

Course Overview

AP Calculus AB is equivalent to a first-semester college calculus course and requires a commensurate amount of work. You will learn all topics in the Calculus AB Topic Outline of the College Board's *AP Calculus Course Description*. You will be expected to be able to work with each concept that we study in several ways: verbally, numerically, analytically, and graphically.

It is important that you become proficient in using your TI-84 calculator -- several problems on each test and quiz will be possible to solve *only* through the use of a graphing calculator. On the other hand, it is equally important for you to understand how to apply the concepts that we learn without using a calculator. Thus, many problems on each test and quiz are designed in such a way that your calculator will not be helpful. In fact, each test will have two parts: one in which a calculator is required and one in which a calculator is not allowed.

I will expect a lot from you. You will be expected to recall the Precalculus topics from last year, so we will start Calculus on the first day of the year. We will review Precalculus topics as needed. Despite the amount of work required, my students typically view taking this course as a valuable experience that prepares them well for the AP exam and for college.

Your best chance for success will be to keep up with the homework daily and to seek help as soon as possible if you ever feel confused. Please help out one another. Also, feel free to schedule meetings to get help from me during a mutually free period, or before or after school. My free periods are listed below. I encourage my students to work together on all assignments except for tests and quizzes. Some tests will have a group component in which you will be asked to solve problems by working with your classmates.

Homework assignments, class notes, and practice test solutions will be posted on Moodle.

Class Schedule

- Meeting time: Period 1 on even days with 40-minute drop-downs on days 5 and 9.
- Meeting location: Hardy 25

Mr. Alexander's Free Periods

- Periods 1 and 2 on odd days.
- Period 4 on days 2, 3, 4, 7, 8, 10

Primary Textbook

Hughes-Hallett et al., 2009: *Calculus: Single Variable (5th Edition)*. Wiley.

Contact information

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Course Outline

Continuity and Limits

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|----------------------------|-----|
| Introduction to Continuity | 1.7 |
| Limits | 1.8 |

The Derivative

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|----------------------------------|-----|
| How do We Measure Speed? | 2.1 |
| The Derivative at a Point | 2.2 |
| The Derivative Function | 2.3 |
| Interpretation of the Derivative | 2.4 |
| The Second Derivative | 2.5 |
| Differentiability | 2.6 |

Differentiation Techniques

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|---|------|
| Powers and Polynomials | 3.1 |
| The Exponential Function | 3.2 |
| The Product and Quotient Rules | 3.3 |
| The Chain Rule | 3.4 |
| The Trigonometric Functions | 3.5 |
| The Chain Rule and Inverse Functions | 3.6 |
| Implicit Functions | 3.7 |
| Linear Approximation | 3.9 |
| Theorems about Differentiable Functions | 3.10 |

Applications of the Derivative

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|--------------------------------------|-----|
| Using First and Second Derivatives | 4.1 |
| Optimization | 4.2 |
| Optimization, Geometry, and Modeling | 4.4 |
| Rates and Related Rates | 4.6 |
| L'Hopital's Rule | 4.7 |

The Definite Integral

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| How Do We Measure Distance Traveled? | 5.1 |
| The Definite Integral | 5.2 |
| The Fundamental Theorem and Interpretations | 5.3 |
| Theorems About Definite Integrals | 5.4 |

Constructing Antiderivatives

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| Antiderivatives Graphically and Numerically | 6.1 |
| Constructing Antiderivatives Analytically | 6.2 |
| Differential Equations | 6.3 |
| Second Fundamental Theorem of Calculus | 6.4 |
| The Equations of Motion | 6.5 |

Integration

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|----------------------------------|-----|
| Integration by Substitution | 7.1 |
| Approximating Definite Integrals | 7.5 |

Using the Definite Integral

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|--------------------------|-----|
| Areas and Volumes | 8.1 |
| Applications to Geometry | 8.2 |

Grading

Semester and Final grades are computed as follows:

| <u>Semester 1 Average</u> | | <u>Semester 2 Average:</u> | | <u>Final Average:</u> | |
|---------------------------|-----|----------------------------|-----|-----------------------|-----|
| Semester 1 | 75% | Semester 2 | 75% | Semester 1 Average | 50% |
| Semester 1 exam | 25% | Semester 2 Exam | 25% | Semester 2 Average | 50% |

AP students are exempt from the final exam if the cumulative year average is 83 or greater. However, a senior who misses 12% or more of the second semester classes must take a final exam.

Assignment weighting

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|-------------------|-----|--|
| Tests | 50% | <p>There will be five tests each semester.</p> <p>Tests will be scheduled approximately one week after you receive a practice test.</p> <p>Each test will consist of at least three parts: a take-home test, a part in which calculators are allowed, and a part in which calculators are not allowed. Students may collaborate on the take-home test. Some tests will have a fourth part: an in-class group test in which students may collaborate on their work.</p> |
| Quizzes | 20% | <p>Quizzes are given daily at the beginning of class.</p> <p>Quizzes are closed book/closed notes, but may be worked on with a partner.</p> |
| Classwork | 10% | <p>On most days, there will be a classwork assignment.</p> <p>Students may collaborate on classwork assignments.</p> |
| Skill Maintenance | 10% | <p>Each cycle, a group of skill maintenance problems will be assigned.</p> <p>These questions will focus on either prerequisite topics or topics that have been covered earlier in the year.</p> <p>These problems are to be handed in for a grade at the beginning of class on Day 10 of each cycle.</p> |
| Homework | 10% | <p>Checked every day at the beginning of class.</p> <p>Each student begins the semester with a homework grade of 100.</p> <p>For each assignment, up to 4 points are subtracted from the semester homework grade, ranging from 0 points for all problems attempted to 4 points for no problems attempted.</p> <p>For a homework problem to be considered attempted, at least some relevant mathematics must be written down.</p> |

Grading Policies

Late Homework

Because homework solutions are posted on Moodle, late homework is not accepted.

Late Skill Maintenance

Skill Maintenance assignments that are handed in late will be penalized 10 points per class day late.

Absence Policy

Tests: Students who miss a test day should make arrangements with me on the day of your return on a mutually agreeable time to take the test. Tests that are not made up by the end of the semester will be recorded as a zero.

Classwork and Quizzes: If you are absent, classwork and quizzes do not need to be made up. However, you will be responsible for the material that is covered on those assignments.

Homework: If you are absent on the day that homework is due, please show me your homework on the day of your return. If you are absent on the day that homework is assigned, please make up your homework as soon as possible before the next test. Homework that is not made up before the next test will be counted as incomplete (-4 points).

Showing Your Work

In order to receive full credit on problems on tests, quizzes, skill maintenance and classwork, you must show all of the work required to arrive at your answer. You will not necessarily receive full credit if you only show your answer.

Honor Code

Students are expected to abide by the Honor Code at all times.