Wyoming Department of Education
Required Virtual Education Course Syllabus

2201000 - Washakie County School District No. 1

Program Name	Washakie #1 Online	Content Area	MA
Course ID	W02056G0.5022	Grade Level	10 - 12
Course Name	WOL-Algebra II-B	# of Credits	0.5
SCED Code	02056G0.5022	Curriculum Type	K-12 Fuel Education

COURSE DESCRIPTION

This course builds upon algebraic concepts covered in Algebra I and prepares students for advanced level courses. Students extend their knowledge and understanding by solving open-ended problems and thinking critically. Topics include conic sections, functions and their graphs, quadratic functions, inverse functions, and advanced polynomial functions. Students are introduced to rational, radical, exponential, and logarithmic functions; sequences and series; and data analysis. Students work on additional challenging assignments, assessments, and research projects.

WYOMING CONTENT AND PERFORMANCE STANDARDS	
STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
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).
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.
A.APR.7	(+)Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
A.CED.1	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*
A.CED.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.*
A.CED.3	Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*
A.CED.4	Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.*
A.REI.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
A.REI.2	Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
A.REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
A.REI.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
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.*
F.BF.1a	Determine an explicit expression, a recursive process, or steps for calculation from a context.
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.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.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.7c	Graph polynomial functions, identifying zeros 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.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.
G.GMD.4	Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.
G.GPE.1	Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.
G.GPE.2	Derive the equation of a parabola given a focus and directrix.

WYOMING CONTENT AND PERFORMANCE STANDARDS	
STANDARD#	BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets
G.GPE.3	(+)Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.
G.GPE.5	Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
N.CN.8	(+)Extend polynomial identities to the complex numbers. For example, rewrite x^2 + 4 as (x + 2i)(x – 2i).
N.Q.2	Define appropriate quantities for the purpose of descriptive modeling.*
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) x 3] to hold, so [5^(1/3)]^3 must equal 5.
N.RN.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N.VM.1	(+)Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v(bold), |v|, ||v||, v(not bold)).
N.VM.10	(+)Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
N.VM.11	(+)Multiply a vector (regarded as a matrix with one column) by a matrix of suitable dimensions to produce another vector. Work with matrices as transformations of vectors.
N.VM.12	(+)Work with 2 X 2 matrices as transformations of the plane, and interpret the absolute value of the determinant in terms of area.
N.VM.6	(+)Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
N.VM.7	(+)Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
N.VM.8	(+)Add, subtract, and multiply matrices of appropriate dimensions.
N.VM.9	(+)Understand that, unlike multiplication of numbers, matrix multiplication for square matrices is not a commutative operation, but still satisfies the associative and distributive properties.
S.CP.1	Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or compliments of other events ("or," "and," "not").
S.CP.2	Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.*
S.CP.3	Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.*
S.CP.5	Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*
S.CP.6	Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.*
S.CP.7	Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.*
S.CP.8	(+)Apply the general Multiplication Rule in a uniform probability model, P(A and B) = [P(A)]x[P(B|A)] =[P(B)]x[P(A|B)], and interpret the answer in terms of the model.*
S.IC.1	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.*
S.IC.2	Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0. 5. Would a result of 5 tails in a row cause you to question the model?*
S.IC.3	Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.*
S.ID.1	Represent data with plots on the real number line (dot plots, histograms, and box plots).*
S.ID.2	Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.*
S.ID.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).*
S.ID.4	Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.*
S.ID.6c	Fit a linear function for a scatter plot that suggests a linear association.*
S.ID.7	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.*

