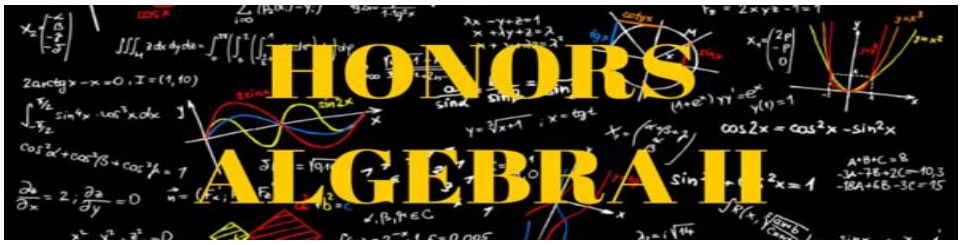
NFC ACADEMY



COURSE OVERVIEW

Algebra II Honors is a full-year, high school math course intended for the student who has successfully completed the prerequisite course Algebra I. This course focuses on algebraic techniques and methods in order to develop student understanding of advanced number theory, concepts involving linear, quadratic and polynomial functions, and pre-calculus theories. This course also integrates geometric concepts and skills throughout the units, as well as introducing students to basic trigonometric identities and problem solving.

OBJECTIVES

- **SET, STRUCTURE, AND FUNCTION**: Student will review the properties of sets and functions, determine the domains, ranges and inverses of functions, and simplifying expressions by combining like terms, exponent rules for multiplication and division and exponents.
- **NUMBERS, SENTENCES, AND PROBLEMS**: Student will solve linear equations and inequalities using multiplication, addition, and distributive properties, graph absolute value, and compound equations and inequalities, and problems involving rate, distance, and time.
- **LINEAR EQUATIONS AND INEQUALITIES**: Student will determine the slope of a line and use that information to write an equation, compare lines, and solve a system of equations using the addition property of equality, the substitution property of equality, and graphical methods.
- **POLYNOMIALS**: Student will factor trinomials using the difference of two squares, the product of the sum of two perfect cubes, perfect square

trinomials, and the difference of two cubes, and solve problems involving direct variation, inverse variation and joint or combination variation.

- **ALGEBRAIC FRACTIONS**: Student will reduce fractions, add and subtract fractions, and change mixed numbers and complex fractions to simple algebraic fractions, and solve equations that contain algebraic fractions, variables in the denominator of a fraction, and mixture problems.
- **REAL NUMBERS**: Student will evaluate and simplify radical expressions and fractional exponent expressions, and solve quadratic equations by the factoring method, and by completing the square.
- **QUADRATIC RELATIONS AND SYSTEMS**: Student will determine the major components of different conic sections, write their equations, solve and graph them.
- **EXPONENTIAL FUNCTIONS**: Student will evaluate and simplify equations in logarithmic form, exponential form, graph them, and use matrices to solve a system of equations.
- **COUNTING PRINCIPLES**: Student will differentiate between a finite and an infinite series, and between an arithmetic and a geometric series, calculate the number of permutations or combinations of r elements from a set of n elements, and use the counting principle, conditional probability, and multiplication principle to calculate the probability of complex events.
- **TRIGONOMETRY**: Student will understand the relationships of trig functions and use Pythagorean identities to determine specific values.
- **STATISTICS**: Student will understand how sampling is used to gather information, distinguish between non-random, and random samples and what kinds of bias they employ, and solve problems with linear, quadratic, and exponential models.

CURRICULUM & SKILL FOCUS

UNIT 1: SET, STRUCTURE, AND FUNCTION

- Count the number of elements in a set, find the subsets of a set, and find the intersection or union of two sets.
- Review the axioms and properties of Algebra, the mathematical operations. (+, -, •, /), the distributive property, and order of operations.
- Identify functions and relations and tell the difference between them.
- Find the domain and range of a function and determine whether or not a given graph represents a function.
- Evaluate a function at any point and find the inverse of a function or set of ordered pairs.
- Evaluate expressions, including negative and zero exponents, and simplify them, combining like terms.
- Review exponent rules for multiplication and division of like bases, and exponentiation of powers.

UNIT 2: NUMBERS, SENTENCES, AND PROBLEMS

- Review addition and multiplication of signed numbers.
- Solve linear equations and inequalities using multiplication, addition, and distributive properties.
- Differentiate between the multiplication property of inequality and the multiplication property of equality.
- Express the solutions of single variable inequalities using a line graph.
- Solve and graph absolute value, and compound equations and inequalities.
- Solve problems involving rate, distance, and time.

UNIT 3: LINEAR EQUATIONS AND INEQUALITIES

- Identify linear and nonlinear equations.
- Determine if two lines are parallel or perpendicular, or if a line is horizontal or vertical.
- Write the point-slope form of parallel lines, perpendicular lines, a line given the slope and a point on the line, and a line that passes through two given points.

- Write equations of a line in general form, point-slope, and slope-intercept form.
- Find the x and y intercepts by inspecting the general form of a line.
- Solve a system of two equations by using the addition property of equality, the substitution property of equality, and graphical methods.
- Graph the solution sets for linear equations or inequalities.

