



2012 Curriculum Catalog

Calculus (for use with AP* courses)

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Ignitia comes complete with a full, multimedia-rich curriculum for grades 3-12 in five core subjects and electives.

Calculus (for use with AP* courses)**Prerequisites/Course Information**

This course is designed to assist students in their preparation for the AB exam and subsequent college-level math courses. The course focuses on a balance of skills, conceptual understanding, and the use of technology.

Prior to taking this calculus courses, students should have successfully completed four years of high-school math: two years of algebra, one year of geometry, and one year of pre-calculus that includes trigonometry.

Textbook

The textbook for the course is the seventh edition of *Calculus of a Single Variable* by Ron Larson, Robert Hostetler, and Bruce Edwards (Boston: Houghton Mifflin, 2001; ISBN 0-618-14916-3).

Required Technology

You will need access to the following technologies for this course:

- a graphing calculator (TI-89 strongly recommended)

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Course Overview

AP Calculus is a full-year, high school credit course that is intended for the student who has successfully mastered a minimum of four high school level mathematics courses that cover analytical and conceptual algebra (with heavy emphasis on functions), coordinate and plane geometry, and trigonometric functions. It is highly recommended that the student successfully complete pre-calculus as a prerequisite. The course primarily focuses on the skills and methods of analyzing graphical behavior of functions, the definition of a derivative as well as applications of derivatives, integration and their relationships with the graphical function.

Upon successfully completing the course, the student should have mastered the following concepts:

- Perform operations on functions including composition and inverses.
- Using calculation and estimation to evaluate limits.
- Analyze infinite limits and the correlation between their values and the graph's behavior; estimate and understand discontinuity and continuous functions.
- Compute the derivative of a function using the power rule, product and quotient rule, chain rule and all trigonometric rules.
- Use the concept of a derivative to interpret a function's rate of change and continuity; construct the equation of a line tangent to a curve; evaluate the intervals for which a function is increasing or decreasing.
- Interpret the Mean Value Theorem.
- Evaluate the second derivative and find the points of inflection.
- Utilize the derivative through application problems involving area under a curve, velocity, acceleration and speed.
- Evaluate a definite integral using the Fundamental Theorem of Calculus, Riemann Sums, and the rate of change formula.

UNIT 1 - GRAPHS AND LIMITS	
Assignment Titles	
1. Course Overview	13. Limit Proofs
2. Course Introduction	14. Evaluating Limits Analytically
3. Fermat's Method Part 1	15. Squeeze Theorem with Trigonometry Review
4. Fermat's Method Part 2	16. Quiz 2 Review
5. Graphs and Models	17. Quiz 2
6. Linear Models and Rates of Change	18. Continuity and One-Sided Limits
7. Functions and Their Graphs	19. Intermediate Value Theorem
8. Quiz 1 Review	20. Infinite Limits
9. Quiz 1	21. Chapter 1 Review
10. Calculus Preview	22. Special Project
11. Finding Limits Graphically and Numerically	23. Chapter 1 Test
12. Epsilon-Delta Definition of a Limit	

UNIT 2 - DERIVATIVES	
Assignment Titles	
1. Definition of the Derivative	10. Product Rule
2. Derivatives on the Graphing Calculator	11. Quotient Rule
3. Drawing Derivatives	12. Higher-Order Derivatives
4. Alternate Form of the Derivative	13. Chain Rule
5. Differentiation Rules	14. Implicit Differentiation
6. Derivatives of Sine and Cosine	15. Chapter 2 Review
7. Slope as a Rate of Change	16. Special Project
8. Quiz 3 Review	17. Chapter 2 Test
9. Quiz 3	

UNIT 3 - RELATED RATES	
Assignment Titles	
1. Related Rates 1	5. Related Rates 5
2. Related Rates 2	6. Special Project
3. Related Rates 3	7. Related Rates Review
4. Related Rates 4	8. Related Rates Test

UNIT 4 - DERIVATIVE TESTS
Assignment Titles

- | | |
|---|------------------------------------|
| 1. Extrema on an Interval | 9. Chapter 3 Review |
| 2. Rolle's Theorem and the Mean Value Theorem | 10. Chapter 3 Test |
| 3. First Derivative Test | 11. Applied Max and Min Problems 1 |
| 4. Quiz 4 Review | 12. Applied Max and Min Problems 2 |
| 5. Quiz 4 | 13. Applied Max and Min Problems 3 |
| 6. Concavity and the Second Derivative Test | 14. Linear Approximations |
| 7. Limits at Infinity | 15. Differentials |
| 8. Curve Sketching | |

UNIT 5 - REVIEW AND SEMESTER I EXAM
Assignment Titles

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| 1. Review | 2. Semester I Exam |
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UNIT 6 - INTEGRALS
Assignment Title

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|---|--|
| 1. Antiderivatives and Integration | 10. Second Fundamental Theorem of Calculus |
| 2. Differential Equations | 11. Integration by Substitution |
| 3. Slope Fields | 12. Definite Integrals with Substitution |
| 4. Sigma Notation and Area | 13. Trapezoidal Rule |
| 5. Riemann Sums and the FTC | 14. Particle Movement |
| 6. Quiz 1 Review | 15. Special Project |
| 7. Quiz 1 | 16. Chapter 4 Review |
| 8. Mean Value Theorem and Average Value | 17. Chapter 4 Test |

UNIT 7 - NATURAL LOGS AND FUNCTIONS
Assignment Title

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|---|--------------------------|
| 1. Review of the Natural Log and its Properties | 8. Exponential Functions |
| 2. Natural Log Function and Differentiation | 9. Bases Other Than e |
| 3. Natural Log Function and Integration | 10. Growth and Decay |
| 4. Integrating Trig Functions | 11. Special Project |
| 5. Quiz 2 Review | 12. Chapter 5 Review |
| 6. Quiz 2 | 13. Chapter 5 Test |
| 7. Review of Inverse Functions | |

UNIT 8 - AREA AND VOLUME
Assignment Title

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|--|--------------------------------|
| 1. Area Between Two Curves | 5. Special Project |
| 2. Volumes of Revolution: The Disk Method | 6. Sections 6.1 and 6.2 Review |
| 3. Volumes of Revolution: The Disk and Washer | 7. Sections 6.1 and 6.2 Test |
| 4. Volumes of Solids with Known Cross Sections | |

UNIT 9 - INVERSE TRIG FUNCTIONS
Assignment Title

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|---|----------------------------------|
| 1. Inverse Trig Functions | 4. Special Project |
| 2. Differentiating Inverse Trig Functions | 5. Inverse Trig Functions Review |
| 3. Integrating Inverse Trig Functions | 6. Inverse Trig Functions Test |

UNIT 10 - REVIEW AND SEMESTER II EXAM
Assignment Title

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|-----------|---------------------|
| 1. Review | 2. Semester II Exam |
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