Grade: 11-12 **Course Title: AP Calculus AB** **Topic/Concept: Limits**

Time Allotment: 2 weeks **Unit Sequence: 1**

Major Concepts to be learned:

- The limit.
- The derivative.
- Thedefinite integral.
- How derivatives and definite integrals depend on the limit process.

Expected Skills to be demonstrated:

- Evaluate a limit.
- Find a derivative numerically.
- Find a definite integral numerically using the trapezoidal method.

PA Standards/Anchors:	Eligible Content:
CC.2.2.HS.D.4 CC.2.2.HS.D.5 CC.2.2.HS.C.2	N/A

Instructional Strategies:	Assessments:
• Problem solving activities • Lecture • Note Taking	• Test

Grade: 11-12 **Course Title: AP Calculus AB** **Topic/Concept: Derivatives I**

Time Allotment: 4 weeks **Unit Sequence: 2**

Major Concepts to be learned:

- That a derivative is a special limit.
- The purpose of finding a derivative.
- The Intermediate Value Theorem.
- Composite functions.

Expected Skills to be demonstrated:

- Calculate a numerical derivative.
- Find a derivative using the definition of derivative.
- Find derivatives using the power and chain rules.
- Find derivatives of trig functions.
- Find antiderivatives of power functions.
- Apply knowledge of derivatives to motion problems.

PA Standards/Anchors:

CC.2.1.HS.F.1
CC.2.2.HS.D.2
CC.2.2.HS.C.7
CC.2.2.HS.C.8

Eligible Content:

N/A

Instructional Strategies:

- Problem solving activities
- Lecture
- Note Taking

Assessments:

- Test

Grade: 11-12 **Course Title: AP Calculus AB** **Topic/Concept: Derivatives II**

Time Allotment: 2 weeks **Unit Sequence: 3**

Major Concepts to be learned:

- The inverse of a function.
- The relationship between differentiability and continuity.

Expected Skills to be demonstrated:

- Find derivatives using the product and quotient rules.
- Differentiate implicitly.
- Find derivatives of trig and inverse trig functions.
- Differentiate logarithmically.

PA Standards/Anchors:

CC.2.2.HS.D.2
CC.2.2.HS.D.6
CC.2.2.HS.D.8
CC.2.3.HS.A.7
CC.2.2.HS.C.4

Eligible Content:

N/A

Instructional Strategies:

- Problem solving activities
- Lecture
- Note Taking

Assessments:

- Test

Grade: 11-12 **Course Title: AP Calculus AB** **Topic/Concept: Integration**

Time Allotment: 4 weeks **Unit Sequence: 4**

Major Concepts to be learned:

- The indefinite integral is an antiderivative.
- The definition and meaning of a definite integral
- The Mean Value Theorem.
- The Fundamental Theorem of Calculus.

Expected Skills to be demonstrated:

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

PA Standards/Anchors:	Eligible Content:
CC.2.1.HS.F.1 CC.2.2.HS.D.2 CC.2.2.HS.C.7	N/A

Instructional Strategies:	Assessments:
• Problem solving activities • Lecture • Note Taking	• Test

Grade: 11-12

Course Title: AP Calculus AB

Topic/Concept: Calculus of Exponential and Logarithmic Functions

Time Allotment: 3 weeks

Unit Sequence: 5

Major Concepts to be learned:

- The "Second" Fundamental Theorem of Calculus
- Logarithmic functions.
- Indeterminate form.

Expected Skills to be demonstrated:

- Apply the "Second" Fundamental Theorem of Calculus
- Differentiate and integrate exponential functions of any base.
- Differentiate logarithmic functions of any base.
- Integrate functions of the form 1/x.
- Apply L'Hospital's Rule to evaluate limits.

PA Standards/Anchors:	Eligible Content:
CC.2.2.HS.D.2 CC.2.2.HS.D.6 CC.2.2.HS.C.4	N/A

Instructional Strategies:	Assessments:
• Problem solving activities • Lecture • Note Taking	• Test

Grade: 11-12 **Course Title: AP Calculus AB** **Topic/Concept: Differential Equations**

Time Allotment: 3 weeks **Unit Sequence: 6**

Major Concepts to be learned:

- Differential equations.
- Slope fields.

Expected Skills to be demonstrated:

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

PA Standards/Anchors:

CC.2.1.HS.F.3	CC.2.2.HS.C.1	CC.2.2.HS.C.5
CC.2.1.HS.F.4	CC.2.2.HS.C.2	CC.2.2.HS.C.6
CC.2.1.HS.D.1	CC.2.2.HS.C.3	

Eligible Content:

N/A

Instructional Strategies:

- Problem solving activities
- Lecture
- Note Taking

Assessments:

- Test

Grade: 11-12

Course Title: AP Calculus AB

Topic/Concept: Calculus of Plane and Solid Figures

Time Allotment: 3 weeks

Unit Sequence: 7

Major Concepts to be learned:

- Defining differential elements.
- Measuring distance on a Cartesian plane.

Expected Skills to be demonstrated:

- Calculate the area between two curves.
- 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
- Calculate the length of a curve.

PA Standards/Anchors:

CC.2.2.HS.D.7
CC.2.3.HS.A.13
CC.2.2.HS.C.2

Eligible Content:

N/A

Instructional Strategies:

- Problem solving activities
- Lecture
- Note Taking

Assessments:

- Test

Grade: 11-12 **Course Title: AP Calculus AB** **Topic/Concept: Calculus Applications**

Time Allotment: 4 weeks **Unit Sequence: 8**

Major Concepts to be learned:

- Differentiation and integration can be used to convert among postion, velocity and acceleration functions.
- Absolute and relative extrema.
- Meaning of average value of a continuous function.

Expected Skills to be demonstrated:

- Use differentiation to find a velocity function from a position function and an acceleration function from a velocity function.
- Use integration to find a position function from a velocity function and a velocity function from an acceleration function. (Both general and particular solutions)
- Find the average value of a continuous function.
- Solve optimization problems.
- Solve related rates problems.
- Apply differentiation to curve sketching.

PA Standards/Anchors:

CC.2.1.HS.F.3	CC.2.2.HS.D.4	CC.2.2.HS.D.10
CC.2.1.HS.F.4	CC.2.2.HS.D.5	CC.2.3.HS.A.7
CC.2.1.HS D.1	CC.2.2.HS.D.7	CC.2.2.HS.C.1
CC.2.2.HS.C.3	CC.2.2.HS.C.5	CC.2.2.HS.C.6

Eligible Content:

N/A

Instructional Strategies:

- Problem solving activities
- Lecture
- Note Taking

Assessments:

- Test