UNIT 4: POLYNOMIALS

- Multiply binomials and trinomials.
- Find special products such as the perfect square trinomial.
- Factor trinomials using the difference of two squares, the product of the sum of two perfect cubes, perfect square trinomials, and the difference of two cubes.
- Add and subtract polynomials and perform long division of polynomials.
- Use shorthand 'synthetic' division to divide two polynomials.
- Solve word problems that involve direct variation of two quantities, inverse variation of two quantities, and joint or combination variation of three quantities.

UNIT 5: ALGEBRAIC FRACTIONS

- Simplify and evaluate algebraic expressions.
- Reduce fractions, add and subtract fractions, and change mixed numbers and complex fractions to simple algebraic fractions.
- Add, subtract, multiply and divide algebraic expressions.
- Find the common denominator of algebraic fractions.
- Solve equations that contain algebraic fractions, variables in the denominator of a fraction, and mixture problems.
- Solve proportions of algebraic equations that have one variable.

UNIT 7: REAL NUMBERS

- Write the fractional equivalent of a rational decimal number.
- Change a radical expression to the equivalent expression with fractional exponents.

- Evaluate and simplify radical expressions and fractional exponent expressions.
- Use conjugates to rationalize the denominator of an algebraic expression.
- Solve quadratic equations by the factoring method, and by completing the square.
- Determine the sum and product of the roots of a quadratic equation.
- Find the discriminant of a quadratic equation and use it to determine what kinds of solutions a quadratic equation has.

UNIT 8: QUADRATIC RELATIONS AND SYSTEMS

- Use the distance formula to find the distance between two points.
- Find the radius and center of a circle from its equation, and write the equation of a circle, given its center and radius.
- Find the length of the major axis, length of the minor axis, foci, and equation of an ellipse, and graph an ellipse given an equation.
- Find the directrix, and focus of a given parabola, and graph it.
- Write the equation of a hyperbola and graph it.
- Identify a quadratic equation as a circle, parabola, hyperbola, or ellipse.
- Solve and graph a system of equations or inequalities.
- Find the conic section, and its equation, that represents a physical situation.

UNIT 9: FUNCTIONS

- Evaluate and simplify exponential functions, and expressions with fractional exponents.
- Express an exponential equation in logarithmic form, and a logarithmic function in exponential form.
- Evaluate logarithmic functions.
- Express decimal numbers in scientific notation.
- Use change of base formula to evaluate common logarithms, solve exponential equations and graph them.
- Identify entries in a matrix by row and column and use the matrix method to solve a system of equations.
- Perform addition or subtraction of matrices.

UNIT 10: COUNTING PRINCIPLES

- Indicate the general term of a sequence and find the nth term.
- Differentiate between a finite and an infinite series, and between an arithmetic and a geometric series.
- Use summation notation and evaluate factorial expressions.
- Calculate the number of permutations or combinations of r elements from a set of n elements.
- Demonstrate knowledge of the pattern of Pascal's triangle and use it to find powers of binomials.
- Use the counting principle, conditional probability, and multiplication principle to calculate the probability of complex events.
- Define independent and dependent events.

UNIT 11: TRIGONOMETRY

- Express trigonometric functions as ratios in terms of the sides of a right triangle.
- Use the Pythagorean theorem and trigonometric ratios to calculate side measures in right triangles.
- Express a trig function, and a reciprocal trig function, of a non-acute angle, in degrees and in radians, in terms of an acute angle.
- Determine the exact trig function values and reciprocal trig functions for the 30°, 45°, and 60° angles.
- Convert between the degree and radian measure.
- Use the Pythagorean identities to determine the remaining trigonometric function values of an angle in standard position when one trigonometric value and sign of another, or one trigonometric value and quadrant the angle lies in, are known.
- Determine the amplitude, frequency and period of a sine or cosine function from the equation, or the graph.
- Determine the amplitude, period, phase shift, and vertical shift of sinusoidal functions, and graph, or identify the graph of, a sinusoidal function.

UNIT 12: STATISTICS

- Understand how sampling is used to gather information about an entire population, and how a normal distribution can be used to make decisions.
- Distinguish between non-random and random samples of a population and understand how non-random samples increase bias and random samples decrease bias.
- Determine normal distribution from a histogram and/or a data table and calculate the variance and standard deviation of a data set.
- Find the sample mean of data that is used to model a population mean and decide if the margin of error justifies the use of the sample mean to represent the population mean.
- Use a table or graph to determine the appropriate model for the data.
- Use technology to model quadratic and square root equations given a table of data.
- Use regression methods available through technology to write linear functions, quadratic functions, and exponential functions from a set of data
- Make predictions and solve problems with linear, quadratic, and exponential models created by technology.

PERFORMANCE TASKS

Each unit of study has Performance Tasks which are a part of the regular assignments for honor's courses. Students are expected to complete all sections of each Performance Tasks successfully.

REQUIRED RESOURCES

Some assignments in this course require the use of resources that must be supplied by the user. These outside resources are listed by assignment.

ALGEBRA II		
Unit	**Assignment Title**	**Supply List**

All	All Assignments	Scratch Paper/Notebook Scientific or Graphing Calculator

GRADING INFORMATION

GRADING COMPONENTS

Lessons	40%
Quizzes	30%
Tests	30%

GRADING SCALE

100-90	A
89-80	B
79-70	C
69-60	D
Below 60	F