Algebra II introduces students to advanced functions, with a focus on developing a strong conceptual grasp of the expressions that define those functions. Students learn through discovery and application, developing the skills they need to break down complex challenges and demonstrate their knowledge in new situations.

Course topics include quadratic equations and functions; polynomial functions; rational expressions and functions; radical expressions and functions; exponential and logarithmic functions; modeling with functions; graphing and modeling data; inferential statistics; confidence intervals; and matrices.

This course supports all students as they develop computational fluency and deepen conceptual understanding. Students begin each lesson by discovering new concepts through guided instruction, then confirm their understanding in an interactive, feedback-rich environment. Modeling activities equip students with tools for analyzing a variety of real-world scenarios and mathematical ideas. Journaling activities allow students to reason abstractly and quantitatively, construct arguments, critique reasoning, and communicate precisely. Performance tasks prepare students to synthesize their knowledge in novel, real-world scenarios and require that they make sense of multifaceted problems and persevere in solving them.

This course is built to state standards.

Length: Two semesters

UNIT 1: EXPRESSIONS, EQUATIONS AND INEQUALITIES

- Lesson 1: Algebraic Expressions
- Lesson 2: Solving Linear Equations
- Lesson 3: Solving Linear Inequalities
- Lesson 4: Solving Absolute Value Equations and Inequalities
- Lesson 5: Solving Literal Equations and Formulas
- Lesson 6: Expressions, Equations, and Inequalities Wrap-Up

UNIT 2: FUNCTIONS AND RELATIONS

- Lesson 1: What Is a Function?
- Lesson 2: Graphing Functions
- Lesson 3: Linear Functions
- Lesson 4: Linear Equations and Inequalities
- Lesson 5: Linear Systems
- Lesson 6: Functions and Relations Wrap-Up

UNIT 3: QUADRATIC FUNCTIONS

- Lesson 1: Factoring $x^2 + bx + c$
- Lesson 2: Factoring $ax^2 + bx + c$
- Lesson 3: Special Cases
- Lesson 4: Solving Quadratic Equations
- Lesson 5: Completing the Square
- Lesson 6: The Quadratic Formula
- Lesson 7: Graphs of Quadratic Functions
- Lesson 8: Imaginary Numbers
- Lesson 9: Conic Sections: Parabolas
- Lesson 10: Nonlinear Systems of Equations
- Lesson 11: Nonlinear Systems of Inequalities

- Lesson 12: Quadratic Functions Wrap-Up

UNIT 4: TRANSFORMING FUNCTIONS

- Lesson 1: Inverses
- Lesson 2: Graphs of Inverses
- Lesson 3: Parent Functions
- Lesson 4: Shifting Functions
- Lesson 5: Stretching Functions Vertically
- Lesson 6: Transformation of Parent Functions
- Lesson 7: Arithmetic of Functions
- Lesson 8: Performance Task: Transforming Functions
- Lesson 9: Transforming Functions Wrap-Up

UNIT 5: POLYNOMIAL FUNCTIONS

- Lesson 1: Polynomial Basics
- Lesson 2: Polynomial Functions
- Lesson 3: Synthetic Division
- Lesson 4: Factoring Polynomials Completely
- Lesson 5: Solving Polynomial Equations
- Lesson 6: Graphing Polynomial Functions
- Lesson 7: Polynomial Identities
- Lesson 8: Binomial Theorem
- Lesson 9: Transformations of Polynomial Functions
- Lesson 10: Polynomial Functions Wrap-Up

UNIT 6: SEMESTER 1 EXAM

- Lesson 1: Semester 1 Exam

UNIT 7: RATIONAL EXPRESSIONS AND FUNCTIONS

- Lesson 1: Proportions
- Lesson 2: Rational Expressions
- Lesson 3: Simplifying Rational Expressions
- Lesson 4: Multiplying and Dividing Rational Expressions
- Lesson 5: Adding and Subtracting Rational Expressions
- Lesson 6: Inverse Variation
- Lesson 7: Solving Rational Functions
- Lesson 8: Vertical Asymptotes
- Lesson 9: Graphing Rational Functions
- Lesson 10: Rational Expressions and Functions Wrap-Up

UNIT 8: RADICAL EXPRESSIONS AND FUNCTIONS

- Lesson 1: Basics of Radicals
- Lesson 2: Multiplying and Dividing Radicals
- Lesson 3: Adding and Subtracting Radicals
- Lesson 4: Rationalizing Denominators
- Lesson 5: Solving Radical Functions
- Lesson 6: Applications of Radical Equations
- Lesson 7: Rational Exponents
- Lesson 8: Review of Complex Numbers
- Lesson 9: Performance Task: The Skid Distance Problem
- Lesson 10: Radical Expressions and Functions Wrap-Up

UNIT 9: EXPONENTIAL AND LOGARITHMIC FUNCTIONS

- Lesson 1: Arithmetic Sequences
- Lesson 2: Geometric Sequences
- Lesson 3: Exponential Functions
- Lesson 4: Examples and Applications of Exponential Functions
- Lesson 5: Graphs of Exponential Functions
- Lesson 6: Logarithmic Functions
- Lesson 7: Graphs of Logarithmic Functions
- Lesson 8: Properties of Exponents and Logarithms
- Lesson 9: Solving Exponential Equations
- Lesson 10: Solving Logarithmic Equations
- Lesson 11: Applications of Logarithms
- Lesson 12: Comparing and Analyzing Function Types
- Lesson 13: Exponential and Logarithmic Functions Wrap-Up

UNIT 10: STATISTICAL ANALYSIS

- Lesson 1: Review of Graphical Analysis of Data
- Lesson 2: Review of Numerical Analysis of Data
- Lesson 3: Fitting Linear Models to Data
- Lesson 4: Data Gathering and Inferential Statistics
- Lesson 5: Random Variables
- Lesson 6: Experimental Design
- Lesson 7: Evaluating Published Reports
- Lesson 8: Applications of Statistical Techniques
- Lesson 9: Statistical Analysis Wrap-Up

UNIT 11: MATRICES

- Lesson 1: Matrix Addition and Scalar Multiplication
- Lesson 2: Matrix Multiplication
- Lesson 3: Transformations and Matrices
- Lesson 4: Determinants and Inverse Matrices
- Lesson 5: Solving Systems Using Matrices
- Lesson 6: Matrices Wrap-Up

UNIT 12: SEMESTER 2 REVIEW AND EXAM

- Lesson 1: Semester 2 Review and Exam