

AP Calculus AB Syllabus 2021-2022 Amherst County High School

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Textbook: Larson/Edwards, Calculus of a Single Variable: Early Transcendental Functions 5 th edition, Brooks/Cole Cengage Learning, 2011

Course Overview: In our class we will cover all of the topics that are listed in the Calculus AB Course Description as it appears on the AP Central website. We cover these topics in the class before the AP test occurs. Projects may be assigned that require the students to use and improve their critical thinking skills. These projects require students to work on their problem solving, writing skills, analytical thinking and group working skills.

AP Calculus AB is an enriched mathematics course and curriculum that is designed to help students in their understanding of the calculus curriculum and to provide and prepare them for the mathematics needed to be successful in post secondary studies. The main objectives of the class are to prepare the students for college level mathematics, enable students to tie together all of the mathematics topics that they have learned throughout high school, and to prepare them for the AP exam. We will also spend time learning how to use technology to estimate answers, check results, complete steps to multi-step problems, and support conclusions.

Course Planner: Listed below is the pacing of our AP Calculus AB course. It is taught on a 90-minute per day alternating day block schedule. The time frame is approximate and includes time for review and testing.

Chapter 2 Limits and Their Properties (5 weeks)

- 2.1 A Preview of Calculus
- 2.2 Finding Limits Graphically and Numerically
- 2.3 Evaluating Limits Analytically
- 2.4 Continuity and One-Sided Limits
- 2.5 Infinite Limits

Chapter 3 Differentiation (4 weeks)

- 3.1 The Derivative and the Tangent Line Problem
- 3.2 Basic Differentiation Rules and Rates of Change
- 3.3 Product and Quotient Rules and Higher-Order Derivatives
- 3.4 The Chain Rule
- 3.5 Implicit Differentiation
- 3.6 Derivatives of Inverse Functions
- 3.7 Related Rates
- 3.8 Newton's Method

Chapter 4 Applications of Differentiation (4 weeks)

- 4.1 Extrema on an Interval
- 4.2 Rolle's Theorem and the Mean Value Theorem

- 4.3 Increasing and Decreasing Functions and the First Derivative Test
- 4.4 Concavity and the Second Derivative Test
- 4.5 Limits at Infinity
- 4.6 A Summary of Curve Sketching
- 4.7 Optimization Problems
- 4.8 Differentials

Chapter 5 Integration (4 weeks)

- 5.1 Antiderivatives and Indefinite Integration
- 5.2 Area
- 5.3 Riemann Sums and Definite Integrals
- 5.4 The Fundamental Theorem of Calculus
- 5.5 Integration by Substitution
- 5.6 Numerical Integration
- 5.7 The Natural Logarithmic Function: Integration
- 5.8 Inverse Trigonometric Functions: Integration
- 5.9 Hyperbolic Functions

Chapter 6 Differential Equations (2 weeks)

- 6.1 Slope Field and Euler's Method
- 6.2 Differential Equations: Growth and Decay

6.3 Differential Equations: Separation of Variables

Chapter 7 Applications of Integration (2 weeks)

7.1 Area of a Region Between Two Curves

7.2 Volume: The Disk Method

7.3 Volume: The Shell Method

Chapter 8 Integration Techniques, L'Hopital's Rule, and Improper Integrals (4 weeks)

8.1 Basic Integration Rules

8.2 Integration by Parts

8.3 Trigonometric Integrals

8.4 Trigonometric Substitution

8.5 Partial Fractions

8.6 Integration by Tables and Other Integration Techniques

8.7 Indeterminate Forms and L'Hopital's Rule

Preparation for the AP Exam (4 weeks)

Preparation for the final exam (3 weeks)

Teaching Strategy: Lessons will be presented on the board along with handouts. Problems will be presented and solved in four distinct ways: analytically, numerically, graphically and verbally. As a class, students respond to questions asked by the instructor to help make connections between the different materials. Students also pick problems from the textbook to be solved and explained on the board. Students will be asked to explain calculus problems and techniques verbally and in writing. Students will work on assignments that require analytical, numerical, graphical and verbal skills. Homework will be given daily. Students will work collaboratively in groups on homework and practice tests and present solutions on the board.

Technology: Students will be provided with a TI-84+ graphing calculator to use throughout the year. Calculators will be checked out at the beginning of the year. Training on all aspects of the calculator will be part of the curriculum. When graphing techniques are presented, students are given step-by-step instructions and work through the problems together. Students will be taught how to use the calculator to help solve problems, experiment, interpret results, and support conclusions. The graphing calculator will be needed for presentations, class work, and homework and on some, but not all tests.

Online Platform: The course will be taught using the Canvas platform. Lessons and review videos will be available on this platform. Work will be submitted through the Canvas platform as well as in-person.

Grades:

Measure of Progress 40%

Mastery of Content 60%

The grading scale will be:

90 – 100 A

80 – 89 B

70 – 79 C

60 – 69 D

Below 60 F

Homework is assigned every day. Students will work on vocabulary for the AP exam as well as AP practice questions. Projects may be assigned throughout the year. Students will keep a portfolio of work related to this class. Tests will be given with at least one days notice. Quizzes can be given at any time.