Wyoming Department of Education Required Virtual Education Course Syllabus

Sweetwater County School District # 1

Course Information	
Program Name	Sweetwater County School District #1 Online Learning
Course ID	MA4762FV
Course Name	Pre-Calculus Trigonometry Semester 1
SCED Code	02110G0.5012
Content Area	Mathematics
Grade Level	9-12
# of Credits	.5
Curriculum Type	District Developed
Please give a concise description of this course including the purpose and what students will demonstrate and/or gain from this course.	
Pre-calculus Trigonometry Semester 1 is intended to provide the mathematical background needed for Pre-calculus Trigonometry Semester 2. This course will provide a general introduction to functions, operations with function, inverse functions, and graphs of functions using standard graphs with transformations. It will include an extensive study of linear functions, polynomial functions (including new methods of solving polynomial equations), rational and radical functions, and exponential and logarithmic functions. The course will include extensive use of the graphing calculators.	

Wyoming Content and Performance Standards	
Standard	**BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets**
N.RN.3	"Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational."
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.3	"Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the

Wyoming Content and Performance Standards	
	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.*"
F.BF.1	"Write a function that describes a relationship between two quantities."
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.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)."
A.SSE.4	"Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*"
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."
A.REI.10	"Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line)."
A.REI.4a	"Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form."
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.8	"Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function."
A.REI.11	"Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions."
A.REI.7	"Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$."
A.REI.8	"Represent a system of linear equations as a single matrix equation in a vector variable."
A.REI.12	"Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the

Wyoming Content and Performance Standards	
	case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes."
F.IF.7b	"Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions."
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.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.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.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."
S.ID.7	"Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data."
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.LE.1	"Distinguish between situations that can be modeled with linear functions and with exponential functions."
A.APR.2	"Know and apply the Remainder Theorem: For a polynomial *p*(*x*) and a number *a*, the remainder on division by *x* - *a* is *p*(*a*), so *p*(*a*) = 0 if and only if (*x* - *a*) is a factor of *p*(*x*)."

Wyoming Content and Performance Standards	
A.APR.3	"Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial."
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."
A.REI.4	"Solve quadratic equations in one variable."
N.CN.1	"Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real."
N.CN.2	"Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers."
N.CN.3	"Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers."
N.CN.7	"Solve quadratic equations with real coefficients that have complex solutions."
N.CN.8	"Extend polynomial identities to the complex numbers. *For example, rewrite* $x^2 + 4$ *as* $(x + 2i)(x – 2i)$."
N.CN.9	"Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials."
N.RN.1	"Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5*."
N.RN.S	"Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational."
F.LE.1	"Distinguish between situations that can be modeled with linear functions and with exponential functions."
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.3	"Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function."
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."

Wyoming Content and Performance Standards	
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."
A.SSE.3c	"Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.*"

Scope and Sequence		
Unit Outline	**Standard #**	**Outcomes** **Objectives/Student Centered Goals**
Number Patterns: Real numbers, relations, and functions Mathematical patterns Arithmetic sequences Lines Linear models Geometric sequences	N.RN.3 F.IF.5 F.IF.3 F.BF.1 F.BF.2 F.LE.2 A.SSE.4 F.BF.3	Students will learn about the real number system, relations, and functions. Students will study different number patterns including arithmetic and geometric sequences, and review the concepts of lines and linear models.
Equations and inequalities: Solving equations graphically Solving quadratic equations algebraically Applications of equations Other types of equations	A.REI.10 A.REI.4a F.IF.7 F.IF.8 A.REI.11 A.REI.7 A.REI.8 A.REI.12 F.IF.7b	Students will solve equations and inequalities. Students will use algebraic, graphical, and geometric techniques. Equations and inequalities will involve expressions of the following types: polynomial (including quadratic), absolute value, radical, and rational. Students will solve real world problems from each type of equations and inequalities.
Functions and graphs:	F.IF.1 F.IF.2	Students will study functions and their graphs, transformations, operations on functions, inverse functions, and rates of change.

Scope and Sequence		
Functions Graphs of functions Quadratic function Graphs and transformations Operations on functions Inverse functions Rates of change	F.IF.4 F.IF.5 F.IF.7 F.BF.3 S.ID.7 F.IF.6 F.LE.1	
Polynomial and rational functions: Polynomial functions Real zeros Rational functions Complex numbers The Fundamental Theorem of Algebra	A.APR.2 A.APR.3 F.IF.7c F.IF.7d A.REI.4 N.CN.1 N.CN.2 N.CN.3 N.CN.7 N.CN.8 N.CN.9	Students will learn about polynomial functions and their quotients called rational functions. Students will study their graphs, zeros (both real and complex), and applications.
Exponential and logarithmic functions: Radicals and rational exponents Exponential functions Applications of exponential functions Common and natural logarithmic functions Properties and laws of logarithms Solving exponential and logarithmic equations	N.RN.1 N.RN.S F.LE.1 F.LE.2 F.LF.3 F.LE.4 F.IF.7 F.IF.7e F.IF.8 A.SSE.3c	Students will explore radicals, rational exponents, and exponential functions. Students will study common and natural logarithms, including their properties and laws, as well as logarithmic functions to other bases. Students will solve exponential and logarithmic equations, and solve real world applications with these models.