

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.

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

BIG IDEAS

Big ideas spiral across topics and units.

- | | |
|-------------------|----------------------------------|
| CHA Change | FUN Analysis of Functions |
| LIM Limits | |

BC ONLY

The purple shading represents BC-only content.

Assess

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

UNIT 1 Limits and Continuity	
AP EXAM WEIGHTING	10–15% AB 5–10% BC
CLASS PERIODS	~22–23 AB ~13–14 BC
Mathematical Practices	Topics
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)

Progress Check 1

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

UNIT 2 Differentiation: Definition and Fundamental Properties	
AP EXAM WEIGHTING	10–15% AB 5–10% BC
CLASS PERIODS	~13–14 AB ~9–10 BC
Mathematical Practices	Topics
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 1 LIM	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

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.

* indicates that Mathematical Practices 1 and 4 are covered by Topic 2.2.

UNIT 3

Differentiation: Composite, Implicit, and Inverse Functions

AP EXAM
WEIGHTING

5–10% AB

5–10% BC

CLASS PERIODS

~10–11 AB

~8–9 BC

Mathematical Practices	Topics
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

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

5–10% BC

CLASS PERIODS

~10–11 AB

~6–7 BC

Mathematical Practices	Topics
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

Progress Check 4

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

UNIT 5

Analytical Applications of Differentiation

AP EXAM
WEIGHTING

15–20% AB

10–15% BC

CLASS PERIODS

~15–16 AB

~10–11 BC

Mathematical Practices	Topics
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

Progress Check 5

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

UNIT 6

Integration and Accumulation of Change

AP EXAM WEIGHTING **15–20% AB** **15–20% BC**

CLASS PERIODS **~18–20 AB** **~15–16 BC**

Mathematical Practices	Topics
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

Progress Check 6

Multiple-choice:

- ~25 questions (AB)
- ~35 questions (BC)

Free-response: 3 questions

UNIT 7

Differential Equations

AP EXAM WEIGHTING **5–10% AB** **5–10% BC**

CLASS PERIODS **~8–9 AB** **~9–10 BC**

Mathematical Practices	Topics
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

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** **5–10% BC**

CLASS PERIODS **~19–20 AB** **~13–14 BC**

Mathematical Practices	Topics
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

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

10–15% BC

CLASS PERIODS

N/A AB

~10–11 BC

Mathematical Practices

Topics

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

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

15–20% BC

CLASS PERIODS

N/A AB

~17–18 BC

Mathematical Practices

Topics

LIM 3	10.1 Defining Convergent and Divergent Infinite Series
LIM 3	10.2 Working with Geometric Series
LIM 3	10.3 The n th 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

Progress Check 10

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