

AP Calculus AB Syllabus

Primary Textbook: Calculus, Ron Larson, Robert Hostetler, Bruce Edwards, Seventh Edition. Houghton Mifflin Company, 2002

Resources:

Barron's How to Prepare for the AP Calculus Advanced Placement Examination

Cracking the AP Calculus Exam: The Princeton Review (2002-2003)
by David Kahn

D & S's Multiple-Choice and Free-Response Questions in Preparation for the AP Calculus (AB) Examination (C2, C5)

Paul Foerster's Calculus Concepts and Applications (C2, 3, 4, 5)

A Watched Cup Never Cools; Ellen Kamischke (1999) (C3, C4)

Graphing calculators (TI-83, TI-84, TI-89) (C5)

Larson's HM Testing v6.1

AP Central Released Exams and Teacher Resources (C2, 3, 4, 5)

Advanced Placement Correlations and Preparation: Calculus (C2, C3, C4, C5)

Teaching Strategies:

During the first few weeks we spend extra time familiarizing students with the **graphing calculators**. Students help each other in this undertaking.

I assign homework daily, although I only collect it as we finish each section. I emphasize that students show all their steps in solving a problem and that they **justify** their answers where applicable.

We give our students many opportunities to solve problems in a variety of ways. They may do so **algebraically** (analytically), **numerically** (tables), **graphically** (geometrically) or **verbally** (descriptively).

I like to introduce many concepts with **exploration** lessons. Students tend to understand the concepts better if they have **discovered** a certain “rule”. Paul Foerster’s Explorations are great for this. I also use some of the Concepts Worksheets from the Finney DeMana Waits Kennedy ancillary materials for their text Calculus: Graphical, Numerical, Algebraic.

At the beginning of the fourth quarter, after **all** concepts have been introduced, I divide the class into as many groups as we have chapters that have been covered. Each group decides on the chapter they will present, pointing out the main ideas, discussing interesting problems, emphasizing the harder concepts. Each student individually is responsible for a part of the chapter. Each student will earn a grade for the section she presents. Each student is an active learner in this project. (C4)

Throughout the year my students work on Free Response questions, sometimes as class work or homework assignments, often as quizzes. As they turn in their responses I give them the rubrics so that they may see what they did correctly right away. The next day, when they receive their graded papers, they discuss the solutions with each other and sometimes with the class. In general, I am very generous with positive comments, smiley faces, and stickers on good answers. If students approach an answer in substantially different ways I make it a point to have these students discuss their work. (C4)

Curriculum Topics			
First Quarter			
Textbook Correlation	Topic	Timeline – Number of Days	CR
1.2	Finding Limits Graphically and Numerically Estimating Limits from graphs or tables of data	2	2,3,5
1.3	Evaluating Limits Analytically	3	2,3
1.4	Definition of Continuity	4	3

	Continuity and One-Sided Limits Intermediate Value Theorem Finding Limits of Piece-Wise Functions		
1.5	Infinite Limits Finding Vertical Asymptotes Using Limits	2	2,3
2.1	Find the derivative and the Slope of the Tangent Line Using the Definition of the Derivative Derivative Presented Graphically, numerically, and Analytically Relationship between Differentiability and Continuity	2	2,3,5
2.2	Find the derivative of a function using the Power Rule Find the Derivative of the Sine and Cosine Use derivatives to find Rates of Change	5	2
2.3	Find Derivative Using Product and Quotient Rules Find Derivatives of the Remaining Trig Functions Find High Order Derivatives	4	2
2.4	Find the Derivative of a Composite Function Using the Chain Rule Find the Derivative of a function Using the General Power Rule	4	2
2.5	Use Implicit Differentiation to Find the Derivative of a Relation	3	2
2.6	Find a Related Rate Use related Rates to Solve Real Life Problems	3	3,5
3.1	Find Extrema on a Closed Interval	3	2,5
3.2	Understand and Use Rolle's and Mean Value theorems and their	3	3

