

AP Calculus AB – Course Details Full Year Course

Course Objectives:

- Find and evaluate finite and infinite limits graphically, numerically, and analytically.
- Find derivatives using a variety of methods including The Chain Rule and Implicit Differentiation.
- Find extrema and apply Rolle's Theorem and the Mean Value Theorem.
- Use the First Derivative Test and The Second Derivative Test to analyze and sketch functions.
- Find antiderivatives using a variety of methods including substitution.
- Understand and apply Riemann sums, definite integrals, and The Fundamental Theorem of Calculus.
- Evaluate integrals using a variety of methods including substitution and numerical integration.
- Differentiate and integrate logarithmic, exponential, and inverse trigonometric functions.
- Solve simple differential equations that can be solved by separation of variables.
- Use simple differential equations that can be solved by separation of variables to solve applied problems.
- Use integration to determine the area between two curves, volume, and surface area.
- Apply integration to determine work, center of mass, and fluid force.

Text: All course material are accessed through the online course. No additional text is required.

Course Outline:

Semester 1

Unit 1 - Course Overview

- Section 1 - Course Introduction
- Section 2 - Getting Started
- Section 3 - Research Papers

Unit 2 - Limits and Their Properties

- Section 1 - Limits and Their Properties: Introduction
- Section 2 - Linear Models and Rates of Change
- Section 3 - Functions, Graphs of Functions, and Finding Models to Data
- Section 4 - Finding Limits Graphically, Numerically, and Analytically
- Section 5 - Continuity, One-Sided Limits, and Infinite Limits
- Section 6 - Exam Preparation

Unit 3 - Differentiation

- Section 1 - Differentiation and Implicit Differentiation: Introduction
- Section 2 - The Derivative
- Section 3 - Differentiation
- Section 4 - Implicit Differentiation
- Section 5 - Exam Preparation

Unit 4 - Applications of Differentiation

- Section 1 - Applications of Differentiation: Introduction
- Section 2 - Extrema and The Mean Value Theorem
- Section 3 - Derivative Tests, Limits, and Graphs
- Section 4 - Optimization, Newton's Method, and Differentials
- Section 5 - Exam Preparation

Semester 1 Exam

Semester 2

- Section 1 - Course Introduction
- Section 2 - Getting Started
- Section 3 - Research Papers

Unit 6 - Integration

- Section 1 - Integration: Introduction
- Section 2 - Antiderivatives and Indefinite Integration
- Section 3 - Area, Riemann Sums, and Definite Integrals
- Section 4 - The Fundamental Theorem of Calculus
- Section 5 - Integration by Substitution and Numerical Integration
- Section 6 - Exam Preparation

Unit 7 - Logarithmic, Exponential, and other Transcendental Functions

- Section 1 - Logarithmic, Exponential, and other Transcendental Functions: Introduction
- Section 2 - The Natural Logarithmic Function
- Section 3 - Inverse Functions and Exponential Functions
- Section 4 - Inverse Trigonometric Functions
- Section 5 - Hyperbolic Functions
- Section 6 - Exam Preparation

Unit 8 - Differential Equations

- Section 1 - Differential Equations: Introduction
- Section 2 - Slope Fields, Euler's Method, and Growth and Decay
- Section 3 - Separation of Variables and First Order Linear Differential Equations
- Section 4 - Exam Preparation

Unit 9 - Applications of Integration

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- Section 1 - Applications of Integration: Introduction
- Section 2 - Area of a Region Between Two Curves
- Section 3 - Volumes, Arc Lengths, and Surfaces
- Section 4 - Work, Moments, and Fluids
- Section 5 - Exam Preparation

Semester 2 Exam

Week by Week Course Breakdown
<ul style="list-style-type: none"> • Unit 1: Introduction • Unit 2: Limits and Their Properties: Sections 1, 2, 3, 4 and 5. • Read and study Chapter P, pages 2–7
<ul style="list-style-type: none"> • Read and study Chapter P, pages 10–15 • Unit 2 Quiz Yourself 1 • Read and study Chapter P, Section P.3, pages 19–26
<ul style="list-style-type: none"> • Read and study Chapter P, Section P.4, pages 31–33 • Research Assignment: Science Application • Research Paper: Topic and Bibliography
<ul style="list-style-type: none"> • Unit 2 Quiz Yourself 2 • Read and study Chapter 1, Section 1.1, pages 41–46 • Read and study Chapter 1, Section 1.2, pages 48–54
<ul style="list-style-type: none"> • Read and study Chapter 1, Section 1.3, pages 59–66 • Writing Assignment: Properties of Limits • Research Paper: Thesis Statement
<ul style="list-style-type: none"> • Unit 2 Quiz Yourself 3 • Read and study Chapter 1, Section 1.4, pages 70–78 • Read and study Chapter 1, Section 1.5, pages 83–87
<ul style="list-style-type: none"> • Writing Assignment: Notation and Graphs • Discussion: End of Unit 2 • Research Paper: Outline
<ul style="list-style-type: none"> • Unit 2 Quiz Yourself 4 • Unit 2-Practice Exam