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Semester 2		
Unit 1: Solving and Graphing Polynomials • Semester Introduction • Polynomial Long Division • Synthetic Division • The Polynomial Remainder Theorem • Factors and Rational Roots • Graphing Polynomials • Factoring Polynomials Completely • Applications: Polynomials	N-CN.8 A-APR.2,3 A-CED.4 F-IF.4,7c	• Complete the Semester Opener. • Solve quadratic equations by factoring. • Divide whole numbers using long division. • Divide polynomials using long division. • Determine if polynomials are factors of other polynomials using long division. • Determine polynomials are factors of other polynomials using long division. • Divide polynomials using synthetic division. • Use the polynomial remainder theorem to evaluate and graph polynomial functions. • Dvide polynomials using long division. • Divide polynomials using synthetic division. • Use the polynomial remainder theorem to evaluate and graph polynomial functions. • Determine if polynomials are factors of other polynomials using long division. • Use the factor theorem to factor polynomial expressions and find roots of polynomial equations. • Use the rational root theorem to factor and find zeros of polynomial expressions. • Use graphs to determine roots of polynomial equations. • Draw or describe graphs of polynomial functions, including end behavior. • Describe the end behavior of the graph of a function. • Draw or describe graphs of polynomial functions (including end behavior). • Use intersections of graphs of functions to solve equations in a single variable. • Find the multiplicity of roots of polynomial equations. • Find the number of rational, real, and complex roots of a polynomial equation. • Factor polynomial expressions completely. • Use polynomials to model and solve real-world problems.
Unit 2: Exponents and Logarithms • Exponential Expressions and Equations, Part 1 • Exponential Expressions and Equations, Part 2 • Graphing Exponential Functions • Applications: Growth and Decay • Logarithms • Using Logs to Solve Exponential Equations • Solving Logarithmic Equations • Graphing Logarithmic Functions • Applications: Logarithms	N-RN.1,2 N-Q.2 A-SSE.3c A-APR.7 A-CED.1,2,3 A-REI.1,3,11 F-IF.7e,8b F-BF.1a,3,5 F-LB.1a.1c,2,3,4,5	• Convert between simple radical form and rational exponent form. • Simplify expressions using the smallest index possible. • Simplify expressions involving rational exponents. • Solve exponential equations using the property of equality for exponential equations. • Draw and/or describe graphs of exponential functions. • Find equations of exponential functions, given the graph. • Understand that exponential functions increase more rapidly for large values of x when compared to linear, quadratic, and polynomial functions. • Simplify expressions involving rational exponents. • Convert between simple radical form and rational exponent form. • Simplify expressions using the smallest index possible. • Solve exponential equations using the property of equality for exponential equations. • Draw and/or describe graphs of exponential functions. • Find equations of exponential functions, given the graph.

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
		• Solve problems involving exponential growth and decay. • Convert between logarithmic and exponential forms. • Simplify and evaluate logarithmic expressions. • Solve exponential equations using logarithms. • Create exponential equations and use them to solve problems. • Solve logarithmic equations. • Draw and/or describe graphs of logarithmic functions. • Find equations of logarithmic functions, given the graph. • Solve problems involving logarithms.
Unit 3: Sequences and Series • Sequences and Patterns • Arithmetic Sequences • Geometric Sequences • Applications: Sequences • Series and Sigma Notation • Arithmetic Series • Geometric Series • Applications: Series • Technology: Sequences and Series	A-SSE.4 F-IF.3,9	• Use recursive rules to find terms of sequences. • Use iterative rules to find terms of sequences. • Find common differences and nth terms of arithmetic sequences. • Graph arithmetic sequences in the coordinate plane. • Find common ratios and nth terms of geometric sequences. • Graph geometric sequences in the coordinate plane. • Identify real-world situations that can be described using arithmetic or geometric sequences. • Use recursive rules to find terms of sequences. • Use iterative rules to find terms of sequences. • Find common differences and nth terms of arithmetic sequences. • Graph arithmetic sequences in the coordinate plane. • Find common ratios and nth terms of geometric sequences. • Determine if sequences are arithmetic, geometric, or neither. • Solve problems involving arithmetic and geometric sequences. • Write a series (in sigma notation) in expanded form and find the sum. • Represent a series using sigma notation. • Given a series in sigma notation, write a series in expanded form and find the sum. • Find the partial sum of an arithmetic series. • Find the partial sum of a geometric series. • Determine if a series is arithmetic, geometric, or neither. • Solve problems involving arithmetic and geometric series. • Use technology to compute terms of arithmetic and geometric sequences. • Use technology to compute partial sums of arithmetic and geometric series.
Unit 4: Counting and Probability • Counting Principles • Permutations and Factorials • Combinations • Basic Probability • Probability with and Without Replacement • Independent and Dependent Events • Mutually Exclusive Events • Binomial probability • Making Predictions	A-CED.3 A-REI.3 S-IC.2 S-CP.1,2,3,5,6,7,8	• Use tree diagrams to solve counting problems. • Use addition and multiplication counting principles to solve problems. • Evaluate factorial expressions. • Write and evaluate permutation expressions to solve problems. • Write and evaluate combination expressions to solve problems. • Use the binomial theorem to expand powers of binomial expressions. • Use the binomial theorem to find nth terms of binomial expansions.