	Geometric Interpretations		
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Special Projects and Activities:

Tootsie Roll Pop Lab Activity (A Watched Cup Never Cools) to give students hands on experience with related rates. (C2, 3, 4)

Second Quarter			
Textbook Correlation	Topic	Timeline – Number of Days	CR
3.3	Determine Intervals on Which a Function Is Increasing/Decreasing; Justify Apply the First Derivative Test to Find Relative Extrema; Justify	4	2, 4,5
3.4	Determine Intervals in Which a Function Is Concave Up/Down Find Point(s) of Inflection; Justify Apply Second Derivative Test	4	2, 4,5
3.5	Determine Limits at Infinity Determine Horizontal Asymptotes	3	2,5
	Relate the Graphs of f, f', and f''	4	2,3, 4
3.6	Summary of Curve Sketching	4	2,3,4,5
3.7	Optimization Problems	4	2,3
3.8	Newton's Method	1	2
3.9	Linearization Find the Differential of a Function	4	2
	Apply the Derivative including velocity, speed, and acceleration	4	2,3,5
	Slope Fields	4	2,3,5
4.1	Find General and Particular Solutions of Differential Equations Use Basic Integration Rules	4	2

4.2	Use Riemann Sums to Approximate Area Under a Curve	4	2,3,5
4.3	Properties of Definite Integrals	3	2
4.4	Evaluate a Definite Integral Using the Fundamental Theorem of Calculus Understand and Use the Second Fundamental Theorem of Calculus Find the Average Value of a Function on a Closed Interval	4	2,3,5
4.5	Integration by Substitution	3	2
4.6	Numerical Integration by Trapezoidal Rule	3	2,3,5

Special Projects and Activities:

Speedometer-Odometer Project (adapted from Instructor's Guide for Stewart's Calculus: Concepts and Contexts, 1997/1998)

Midterm is composed of released AP Exam questions

Curriculum Topics			
Third Quarter			
Textbook Correlation	Topic	Timeline – Number of Days	CR
5.1	Derivative of Natural Logarithmic Function	3	2,5
5.2	Integrating the Natural Logarithmic Function	3	2,5
5.3	Find the Derivative of an Inverse Function	3	2
5.4	Finding Derivative and Integrals of the Exponential Function	3	2,5
5.5	Finding Derivatives and Integrals of Functions with Bases Other than “e”	3	2,5
5.6	Use Separation of Variables to Solve a Differential Equation	4	2,3

	Law of Growth and Decay		
	Comparing Rates of Growth of Functions Including, exponential, polynomial, and logarithmic	1	2
5.7	Solve Separable Differential Equations	3	2
5.8	Derivatives of Inverse Trigonometric Functions	2	2
5.9	Integrating Inverse Trigonometric Functions	2	2
6.1	Find Area of a Region between Two Curves	2	2,3,5
6.2	Find Volume of a Solid of Revolution Using the Disk Method Find Volumes of Solids with a Known Cross Section	5	2,3,5
6.3	Find Volume of a Solid Using the Shell Method	3	2,3,5
7.7	Apply l'Hopital's Rule to evaluate Limits of Indeterminate Forms	3	2

Special Projects and Activities:

Speedometer and odometer Project (C2, 3, 4)

Curriculum Topics			
Fourth Quarter			
Textbook Correlation	Topic	Timeline – Number of Days	CR
	College Board Sample Exam 1997	4	
	College Board Sample Exam 1998	4	
	College Board Sample Exam 2003	4	
	Chapter Review Presentations	4	
	Free Response Questions 2006	4	
	Free Response Questions 2005	4	
	Free Response Questions 2004	4	
	AP Exam	1	

	Student Presentations of AP Free Responses after 48 hours wait	2	
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Special Projects and Activities:

Calculus Review: Students are divided into groups. Each group is responsible for reviewing a chapter with the class. Each student is responsible for a section of the chapter. They may present the review as a game, as a lecture, as an activity. (C2, C3, C4)