.2	Verifying Solutions for Differential Equations
FUN 2	7.3	Sketching Slope Fields
FUN 4	7.4	Reasoning Using Slope Fields
FUN 1	7.5	Approximating Solutions Using Euler's Method BC ONLY
FUN 1	7.6	Finding General Solutions Using Separation of Variables
FUN 1	7.7	Finding Particular Solutions Using Initial Conditions and Separation of Variables
FUN 3	7.8	Exponential Models with Differential Equations
FUN 3	7.9	Logistic Models with Differential Equations BC ONLY

Personal Progress Check 7

Multiple-choice:
- ~15 questions (AB)
- ~20 questions (BC)

Free-response: 3 questions

UNIT 8 Applications of Integration

AP EXAM WEIGHTING	10–15% AB 6–9% BC
CLASS PERIODS	~19–20 AB ~13–14 BC

CHA 1	8.1	Finding the Average Value of a Function on an Interval
CHA 1	8.2	Connecting Position, Velocity, and Acceleration of Functions Using Integrals
CHA 3	8.3	Using Accumulation Functions and Definite Integrals in Applied Contexts
CHA 4	8.4	Finding the Area Between Curves Expressed as Functions of x
CHA 1	8.5	Finding the Area Between Curves Expressed as Functions of y
CHA 2	8.6	Finding the Area Between Curves That Intersect at More Than Two Points
CHA 3	8.7	Volumes with Cross Sections: Squares and Rectangles
CHA 3	8.8	Volumes with Cross Sections: Triangles and Semicircles
CHA 3	8.9	Volume with Disc Method: Revolving Around the x- or y-Axis
CHA 2	8.10	Volume with Disc Method: Revolving Around Other Axes
CHA 4	8.11	Volume with Washer Method: Revolving Around the x- or y-Axis
CHA 2	8.12	Volume with Washer Method: Revolving Around Other Axes
CHA 3	8.13	The Arc Length of a Smooth, Planar Curve and Distance Traveled BC ONLY

Personal Progress Check 8

Multiple-choice: ~30 questions
Free-response: 3 questions

UNIT 9
Parametric Equations, Polar Coordinates, and Vector-Valued Functions BC ONLY

AP EXAM WEIGHTING	N/A AB	11–12% BC
CLASS PERIODS	N/A AB	~10–11 BC

CHA 2	9.1	Defining and Differentiating Parametric Equations
CHA 1	9.2	Second Derivatives of Parametric Equations
CHA 1	9.3	Finding Arc Lengths of Curves Given by Parametric Equations
CHA 1	9.4	Defining and Differentiating Vector-Valued Functions
FUN 1	9.5	Integrating Vector-Valued Functions
FUN 1	9.6	Solving Motion Problems Using Parametric and Vector-Valued Functions
FUN 2	9.7	Defining Polar Coordinates and Differentiating in Polar Form
CHA 3	9.8	Find the Area of a Polar Region or the Area Bounded by a Single Polar Curve
CHA 3	9.9	Finding the Area of the Region Bounded by Two Polar Curves

Personal Progress Check 9

Multiple-choice: ~25 questions
Free-response: 3 questions

UNIT 10
Infinite Sequences and Series BC ONLY

AP EXAM WEIGHTING	N/A AB	17–18% BC
CLASS PERIODS	N/A AB	~17–18 BC

LIM 3	10.1	Defining Convergent and Divergent Infinite Series
LIM 3	10.2	Working with Geometric Series
LIM 3	10.3	The nth Term Test for Divergence
LIM 3	10.4	Integral Test for Convergence
LIM 3	10.5	Harmonic Series and p-Series
LIM 3	10.6	Comparison Tests for Convergence
LIM 3	10.7	Alternating Series Test for Convergence
LIM 3	10.8	Ratio Test for Convergence
LIM 3	10.9	Determining Absolute or Conditional Convergence
LIM 1	10.10	Alternating Series Error Bound
LIM 3 2	10.11	Finding Taylor Polynomial Approximations of Functions
LIM 1	10.12	Lagrange Error Bound
LIM 2	10.13	Radius and Interval of Convergence of Power Series
LIM 2	10.14	Finding Taylor or Maclaurin Series for a Function
LIM 3	10.15	Representing Functions as Power Series

Personal Progress Check 10

Multiple-choice: ~45 questions
Free-response: 3 questions