

AP Calculus AB

Instructor:

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This course is designed to give students more than one semester of college Calculus. An understanding of limits, trigonometry and functions is necessary. An in-depth study of limits, derivatives, integrals and the applications of each will be the focus of the course. Test preparation will be the central focus in the spring. Following the AP exam, students will be exposed to extended topics in precalculus that will be beneficial to further study in mathematics. Students are expected to take the AP Exam in the spring. Optional USM credit requires a USM registration. The AP Exam has a required College Board exam fee of approximately \$95. A graphing calculator is required for the completion of the course. 1 Credit HHS (optional USM 4 credit hrs)

Graduation Standards (the number of the standard is referenced in the performance indicators listed in each unit):

1: Reason and model quantitatively, using units and number systems to solve problems.

3: Interpret, analyze, construct, and solve linear, quadratic, and trigonometric functions.

Unit 1 Limits & Rates of Change

Summary Concepts of limits will be covered in detail as limits are what distinguish calculus from algebra. Students will understand the concept of a limit, be able to find limits through graphical, numerical, and algebraic techniques and explain why some limits do not exist. Students will be introduced to the Intermediate Value Theorem. Precalculus topics will be reviewed as needed.

Performance Indicators 1F. Compute within the real number system.

3C. Analyze functions using different representations.

Assessed in Unit 3K. Understand limits and apply to determining continuity of a function

Unit 2 Differentiation and the Derivative Rules

Summary Concepts of derivatives will be covered in detail. The unit begins with using the definition of a derivative to find instantaneous rates of change. This is followed with a discussion of what it means for a function to be differentiable. Students then learn rules for differentiation and go on to find velocity and other rates of change. Derivatives of trigonometric, logarithmic, exponential and inverse trigonometric functions are learned and applied. Students will work with both average and instantaneous rates of change.

Performance Indicators 1F. Compute within the real number system.

3L. Find derivatives of functions and apply in problem solving.

Assessed in Unit

Unit 3 Differentiation -Part 2 Composite, Implicit and Inverse Functions

Summary Students will learn to apply the chain rule to find the derivative of composite functions. Derivatives will be calculated from tables and when given values symbolically. When functions are not defined explicitly, students will use implicit differentiation to find and apply derivatives to related problems. Lastly, inverse functions will be studied, including the inverse trigonometric functions.

Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3L. Find derivatives of functions and apply in problem solving.
Unit 4	Contextual Applications of Differentiation
Summary	Students will understand the meaning and uses of the derivative as an instantaneous rate of change in graphing and in application. Students will study straight line motion, and related rates. Students will understand how to apply the concept of local linearity and L'Hospitals Rule.
Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3D. Build a function that models a relationship between two quantities. 3K. Understand limits and apply to determining continuity of a function 3L. Find derivatives of functions and apply in problem solving.
Unit 5	Analytic Applications of Differentiation
Summary	Students will understand the applications of the Mean Value Theorem and how it leads us to finding extrema on an interval. We will apply the first and second derivative tests to determine behaviors of functions and use those behaviors to sketch curves. The unit concludes with a study of optimization.
Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3D. Build a function that models a relationship between two quantities. 3L. Find derivatives of functions and apply in problem solving.
Unit 6	Integration – Accumulation of Change
Summary	This unit begins our study of accumulation of a function by approximating areas with Riemann Sums. We will then study definite integrals and their defining properties. Students will find antiderivatives, using the Fundamental Theorem of Calculus to link them to Riemann sums. Students will learn to integrate complex functions using substitution and using rules for transcendental functions.
Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3D. Build a function that models a relationship between two quantities. 3M. Find integrals of functions and apply in problem solving.
Unit 7	Differential Equations
Summary	This unit provides an introduction to differential equations, their related slope fields, and their use in growth and decay problems. Students will learn to use separation of variables to enable integration of functions. Rules for integration of transcendental functions will also be studied.
Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3D. Build a function that models a relationship between two quantities. 3M. Find integrals of functions and apply in problem solving.

Unit 8	Applications of Integration
Summary	Students will find average values of integrals and apply concepts of integrals to particle motion. We will then use the integral as an accumulator to find area between two curves, and to find volumes of solids and volumes of rotations.
Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3D. Build a function that models a relationship between two quantities. 3M. Find integrals of functions and apply in problem solving. Another Look at Particle Motion
Unit 9	AP Exam Preparation
Summary	Students will remove all material, units 1-3 through AP style multiple choice and free response questions. Timed practice exams and scoring with AP rubrics will be a focus of this unit.
Performance Indicators Assessed in Unit	1F. Compute within the real number system. 3C. Analyze functions using different representations. 3D. Build a function that models a relationship between two quantities. 3K. Understand limits and apply to determining continuity of a function 3L. Find derivatives of functions and apply in problem solving. 3M. Find integrals of functions and apply in problem solving.
Unit 10	Post-Exam Studies in Precalculus
Summary	Topics in precalculus, central to Calculus II will be covered, as time allows. Potential topics: vectors, polar coordinates, series & sequences.
Performance Indicators Assessed in Unit	1F. Compute within the real number system.
<p style="text-align: center;"><u>Summative Assessments & Retake policy</u></p> <ul style="list-style-type: none"> • Students have the opportunity to retake summative assessments. • Summative assessments will count as 70% of the grade in the course • The student must submit a retake form to the teacher within five (5) school days of the date that the summative assessment score is reported to the student. • The highest score a student can receive on a retake or late assessment is a 75. • The score achieved on a retake will replace the current score (even if the score is lower). • If a student is making up a test from an absence, that assessment will be graded up to 100. • A final exam will be given which will count as 10% of the course grade. 	
<p style="text-align: center;"><u>Make-up Work</u></p> <p>Upon their return to school from an absence, it is the student's responsibility to secure make-up work from their teacher. The due date of the missed work will be one additional class period for each day of absence from that class or at the discretion of the teacher.</p>	
<p><u>Grading of Formative Assessments</u></p>	

- Formative assessments will count as 30% of the grade.
- Formative assessments may be scored on either a 0-100 scale or a 0-4 scale.
- The 0-4 scale will be represented in Power School as 4=100, 3=87, 2=77, and 1=67.
- The method of scoring of formative assessments will be determined by assignment.