

# 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.

- |  |                                     |
|--|-------------------------------------|
| <b>1</b> Implementing Mathematical Processes | <b>3</b> Justification              |
| <b>2</b> Connecting Representations          | <b>4</b> Communication and Notation |

### BIG IDEAS

Big ideas spiral across topics and units.

- |                   |                                  |
|-------------------|----------------------------------|
| <b>CHA</b> Change | <b>FUN</b> Analysis of Functions |
| <b>LIM</b> Limits |                                  |

### 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	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**

<b>FUN</b> 1	<b>3.1</b> The Chain Rule
<b>FUN</b> 1	<b>3.2</b> Implicit Differentiation
<b>FUN</b> 3	<b>3.3</b> Differentiating Inverse Functions
<b>FUN</b> 1	<b>3.4</b> Differentiating Inverse Trigonometric Functions
<b>FUN</b> 1	<b>3.5</b> Selecting Procedures for Calculating Derivatives
<b>FUN</b> 1	<b>3.6</b> 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**

<b>CHA</b> 1	<b>4.1</b> Interpreting the Meaning of the Derivative in Context
<b>CHA</b> 1	<b>4.2</b> Straight-Line Motion: Connecting Position, Velocity, and Acceleration
<b>CHA</b> 2	<b>4.3</b> Rates of Change in Applied Contexts Other Than Motion
<b>CHA</b> 1	<b>4.4</b> Introduction to Related Rates
<b>CHA</b> 3	<b>4.5</b> Solving Related Rates Problems
<b>CHA</b> 1	<b>4.6</b> Approximating Values of a Function Using Local Linearity and Linearization
<b>LIM</b> 3	<b>4.7</b> 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**

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

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

### 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**

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

### 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**

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

### Personal Progress Check 8

**Multiple-choice: ~30 questions**

**Free-response: 3 questions**