Information for Course Syllabus

Name of Course: AP Calculus AB

Grade Level: 10-12

School: ORHS

Major Assignments: Graphical Analysis of 4 Functions Project

Field Trips: None

How can parents access instructional materials? Canvas

AP Calculus AB
2021-2022

Term 1

Limits and Continuity Unit	
	Interpret rates of change at an instant in terms of the averages of the rates of change over intervals containing that instant.
	Calculate limits using algebra.
	Estimate limits from graphs or tables of data.
	Determine asymptotic behavior graphically and by using infinite limits analysis.
	Compare both relative magnitudes of functions and their rates of change.
	Determine limits using the Squeeze Theorem.
	Determine the continuity of a function at a point.
	Explain the behavior of a function on an interval using the Intermediate Value Theorem.

Intro to Differentiation Unit	
	Define the derivative as a limit of the difference quotient.
	Interpret the derivative as an instantaneous rate of change.
	Relate the concepts of differentiability and continuity.
	Find the slope of a curve at a point and use it to write an equation of a tangent line if one exists.
	Use the tangent line as a linear approximation and graphically extend the concept of differentiability to local linearity.
	Approximate rate of change from graphs and data.
	Connect concepts of average vs. instantaneous rates of change and interpret verbally.
	Use differentiation rules for sums, products, quotients and compositions involving the elementary functions (power, exponential, logarithmic, trigonometric) of single variable calculus.

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Term 1

Differentiation Techniques Unit	
	Identify when to use the Chain Rule to calculate the derivatives of composite functions.
	Differentiate implicitly defined functions.
	Use differentiation rules for inverse functions.
	Use differentiation rules for Inverse Trigonometric Functions.
	Be able to select an appropriate method for calculating the derivative, including those of higher powers.
	Compute limits using L'Hospital's Rule.

Contextual Applications of Differentiation Unit	
	Interpret the meaning of the derivative in Context.
	Model rates of change, including related rates.
	Use the derivative in the study of motion: speed, velocity and acceleration for elementary functions.
	Calculate rates of change in applied contexts.
	Approximate a value on a curve using the tangent line.

Analytical Applications of Differentiation Unit	
	Use $f'(x)$ and $f''(x)$ to analyze both the local and global behavior of the graph of $f(x)$, including characteristics such as monotonicity, concavity, extrema and points of inflection.
	Find corresponding relationships among the graphs of $f(x)$, $f'(x)$, and $f''(x)$.
	Successfully use the Candidates Test to determine Absolute Extrema.
	Use the Mean Value Theorem and know its geometric consequences.
	Optimize, finding both absolute and relative extrema.
	Apply graphical interpretations of continuity as in the Intermediate Value Theorem and the Extreme Value Theorem.

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Term 2

Intro to Integration Unit	Compute Riemann sums using left, right and midpoint evaluation points.
	Recognize the definite integral as a limit of Riemann sums over equal subdivisions.
	Use data and Riemann summing to approximate definite integrals and write Riemann sums as definite integrals.
	Use basic properties of definite integrals.
	Understand the basic premise of the Fundamental Theorem of Calculus, that is, integration is antidifferentiation.
	Use the Fundamental Theorem of Calculus to evaluate definite integrals.
	Connect both the concept of accumulation and the analytical features of the Fundamental Theorem of Calculus in interpreting the graphs of integral functions.
	Find antiderivatives analytically including a substitution of variables technique including change of limits for definite integrals.
	Use Riemann and trapezoidal sums to approximate definite integrals of functions represented algebraically, geometrically and by tables of values.
	Integrate functions using a variety of techniques including: substitution, long division, or completing the square.

Application of Integration Unit	Interpret the definite integral of the rate of change of a quantity over an interval as the change of the quantity over the interval.
	Use integrals to model physical, social or economic situations.
	Compute the area of a region.
	Compute volumes of solids of revolution and volumes of solids with known cross sections.
	Compute the distance traveled by a particle along a line.
	Determine the average value of a function over an interval and understand the geometric interpretation of average value.
	Use the integral of a rate of change to give accumulated change.

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Term 2

Differential Equations Unit	Write equations involving derivatives from verbal descriptions (and vice versa).
	Find specific antiderivatives using boundary conditions.
	Solve separable differential equations and use them in modeling, such as exponential growth.
	Interpret differential equations geometrically via slope fields.

AP Exam Review