AP Calculus BC - 25-Hour Curriculum Outline

Unit 1: Limits and Continuity

Session 1: Understanding Limits

- - Numerical and graphical limits
- - One-sided and two-sided limits
- - Infinite limits and limits at infinity
- - Limit laws

Session 2: Continuity and the Intermediate Value Theorem

- - Definition of continuity
- - Removable and non-removable discontinuities
- - Intermediate Value Theorem
- - Concept of limit vs. function value

Unit 2: Derivatives

Session 3: Definition of the Derivative

- - Limit definition
- - Derivative as slope, rate of change
- - Graphical interpretation

Session 4: Rules of Differentiation

- - Power, product, quotient, chain rule
- - Derivatives of polynomials and exponentials

Session 5: Trigonometric and Implicit Differentiation

- - Derivatives of sin, cos, tan, etc.
- - Implicit differentiation
- - Higher-order derivatives

Session 6: Applications – Motion and Related Rates

- - Velocity and acceleration
- - Related rates problems

Session 7: Applications – Tangents and Optimization

- - Tangent lines, linear approximation

- Optimization problems using derivatives

Unit 3: Integrals

Session 8: Antiderivatives and Indefinite Integrals

- Basic integration rules
- u-substitution

Session 9: Definite Integrals and the Fundamental Theorem

- Properties of definite integrals
- FTC Part 1 and 2
- Area under a curve

Session 10: Applications of Integrals (Part 1)

- Net area
- Accumulation functions
- Motion (displacement, total distance)

Session 11: Applications of Integrals (Part 2)

- Average value of a function
- Area between curves

Unit 4: Differential Equations and Slope Fields

Session 12: Slope Fields and Euler's Method

- Sketching and interpreting slope fields
- Euler's method basics

Session 13: Solving Differential Equations

- Separation of variables
- Exponential growth and decay

Unit 5: Applications of Integration

Session 14: Volume – Disk and Washer Method

- Solids of revolution
- Disk/washer method

Session 15: Volume – Shell Method & Length

- Shell method

- Arc length

Unit 6: Parametric, Polar, and Vector Functions

Session 16: Parametric Equations

- Derivatives and integrals of parametric curves
- Elimination and graphing

Session 17: Polar Coordinates

- Graphing polar curves
- Area bounded by polar curves

Session 18: Vector-Valued Functions

- Derivatives and integrals of vector functions
- Motion in the plane

Unit 7: Series

Session 19: Introduction to Series

- Sequences and series
- Convergence/divergence basics
- Geometric and p-series

Session 20: Tests for Convergence

- nth-term test, integral test
- Comparison, ratio, and alternating series tests

Session 21: Taylor and Maclaurin Series (Part 1)

- Power series representation
- Radius and interval of convergence

Session 22: Taylor and Maclaurin Series (Part 2)

- Common Taylor series (e^x, sin x, etc.)
- Error bound (Lagrange form)

Review and Practice

Session 23: FRQ Practice – AB Topics

- Targeted review of AB content (limits, derivatives, integrals)
- Focus on past FRQs

Session 24: FRQ Practice – BC Topics

- [ ] - Series, parametric/polar/vector problems
- [ ] - Past BC-only questions

Session 25: Full Practice Test and Wrap-Up

- [ ] - Timed multiple choice & FRQ practice
- [ ] - Q&A and test strategies