Wyoming Department of Education Required Virtual Education Course Syllabus

Niobrara County School District # 1

Program Name	Wyoming Virtual Academy	Content Area	MA
Course ID	D-MTH-433AV2-AVT	Grade Level	9-12
Course Name	Summit Calculus-semester 1	# of Credits	0.5
SCED Code	02121E0.5012	Curriculum Type	K12 Inc

COURSE DESCRIPTION

Generally offered first semester/ This course provides a comprehensive survey of differential and integral calculus concepts, including limits, derivative and integral computation, linearization, Riemann sums, the fundamental theorem of calculus, and differential equations. Content is presented in 10 units and covers various applications, including graph analysis, linear motion, average value, area, volume, and growth and decay models. In this course students use an online textbook, which supplements the instruction they receive and provides additional opportunities to practice using the content they've learned. Students will use an embedded graphing calculator applet (GCalc) for their work on this course; the software for the applet can be downloaded at no charge.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
F.IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x).
F.IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
F.IF.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1 (n is greater than or equal to 1).
F.IF.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*
F.IF.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*
F.IF.6	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.*
F.IF.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.*
F.IF.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.*
F.IF.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.*

F.IF.7c	Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.*
F.IF.7d	(+)Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.*
F.IF.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.*
F.IF.8	Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
F.IF.8a	Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.
F.IF.8b	Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)^t, y = (0.97)^t, y = (1.01)^(12t), y = (1.2)^(t/10), and classify them as representing exponential growth and decay.
F.IF.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.
F.BF.1	Write a function that describes a relationship between two quantities.*
F.BF.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
F.BF.1b	Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.
F.BF.1c	(+)Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.
F.BF.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.*
F.BF.3	Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.
F.BF.4	Find inverse functions.
F.BF.4a	Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, f(x) =2(x^3) or f(x) = (x+1)/(x-1) for x ≠ 1 (x not equal to 1).
F.BF.4b	(+)Verify by composition that one function is the inverse of another.
F.BF.4c	(+)Read values of an inverse function from a graph or a table, given that the function has an inverse.
F.BF.4d	(+)Produce an invertible function from a non-invertible function by restricting the domain.

F.BF.5	(+)Build new functions from existing functions. Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.	
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.*	

SCOPE AND SEQUENCE		

UNIT OUTLINE	STANDARD#	OUTCOMES
		OBJECTIVES/STUDENT CENTERED GOALS
Limits and Continuity-1.01 Writing Assignment: Concept of a Limit		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.01 Concept of a Limit Quiz		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.02 Writing Assignment: Computation of a Limit		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.02 Algebraic Computation of a Limit Quiz		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.03 Writing Assignment: Limits Involving Infinity		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.

		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.03 Limits Involving Infinity Quiz		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.04 Continuity Quiz		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.05 Intermediate Value Theorem Quiz		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
		Understand the conditions and conclusions of the Intermediate Value Theorem.
Limits and Continuity-1.06 Limits and Continuity Unit Exam		Evaluate a limit graphically, numerically, and analytically.
		Use limits to describe the continuity of a function at a point.
	F.IF.4, F.IF.5, F.IF.7, F.IF.8, F.IF.9, F.BF.1, F.BF.3	Understand the conditions and conclusions of the Intermediate Value Theorem.
Derivatives-2.01 Concept of a Derivative Quiz		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.02 Writing Assignment: Differentiability		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.02 Differentiability Quiz		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.03 Graphs of f and f ' Quiz		Evaluate the derivative of a function.
		Describe the differentiability of a function.

		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.04 Writing Assignment: Motion Along a Line		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.04 Motion Along a Line Quiz		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.05 Writing Assignment: Tangent Line Approximation		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.05 Tangent Line Approximation Quiz		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
		Describe linear motion using derivatives.
Derivatives-2.06 Derivatives Unit Exam		Evaluate the derivative of a function.
		Describe the differentiability of a function.
		Understand the relationship between the graph of a function and its derivative.
		Use tangent lines to approximate function values.
	F.IF.2, F.IF.3, F.BF.1, F.BF.2, F.LE.5	Describe linear motion using derivatives.
Differentiation-3.01 Writing Assignment: Basic Computation Rules		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function

Differentiation-3.01 Basic Computation Rules Quiz		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.02 Writing Assignment: Higher Order Derivatives		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.02 Higher Order Derivatives Quiz		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.03 Writing Assignment: Product, Quotient, and Chain Rules		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.03 Product, Quotient, and Chain Rules Quiz		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.04 Writing Assignment: Implicit Differentiation		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.04 Implicit Differentiation Quiz		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Differentiation-3.05 Derivatives of Inverse Functions Quiz		Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function

Differentiation-3.06 Differentiation Unit Exam	F.IF.2, F.IF.3, F.BF.1, F.BF.2, F.LE.5, F.BF.1, F.BF.3	Find the derivative of a variety of functions using differentiation rules.
		Calculate higher-order derivatives.
		Differentiate an implicitly-defined equation.
		Calculate the derivative of an inverse function
Graph Behavior-4.01 Writing Assignment: Asymptotes and End-Behavior		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.01 Asymptotes and End-Behavior Quiz		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.02 Writing Assignment: Increasing/Decreasing Behavior and Concavity		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.02 Increasing/Decreasing Behavior and Concavity Quiz		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.03 Relative Extreme Values and Points of Inflection Quiz		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.04 Writing Assignment: Absolute Extreme Values and Extreme Value Theorem		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function

		Use limits to describe the asymptotic and end-behavior of a function
Graph Behavior-4.04 Absolute Extreme Values and Extreme Value Theorem Quiz		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.05 Graph Analysis Quiz		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
		Use graph analysis to sketch a function
Graph Behavior-4.06 Graph Behavior Unit Exam		Use limits to describe the asymptotic and end-behavior of a function
		Find intervals of increasing/decreasing behavior and concavity in a function
		Locate relative and absolute extreme values of a function
	F.IF.1-9, F.BF.1-5	Use graph analysis to sketch a function
Derivative Applications-5.01 Writing Assignment: Mean Value and Rolle's Theorems		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.01 Mean Value and Rolle's Theorems Quiz		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.02 Writing Assignment: Rates of Change		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.02 Rates of Change Quiz		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.03 Writing Assignment: Related Rates		Understand and use the Mean Value and Rolle's Theorems.

		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.03 Related Rates Quiz		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.04 Writing Assignment: Optimization		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.04 Optimization Quiz		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
		Solve optimization problems.
Derivative Applications-5.05 Derivative Applications Unit Exam		Understand and use the Mean Value and Rolle's Theorems.
		Use derivatives to model situations involving rates of change.
		Solve problems involving related rates.
	F.IF.1-9, F.BF.1-5	Solve optimization problems.