Year at a Glance

Course Name: Advanced Algebra II
Last Revised: August 2024

Course Description: This course is designed to deepen and extend students' understanding of quadratic, exponential, logarithmic, and rational relationships by expanding on the students' understanding of functions. This course focuses on multiple representations of functions and equations, modeling real world scenarios with functions and methods for finding and representing solutions of equations, performing operations with functions and studying inverse functions. Students will engage in critical thinking skills as well as focus on mathematical practices that students develop and leverage as they engage with the content. These practices support and align to the AP Calculus Mathematical Practices, the AP Statistics Course Skills, and the mathematical practices listed in the Arkansas state standards.

Overview of Key Concepts and Essential Learning

Unit 1: Foundations of Algebra
The student can/will
● Combine standard function types using arithmetic operations
● Compose functions
● Piece-wise
Upcoming Standards: A2.FN.1, A2.PRF.12
Current Standards: HSF.BF.A.1, HSA.SSE.B.3

Unit 2: Quadratic Functions
The student can/will
● Graph quadratic functions using the various forms
● Factor a quadratic expression
● Solve quadratic functions by factoring, finding square roots, completing the square, and the quadratic formula
● Perform arithmetic operations with square roots and complex numbers
● Model using quadratic functions and quadratic inequalities
● Identify transformations of graphs of quadratic functions
Upcoming Standards: A2.RC.4, A2.RC.5, A2.RC.6, A2.QFE.1, A2.QFE.2, A2.QFE.3, A2.QFE.4, A2.QFE.5, A2.PRF.2
Current Standards: HSA.SSE.B.3, HSA.REI.B.4, HSA.CN.C.7, HSA.CED.A.1

Unit 3: Polynomials and Polynomial Functions
The student can/will
● Use the properties of exponents
● Evaluate and graph polynomial functions
● Factor and solve polynomial equations (inspection, long division, and synthetic division with and without remainder)
● Apply the Remainder and Factor Theorems
● Polynomial identities - Diff. of Squares, etc.
● Perform operations with polynomials including division
● Apply the Fundamental Theorem of Algebra
● Analyze graphs of polynomial functions, including transformations
Upcoming Standards: A2.FN.2, A2.PRF.2, A2.PRF.3, A2.PRF.4, A2.PRF.5, A2.PRF.7, A2.PRF.8, A2.PRF.9, A2.PRF.10, A2.PRF.11, A2.PRF.12, A2.PRF.15, A2.PRF.16, A2.PRF.19
Current Standards: HSA.APR.B.3, HSF.IF.B.4 & 5, HSF.BF.B.3, HSF.IF.C.7

Unit 4: Powers, Roots, and Radicals
The student can/will
● Solve radical equations and check for extraneous solutions

● Use properties of exponents to rewrite expressions with rational exponents and radicals
● Use inverse functions and relations
● Perform operations with radical expressions
● Graph radical functions and identify key features of the graph
● Identify transformations of graphs of radical functions
Upcoming Standards: A2.RC.1, A2.RC.2, A2.RC.3, A2.FN.3, A2.FN.4, A2.ELF.1, A2.PRF.1, A2.PRF.12, A2.PRF.13, A2.PRF.14
Current Standards: HSA.REI.A.2, HSF.BF.B.3

Unit 5: Graphing Exponential and Logarithmic Functions
The student can/will
● Graph exponential and logarithmic functions
● Evaluate and graph exponential functions with natural base e
Upcoming Standards: A2.ELF.3, A2.ELF.5, A2.ELF.8, A2.ELF.9, A2.ELF.10, A2.ELF.11, A2.ELF.12, A2.ELF.13, A2.ELF.14
Current Standards: HSF.IF.C.7, HSF.BF.B.3

Unit 6: Solving Exponential and Logarithmic Functions
The student can/will
● Evaluate logarithmic functions
● Understand and use the properties of logarithms to solve logarithmic equations
● Model and use exponential and logarithmic functions
Upcoming Standards: A2.ELF.2, A2.ELF.5, A2.ELF.6, A2.ELF.7
Current Standards: HSA.CED.A.1, HSF.LE.A.4

Unit 7: Rational Functions and Relations
The student can/will
● Graph rational functions
● Perform arithmetic operations with rational functions
● Simplify complex fractions
● Solve rational equations
Upcoming Standards: A2.PRF.6, A2.PRF.7, A2.PRF.8, A2.PRF.12, A2.PRF.13, A2.PRF.14, A2.PRF.17, A2.PRF.18
Current Standards: HSA.REI.A.2, HSF.IF. 5, HSF.BF.B.3 & 4, HSF.IF.C.7

Unit 8: Sequences and Series
The student can/will
● Use and write arithmetic and geometric sequences recursively and explicitly; see sequences as functions
Upcoming Standards: A2.LFE.1, A2.ELF.4
Current Standards: HSF.BF.A.2 & 3

Unit 9: Systems and Matrices
The student can/will
● Perform operations with matrices (add, subtract, scalar multiplication)
● Solve a system of equations consisting of a linear equation and a nonlinear equation in two variables by choosing substitution, elimination, or graphically (linear, polynomial, exponential, logarithmic, and/or rational)
● Solving systems of linear equations in three variables using matrices
Upcoming Standards: A2.LFE.2, A2.LFE.3, A2.LFE.4, A2.QFE.6, A2.PRF.20
Current Standards: HSN.VM.C.6, 7, 8, 9, 10

Unit 10: Statistics
The student can/will
● Use data from a random sample to make inferences about a population (scatter plots and regressions)
● Compare theoretical and empirical probabilities using simulations
● Distinguish between sample surveys, experiments and observation studies

- Explain the purpose of randomization in statistical studies
- Explain the validity of data from outside reports
- Identify type of data, data collection method, and potential biases

Upcoming Standards: A2.SP.1, A2.SP.2, A2.SP.3, A2.SP.4
Current Standards: HSS.ID.A.4, HSS.ID.B.6

Available Student Support for Learning:
Refer to the teacher's Course Syllabus and Google Classroom for resources and course specific opportunities.

Algebra 2 Arkansas State Standards