Syllabus for Advanced Algebra

 This class is designed to further develop algebraic skills and prepare students for more advanced mathematics. This class focuses on a basic understanding of functions, what they do and basic function equations. The understanding of linear, quadratic, hyperbolic and exponential functions is explored. Alternative methods for solutions are learned using matrices and their applications. This class deals with how to manipulate and solve basic equations using more advanced algebraic techniques and how to rationalize reasonable solutions considering any possible restraints. Several applications use actual data so students can learn to derive equations from collected information.

Topic: Functions

 Concepts: The Language of Algebra

 Relations and Functions

 Function Notations

 Graphs of Functions

 Using Graphs and Tables of Functions

 Solving Equations

 Rewriting formulae

 Explicit Formulae for Sequences

Topic: Variations and Graphs

 Concepts: Direct Variation

 Inverse Variation

 The Fundamental Theorem of Variation

 The Graph of y = kx

 The Graph of y = kx2

 The Graphs of y = k/x and y = k/x2

 Fitting a Model to Data I

 Fitting a Model to Data II

 Combined and Joint Variation

Topic: Linear Functions

 Concepts: Constant Change and the graph of y = mx + b

 Linear Combinations and Ax + By = C

 The Graph of Ax + By = C

 Finding an Equations of a Line

 Fitting a Line to Data

 Recursive Formulae for Sequences

 Graphs of Sequences

 Formulae for Linear (Arithmetic) Sequences

 Step Functions

Topic: Matrices

 Concepts: Storing Data in Matrices

 Matrix Addition

 Matrix Multiplication

 Matrices for Size Changes

 Matrices for Scale Changes

 Matrices for Reflections

 Transformations and Matrices

 Matrices for Rotations

 Rotations and Perpendicular Lines

 Translations and Parallel Lines

Topic: Systems

 Concepts: Inequalities and Compound Sentences

 Solving Systems Using Tables or Graphs

 Solving Systems Using Substitution

 Solving Systems Using Linear Combinations

 Inverses of Matrices

 Solving Systems Using Matrices

 Graphing Inequalities in the Coordinate Plane

 Systems of Linear Inequalities

 Linear Programming

Topic: Quadratic Functions

 Concepts: Quadratic Expressions, Rectangles and Squares

 Absolute Value, Square Roots, and Quadratic Equations

 The Graph-Translation Theorem

 Graphing y = ax2 + bx + c

 Completing the Square

 Fitting a Quadratic Model to Data

 The Quadratic Formula

 Pure Imaginary Numbers

 Complex Numbers

 Analyzing Solutions to Quadratic Equations

Topic: Powers

 Concepts: Power Functions

 Properties of Powers

 Negative Integer Exponents

 Compound Interest

 Geometric Sequences

 nth roots

 Positive Rational Exponents

 Negative Rational Exponents

Topic: Inverses and Radicals

 Concepts: Composition of Functions

 Inverses of Relations

 Properties of Inverse Functions

 Radical Notation for nth Roots

 Products with Radicals

 Quotients with Radicals

 Powers and Roots of Negative Numbers

 Solving Equations with Radicals

Topic: Exponential and Logarithmic Functions

 Concepts: Exponential Growth

 Exponential Decay

 Continuous Compounding

 Fitting Exponential Models to Data

 Common Logarithms

 Logarithmic Scales

 Logarithms to Bases Other Than 10

 Natural Logarithms

 Properties of Logarithms

 Using Logarithms to Solve Exponential Equations

Topic: Polynomials

 Concepts: Introduction to Polynomials

 Multiplying Polynomials

 Quick-and-Easy Factoring

 The Factor Theorem

 The Rational-Root Theorem

 Solving all Polynomial Equations

 Finite Differences

 Modeling Data with Polynomials