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
		• Find probabilities of simple and compound events. • Find probabilities of events involving permutations. • Find probabilities of events involving combinations. • Use tree diagrams to find probabilities of events. • Use multiplication rules to find probabilities of events. • Find probabilities of independent events. • Find probabilities of dependent events. • Determine whether events are independent or dependent and find their probabilities. • Find probabilities of unions of events. • Determine if events are complementary. • Determine if experiments are binomial experiments. • Determine if events are complementary. • Find binomial probabilities. • Find and use experimental probabilities to make predictions. • Determine whether the law of large numbers applies to problem situations.
Unit 5: Statistics • Measures of Center • Variability • Samples • Graphs of Univariate Data • Frequency Distributions • The Normal Distribution • Lines of Best Fit	S-ID.1,2,3,4,6c,7 S-IC.1,3	• Find the mean, median, and mode of data sets. • Use stem-and-leaf plots to represent and analyze data. • Find weighted averages of numbers. • Find the five-number summary of sets of data. • Draw box-and-whisker plots for data sets. • Find the range, variance, and standard deviation of data sets. • Identify sampling methods used in sampling situations. • Determine if a sampling method is biased. • Use samples to make predictions about populations. • Identify sampling methods used in sampling situations. • Determine if a sampling method is biased. • Use samples to make predictions about populations. • Find the mean, median, and mode of data sets. • Use stem-and-leaf plots to represent and analyze data. • Find the five-number summary of sets of data. • Draw and interpret bar graphs. • Draw and interpret line graphs. • Use stem-and-leaf plots to represent and analyze data. • Construct and interpret frequency tables. • Draw and interpret histograms. • Determine whether distributions are normal. • Use properties of normally distributed data to solve problems. • Calculate percentile scores. • Find the z-score for data sets and use it to solve problems. • Describe the correlation between two variables in a scatter plot, if it exists. • Find equations of lines of best fit for data sets, and use them to make predictions.
Unit 6: Vectors and Matrices • Matrices and Vectors • Operations with Matrices • Matrix Multiplication • Transforming Points and Figures • Determinants and Cramer's Rule, Part 1 • Determinants and Cramer's Rule, Part 2 • Identity and Inverse Matrices	N-VM.1,6,7 N-VM.8,9,1011,12 A-REI.5	• Find the dimensions of a matrix and determine if it is a vector. • Use rows and columns to determine the location of elements of matrices. • Represent and solve real-world problems using matrices. • Represent and solve real-world problems using a matrix. • Add and subtract matrices. • Multiply a matrix by a scalar.

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
• Using Matrices to Solve Linear Systems		• Solve real-world problems involving matrix addition, matrix subtraction, and scalar multiplication. • Represent and solve real-world problems involving matrix addition, matrix subtraction, and scalar multiplication. • Find the dimensions of a matrix and determine if it is a vector. • Use rows and columns to determine the location of elements of matrices. • Add and subtract matrices. • Multiply a matrix by a scalar. • Solve real world problems involving matrix addition, matrix subtraction, and scalar multiplication. • Multiply matrices. • Simplify matrix expressions involving multiple operations. • Represent and solve real-world problems involving matrix multiplication. • Represent and solve real-world problems using a matrix. • Use scalar or matrix multiplication to represent transformations of points and figures in the coordinate plane. • Use augmented matrices to represent translations of points and figures in the coordinate plane. • Use matrix multiplication to represent reflections and rotations of figures in the coordinate plane. • Find the determinant of a 2 x 2 matrix. • Use Cramer's rule to solve systems of two linear equations • Find the determinant of a 3 x 3 matrix. • Use Cramer's rule to solve systems of three linear equations. • Determine the multiplicative identity matrix for a given matrix. • Determine if two matrices are inverses of each other. • Find the inverse of a matrix. • Solve a system of linear equations by writing and solving a related matrix equation.
Unit 7: Conic Sections • Introduction to Conic Sections • Circles • Ellipses • Hyperbolas • Parabolas • Putting Conics into Graphing Form, Part 1 • Putting Conics into Graphing Form, Part 2	A-REI.2 G-GPE.1,2,3,5 G-GMD.4	• Identify the conic section that results from the intersection of a cone and a plane. • Find the distance and midpoint between two points. • Determine the equation of a circle, given the center and radius. • Draw the graph of a circle given its equation, and determine the center and radius. • Solve problems involving circles. • Identify the conic section that results from the intersection of a cone and a plane. • Find the distance and midpoint between two points. • Determine the equation of a circle, given the center and radius. • Draw the graph of a circle given its equation, and determine the center and radius. • Solve problems involving circles. • Solve problems involving ellipses. • Determine the equation of an ellipse, given its graph. • Draw the graph of an ellipse and identify its center, the lengths of it major and minor axes, and its foci. • Draw the graph of an ellipse and identify its center, and the lengths of its major and minor axes. • Find the coordinates of the foci of an ellipse.

SCOPE AND SEQUENCE		
UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
		• Solve problems involving hyperbolas. • Draw the graph of a hyperbola and identify its center, the lengths of its transverse and conjugate axes, its asymptotes, and its foci. • Draw the graph of a hyperbola and identify its center, the lengths of its transverse and conjugate axes, and its asymptotes. • Determine the equation of a hyperbola, given its graph. • Find the coordinates of the foci of a hyperbola. • Identify the conic section that results from the intersection of a cone and a plane. • Solve problems involving parabolas. • Draw the graph of a parabola and identify the vertex, focus, focal length, and equation of the directrix. • Determine the equation of a parabola, given its graph. • Determine if the equation in general form of a conic section represents a circle, ellipse, hyperbola, or parabola. • Convert an equation of a conic section in general form to graphing form.
Unit 8: Semester Review and Test • Semester Review • Semester Test		