<ul style="list-style-type: none">• Unit 2 Exam
<ul style="list-style-type: none">• Unit 3: Differentiation: Sections 1, 2, 3, 4, and 5• Read and study Chapter 2, Section 2.1, pages 96–103• Read and study Chapter 2, Section 2.2, pages 107–114
<ul style="list-style-type: none">• Writing Assignment: The Difference Quotient and The Derivative• Research Paper: Rough Draft Part 1• Unit 3 Quiz Yourself 1
<ul style="list-style-type: none">• Read and study Chapter 2, Section 2.3, pages 119–125• Read and study Chapter 2, Section 2.4, pages 130–136• Research Assignment: Position, Velocity, and Acceleration
<ul style="list-style-type: none">• Unit 3 Quiz Yourself 2• Read and study Chapter 2, Section 2.5, pages 141–145• Read and study Chapter 2, Section 2.6, pages 149–153
<ul style="list-style-type: none">• Research Assignment: The Universe• Discussion: Limits and Differentiation• Research Paper: Rough Draft Part 1
<ul style="list-style-type: none">• Unit 3 Quiz Yourself 3• Unit 3-Practice Exam• Unit 3 Exam
<ul style="list-style-type: none">• Unit 4: Applications of Differentiation: Sections 1, 2, 3, 4, and 5• Read and study Chapter 3, Section 3.1, pages 163–168• Read and study Chapter 3, Section 3.2, pages 172–175
<ul style="list-style-type: none">• Writing Assignment: Extrema• Unit 4 Quiz Yourself 1
<ul style="list-style-type: none">• Read and study Chapter 3, pages 179–185• Read and study Chapter 3, pages 190–194
<ul style="list-style-type: none">• Read and study Chapter 3, pages 198–204• Read and study Chapter 3, pages 209–214
<ul style="list-style-type: none">• Research Assignment: Precipitation

<ul style="list-style-type: none">• Unit 4 Quiz Yourself 2
<ul style="list-style-type: none">• Read and study Chapter 3, pages 218–222• Read and study Chapter 3, pages 229–232
<ul style="list-style-type: none">• Read and study Chapter 3, pages 235–239• Writing Assignment: Newton’s Method
<ul style="list-style-type: none">• Research Paper: Final Paper• Unit 4 Quiz Yourself 3
No tasks due
<ul style="list-style-type: none">• Unit 4-Practice Exam• Unit 4 Exam
<ul style="list-style-type: none">• Semester 1 Exam: Introduction• Practice-Section 1 PartA
<ul style="list-style-type: none">• Practice-Section 1 PartB• Practice-Section 2 PartA
<ul style="list-style-type: none">• Practice-Section 2 PartB• Semester 1 Exam

Semester 2

<ul style="list-style-type: none">• Unit 6: Integration: Sections 1, 2, 3, 4, 5 and 6• Read and study Chapter 4, Section 4.1, pages 247–255• Writing Assignment: Antiderivatives and Derivatives
<ul style="list-style-type: none">• Research Paper: Topic and Bibliography• Section 2 Quiz• Read and study Chapter 4, pages 259–267
<ul style="list-style-type: none">• Read and study Chapter 4, pages 271–278• Research Assignment: Riemann Sums and Area• Section 3 Quiz
<ul style="list-style-type: none">• Read and study Chapter 4, pages 282–290

- Writing Assignment: The Fundamental Theorem of Calculus
- Research Paper: Thesis Statement

- Section 4 Quiz
- Read and study Chapter 4, pages 295–303 and pages 309–313
- Read and study Chapter 4, pages 309–313

- Discussion: Integration, 100 points
- Research Paper: Outline
- Section 5 Quiz

- Unit 6-Practice Exam
- Unit 6 Exam
- Unit 7: Logarithmic, Exponential, and Other Transcendental Functions: Sections 1, 2, 3, 4, 5, and 6

- Read and study Chapter 5, pages 322–328
- Read and study Chapter 5, pages 332–337
- Research Assignment: The Number e

- Research Paper: Rough Draft Part 1
- Section 2 Quiz
- Read and study Chapter 5, pages 341–346

- Read and study Chapter 5, pages 350–355
- Read and study Chapter 5, pages 360–365
- Research Assignment: Modeling Growth

- Section 3 Quiz
- Read and study Chapter 5, pages 371–376
- Read and study Chapter 5, pages 380–385

- Writing Assignment: Inverse Trigonometric Functions
- Section 4 Quiz
- Read and study Chapter 5, pages 388–396

No tasks due.

- Research Assignment: Suspension Bridges
- Discussion: Function and Inverse Function Pairs

- Section 5 Quiz

- Unit 7-Practice Exam
- Unit 7 Exam
- Unit 8: Differential Equations: Sections 1, 2, 3, and 4

- Read and study Chapter 6, pages 404–408
- Read and study Chapter 6, pages 413–417
- Research Assignment: Modeling Radioactive Decay

- Section 2 Quiz
- Read and study Chapter 6, pages 421–428
- Read and study Chapter 6, pages 432–438

- Discussion: Differential Equations
- Research Paper: Rough Draft Part 2
- Section 3 Quiz

- Unit 8-Practice Exam
- Unit 8 Exam
- Unit 9: Applications of Integration: Sections 1, 2, 3, 4, and 5

- Read and study Chapter 7, pages 446–451
- Section 2 Quiz
- Read and study Chapter 7, pages 456–458

- Read and study Chapter 7, pages 459–462
- Read and study Chapter 7, pages 467–471
- Read and study Chapter 7, pages 476–482

- Writing Assignment: Which Method and When?
- Section 3 Quiz
- Read and study Chapter 7, pages 487–492

- Read and study Chapter 7, pages 496–501
- Read and study Chapter 7, page 501, 503, 507–510

- Discussion: Work, Moments, and Fluids
- Research Paper: Final Paper

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- Section 4 Quiz
- Unit 9-Practice Exam

No tasks due.

- Unit 9 Exam
- Semester 2 Exam: Introduction

- Practice AB Section 1, Part A
- Practice AB Section 1, Part B

- Practice AB Section II, Part A
- Practice AB Section II, Part B
- Semester 2 Exam Part 1
- Semester 2 Exam Part 2

AP Exam. Check [official AP schedule](#) for exact date.