

Course Title: AP Calculus

Topic/Concept: Limits

Time Allotment: 2 Wks

Unit Sequence: 1

**Major Concepts to be learned:**

1. What a limit is.
2. What a derivative is.
3. What a definite integral is.
4. How derivatives and definite integrals depend on the limit process.

**Expected Skills to be demonstrated:**

1. Evaluate a limit.
2. Find a derivative numerically.
3. Find a definite integral numerically using the trapezoidal method.

**PA Standards/Anchors:**

**Eligible Content:**

N/A	N/A
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**Instructional Strategies:**

**Assessments:**

Problem solving activities Lecture Note Taking	<ul style="list-style-type: none"><li>• Test</li></ul>
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Course Title: AP Calculus

Topic/Concept: Derivatives I

Time Allotment: 4 Wks

Unit Sequence: 2

**Major Concepts to be learned:**

1. That a derivative is a special limit.
2. The purpose of finding a derivative.
3. Understand the Intermediate Value Theorem.
4. What a composite function is.

**Expected Skills to be demonstrated:**

1. Calculate a numerical derivative.
2. Find a derivative using the definition of derivative.
3. Find derivatives using the power and chain rules.
4. Find derivatives of trig functions.
5. Find antiderivatives of power functions.
6. Apply knowledge of derivatives to motion problems.

**PA Standards/Anchors:**

**Eligible Content:**

N/A	N/A
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**Instructional Strategies:**

**Assessments:**

Problem solving activities Note Taking	Lecture	• Test
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Course Title: AP Calculus

Topic/Concept: Derivatives II

Time Allotment: 2 Wks

Unit Sequence: 3

**Major Concepts to be learned:**

1. What the inverse of a function is.
2. What parametric functions are.
3. That differentiability implies continuity

**Expected Skills to be demonstrated:**

1. Find derivatives using the product and quotient rules.
2. Differentiate implicitly.
3. Find derivatives of inverse trig functions.
4. Apply the parametric chain rule.

**PA Standards/Anchors:**

**Eligible Content:**

N/A

N/A

**Instructional Strategies:**

**Assessments:**

Problem solving activities  
Lecture  
Note Taking

- Test

Course Title: AP Calculus

Topic/Concept: Integration

Time Allotment: 4 Wks

Unit Sequence: 4

**Major Concepts to be learned:**

1. The indefinite integral is an antiderivative.
2. The definition and meaning of a definite integral
3. The Mean Value Theorem.
4. The Fundamental Theorem of Calculus.

**Expected Skills to be demonstrated:**

1. Find an antiderivative.
2. Evaluate definite integrals numerically, using the Fundamental Theorem, and using the limit definition.

**PA Standards/Anchors:**

**Eligible Content:**

N/A

N/A

**Instructional Strategies:**

**Assessments:**

Problem solving activities  
Lecture  
Note Taking

- Test

Course Title: AP Calculus

Topic/Concept: Calculus of Exponential and Logarithmic Functions

Time Allotment: 3 Wks

Unit Sequence: 5

**Major Concepts to be learned:**

1. The "Second" Fundamental Theorem of Calculus
2. What a logarithmic function

**Expected Skills to be demonstrated:**

1. Apply the "Second" Fundamental Theorem of Calculus
2. Differentiate and integrate exponential functions of any base.
3. Differentiate logarithmic functions of any base.
4. Integrate functions of the form  $1/x$ .

**PA Standards/Anchors:**

**Eligible Content:**

N/A

N/A

**Instructional Strategies:**

**Assessments:**

Problem solving activities  
Lecture  
Note Taking

- Test

Course Title: AP Calculus

Topic/Concept: Differential Equations

Time Allotment: 4 Wks

Unit Sequence: 6

**Major Concepts to be learned:**

1. What a differential equation is.
2. What a slope field is.

**Expected Skills to be demonstrated:**

1. Find general and particular solutions for differential equations which can be solved using separation of variables.
2. Write a differential equation which models a physical scenario.
3. Sketch a slope field defined by a differential equation
4. Sketch the particular solution to a differential equation on a slope field
5. Approximate the solution to a differential equation using Euler's method.

**PA Standards/Anchors:**

**Eligible Content:**

N/A	N/A
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**Instructional Strategies:**

**Assessments:**

Problem solving activities Lecture Note Taking	<ul style="list-style-type: none"><li>• Test</li></ul>
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Course Title: AP Calculus

Topic/Concept: Calculus of Plane and Solid Figures

Time Allotment: 4 Wks

Unit Sequence: 7

**Major Concepts to be learned:**

1. What a critical point is.
2. Local extrema occur at critical points.

**Expected Skills to be demonstrated:**

1. Calculate the area between two curves.
2. Calculate the volume for a solid of revolution using both disc and shell methods, and the volume of a solid which can be broken into plane slices of similar geometry
3. Calculate the length of a curve.
4. Calculate the area of a surface of revolution.
5. Use differentiation to sketch a curve.
6. Use differentiation to solve optimization problems.

**PA Standards/Anchors:**

**Eligible Content:**

N/A

N/A

**Instructional Strategies:**

**Assessments:**

Problem solving activities  
Lecture  
Note Taking

- Test

Course Title: AP Calculus

Topic/Concept: Calculus of Motion

Time Allotment: 2 wks

Unit Sequence: 8

**Major Concepts to be learned:**

1. Differentiation and integration can be used to convert among position, velocity and acceleration functions.
2. Velocity and acceleration.
3. Average value of a continuous function.

**Expected Skills to be demonstrated:**

1. Use differentiation to find a velocity function from a position function and an acceleration function from a velocity function.
2. Use integration to find a position function from a velocity function and a velocity function from an acceleration function. (Both general and particular solutions)
3. Find the average value of a continuous function.
4. Use optimization techniques to find least time or least cost path between two points.
5. Solve related rates problems.

**PA Standards/Anchors:**

**Eligible Content:**

N/A	N/A
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**Instructional Strategies:**

**Assessments:**

Problem solving activities Lecture Note Taking	<ul style="list-style-type: none"><li>• Test</li></ul>
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Course Title: AP Calculus

Topic/Concept: Applications of Integration

Time Allotment: 3 Wks

Unit Sequence: 9

**Major Concepts to be learned:**

1. What a definite integral is and how it can be used.

**Expected Skills to be demonstrated:**

1. Set up appropriate integral.
2. Evaluate integral.
3. Apply correct units and interpretation to numerical answer.

**PA Standards/Anchors:**

**Eligible Content:**

N/A

N/A

**Instructional Strategies:**

**Assessments:**

Problem solving activities  
Lecture  
Note Taking

- Test