Oak Ridge SCHOOLS

AP Calculus BC

	UNIT	Standards Addressed
Term 1	Unit 1: Functional Analysis	• Represent functions numerically, graphically, algebraically and verbally. • Classify and graph the elementary functions: power, root, polynomial, rational, algebraic, and transcendental (exponential, logarithmic, trigonometric and inverse trigonometric). • Transform functions by shifting, stretching and reflecting. • Analyze the differences in graphs $f(x), f(\|x\|)$, and, $\|f(x)\|$ • Define inverse functions and form function compositions. • Analyze and graph planar curves including those given in parametric form, polar form and vector form.
	Unit 2: Limits and Continuity	• 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 the continuity of a function at a point. • Apply graphical interpretations of continuity as in the Intermediate Value Theorem and the Extreme Value Theorem.
	Unit 3-4: Differentiation	• 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 and inverse trigonometric) of single variable calculus. • Differentiate implicitly defined functions. • Differentiate parametric, polar and vector functions.

AP Calculus BC cont.

	UNIT	Standards Addressed
Term 2	Unit 5: Applications of Differentiation	• 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 $f''(x)$. • Use the Mean Value Theorem and know its geometric consequences. • Optimize, finding both absolute and relative extrema. • Model rates of change, including related rates. • Use the derivative in the study of motion: speed, velocity and acceleration for both elementary functions and for planar curves which are given in parametric, polar or vector form.
	Unit 6: Integration	• Compute Riemann sums using left, right and midpoint evaluation points. • Investigate upper and lower Riemann sums. • Recognize the definite integral as a limit of Riemann sums over equal subdivisions. • 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 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. • Antidifferentiate using integration by parts and partial fractions techniques.

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	UNIT	Standards Addressed
Term 3	Unit 8: Applications of Integration	• 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. • Use data and Riemann summing to approximate definite integrals. • Compute arc length (function or parametric). • Compute polar area.
	Unit 7: Differential Equations	• 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. • Numerically approximate solutions to differential equations using Euler's Method. • Solve logistic differential equations and use them in modeling.
	Unit 9-10: Series and Polynomial Approximations	• Compute limits using L'Hospital's Rule. • Evaluate improper integrals (as limits of definite integrals). • Define a series as a sequence of partial sums. • Review geometric series and applications and the harmonic series. • Determine convergence or divergence of a series of constants using the Integral Test, p-Series Test, Ratio Test, Comparison Tests and the Alternating Series Test. • Interpret terms of a series as areas of rectangles and their relationship to improper integrals. • Determine error bound in the sum of an alternating series. • Write Taylor and Maclaurin Series for functions. • Understand and use graphical convergence of the Taylor and Maclaurin series. • Manipulate Taylor Series and use substitution, differentiation and antidifferentiation techniques to form new series from old series. • Find the radius and interval of convergence of power series. • Find the LaGrange error bound for Taylor polynomials.
Term 4	AP Review and Advanced Topics	

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Major Assignments	Unit Tests
Field Trips	No Field Trips
Instructional Materials	Canvas