Wyoming Department of Education Required Virtual Education Course Syllabus

BIG HORN COUNTY SCHOOL DISTRICT #1

Program Name	WYCA	Content Area	Mathematics
Course ID	CAMA77663	Grade Level	9, 10, 11, 12
Course Name	AP Calculus AB B	# of Credits	0.5
SCED Code	02124E0.5012	Curriculum Type	Connections Academy

COURSE DESCRIPTION

AP Calculus AB, semester B is a college-level course covering such concepts as derivatives, integrals, limits, approximation, applications, and modeling. In the second semester, students learn integration techniques and be introduced to differential equations, along with other supplementary topics.

WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD#	BENCHMARK
A.SSE.1	Interpret expressions that represent a quantity in terms of its context.*
A.SSE.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret P(1+r)^n as the product of P and a factor not depending on P.*
A.SSE.2	Use the structure of an expression to identify ways to rewrite it. For example, see x^4 – y^4 as (x^2)^2 – (y^2)^2, thus recognizing it as a difference of squares that can be factored as (x^2 – y^2)(x^2 + y^2).
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
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.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.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
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
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.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.*
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.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
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.1	Distinguish between situations that can be modeled with linear functions and with exponential functions.*
F.LE.1a	Prove that linear functions grow by equal differences over equal intervals and that exponential functions grow by equal factors over equal intervals.*
F.LE.1b	Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.*
F.LE.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.*
F.LE.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).*
F.LE.4	For exponential models, express as a logarithm the solution to ab^(ct) = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.*
F.LE.5	Interpret the parameters in a linear or exponential function in terms of a context.*

SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES

Unit 1: Integration In this unit, you will learn about the integral. You will approximate area, learn about the Fundamental Theorem of Calculus, and integrate by substitution.	A.SSE.1b; A.SSE.2; F.IF.1; F.IF.2; F.IF.4; F.IF.5; F.IF.6; F.IF.7; F.IF.9; F.BF.1; F.BF.3; F.BF.5	•understand Integrals with Archimedes' Method of Exhaustion (numerical approximation) •understand how Archimedes' Method of Exhaustion leads to the natural use of the rectangle approximation method for the area under a curve •represent the area under a curve as a limit using sigma notation •sketch the curve of a function based upon information from its first and second derivatives and vice versa •identify the definite integral as a limit of Riemann Sums •evaluate definite integrals by interpreting them geometrically •understand the differences or similarities (depending) between area--a.k.a. "net signed area"--and the definite integral •explore the above-described concept using a graphing calculator •explore Riemann Sums and accumulated change from a Rate of Change •use integrals to define functions and explore that relationship •take the derivatives of integrals by the Fundamental Theorem of Calculus •use the Fundamental Theorem of Calculus to evaluate definite integrals
		•evaluate indefinite integrals by use of the method of substitution •evaluate definite integrals by use of the graphing calculator •evaluate definite integrals by use of the method of substitution •evaluate definite integrals by use of the graphing calculator
Unit 2: Application of Integrals In this unit, you will learn more applications of the integral.	A.SSE.1b; A.SSE.2; F.IF.1; F.IF.4; F.IF.5; F.IF.6; F.IF.7; F.IF.9; F.BF.1; F.BF.5	find the area between two curves using definite integrals •explore the area between two curves using technology •explore and understand the Mean Value Theorem for Integrals •find the average value of a function •explore Rectilinear Motion with Integrals •explore General Motion of Objects (distance, displacement, velocity, speed, and acceleration) •evaluate constants of integration given an initial condition
Unit 3: Differential Equations and More Riemann Sums In this unit, you are introduced to differential equations and their applications. You will also learn about slope fields and how to use approximation techniques to evaluate definite integrals.	A.SSE.1b; A.SSE.2; F.IF.1; F.IF.4; F.IF.5; F.IF.6; F.IF.7; F.IF.9; F.BF.1; F.BF.5	•evaluate constants of integration given an initial condition •solve separable differential equations •model various applications using separable differential equations, with particular focus on the study of the equation $y' = ky$ and exponential growth •draw a slope field (or direction field) for a differential equation •interpret a slope field when given it •interpret the solution curve attached to an initial value •use numerical approximation techniques to evaluate definite integrals, where appropriate, including the area

Unit 4: Supplemental Topics In this unit, you will bring all of your knowledge together and apply it to new topics. You will learn about the relationships between graphs, relationships between functions, and how to work with improper integrals.	A.SSE.1; A.SSE.1b; A.SSE.2; A.CED.2; F.IF.1; F.IF.4; F.IF.5; F.IF.6; F.IF.7; FIF.7e; F.IF.9; F.BF.1; F.BF.5; F.LE.1; F.LE.1a; F.LE.1b; F.LE.1c; F.LE.2; F.LE.4; F.LE.5	•describe and explore the relationship and/or characteristics between the graphs of f, f ', and f". •compare and contrast the relative growth rate functions, including polynomial, exponential and logarithmic growth. •use integrals to define functions •explore the relationship of functions defined by integrals •explore accumulated change from a rate of change as an application of integrals •use Riemann Sums and trapezoidal sums to approximate definite integrals of functions represented by tables of values •explore functions defined by integrals
Unit 5: Exam Preparation In this unit, you will learn about the structure of the AP Exam and will practice exam questions to prepare for the exam.		•format of the AP exam test taking techniques for taking the multiple choice part of the exam •question types to expect on the multiple choice part of the exam •learn which calculator models may be used on the exam •understand which calculator operations are permitted •understand the degree of accuracy required on the exam •understand the format of free-response questions (FRQ) on the exam •review a list of topics frequently tested in the FRQ section •review a list of common mistakes made on the exam •understand how the AB score is computed