Algebra II 2022 Course Syllabus

A. Course Description

Algebra II is traditionally taught in 11th grade. It covers a variety of different topics related to specific types of functions and other mathematical techniques. We will cover eight units in this course. A full description of each unit is available in section J.

B. Instructor Information

Josh Naddor – *Instructor*
Email: Summer_Algebra2@landon.net
Office Hours: After class each day.

C. Course Meetings

Days: Monday - Friday
Time: 9:30 a.m. – 12:30 p.m.
Location: Synchronous Zoom sessions

D. Course Materials

Textbooks: None
Materials: Reading materials will be provided by the instructor in Google Classroom. A Graphing Calculator is strongly recommended. **No phone calculators will be allowed on exams.**

E. Prerequisite

Algebra I

F. Learning Outcomes

By the end of this course, students Algebra II will:

1. Participate in learning tasks that focus on different approaches to introduce and work with concepts of Algebra II.
2. Work hard, in class and out; working together with others well and by themselves with determination.
3. Work hard at understanding the *why* of the mathematics and not just the how.
4. Enhance their problem-solving skills and work on interpreting the mathematics in a real context and vice versa.

G. Grading

Grade Components

Component	Weight
Participation	5%
Weekly Check-Ins	5%
Classwork	20%
Quizzes	30%
Project	5%
Midterm	15%
Final Exam	20%

Participation: Students are expected to participate in class. Whether that is answering questions from the teacher, asking the teacher questions, or helping classmates with concepts, students will need to participate. This will be graded on a completion basis.

Weekly Check-Ins: Every Friday, students will spend 15 minutes completing a weekly check-in on Google Forms. Students will be asked how they are feeling with the past week of class, if there are any topics they are unsure of, and a space will be left for any questions, comments, or feedback. This will be graded for on a completion basis.

Classwork: Throughout the class, students will be given worksheets to work on during class. Specific worksheets will be collected throughout the course and graded on a completion basis.

Quizzes: Before lecture starts for the day, several classes will have a 10-minute quiz over what was covered during the prior lesson(s). There are 12 quizzes during this course. Each one will be worth 3% of your grade. The two lowest quizzes will be dropped. These will be graded for accuracy.

Project: More information will be coming on this assignment, but it should be a "fun" short project allowing students to show what they've learned. This will be graded on a completion basis.

Midterm: This cumulative exam will occur on Friday July 8th. It will cover everything that the class has covered up until that point. It will be graded for accuracy.

Final Exam: This cumulative final will occur on Friday July 29th. It will cover everything students have learned in the course. However, a larger emphasis will be placed on material that was not on the midterm. It will be graded for accuracy.

H. Attendance Policy

Attendance is required every day. Except July 4th.

If you're not able to come to class, please let me know via email as soon as you are able.

Per Landon School policy, students that miss three or more classes will be ineligible to receive credit for this course.

I. Other Course Policies

1. You have my permission to call me Josh. If that makes you uncomfortable, call me Mr. Josh. If you're still not comfortable doing that, Mr. Naddor is fine. Please address me however you feel most comfortable!

2. I'm easily distracted. Please try to keep cell phones and other devices on silent.

3. I have no issues with emails in the middle of the night; if you have a question, feel free to send me an email. Please allow up to 24 hours for a response.

4. It is your responsibility to maintain a valid email address and check/empty your inbox regularly.

5. The term grades will be recorded in the grade book in Google Classroom. Please notify me immediately if you notice any discrepancies in your grades. Keep all your assignments and tests for future reference.

6. **PLEASE COMMUNICATE WITH ME**. If you are going to miss class, let me know. If you're struggling with a concept or two, let me know. If you do not feel prepared for a test, let me know. I am here to be of assistance to you, but you will need to communicate so I am able to know how to best be of assistance.

7. **Honor Pledge** Your signature on any test or assignment indicates, "I have neither given nor received unauthorized aid on this test or assignment."

8. I reserve the right to make adjustments to the syllabus as necessary.

J. Unit Breakdown

Unit 1: Intro to Functions

• Describe functions using domain and range, one-to-one, increasing and decreasing, continuous, maximum and minimum values, and symmetry.
• Represent piecewise functions involving linear, absolute value, and step functions numerically, algebraically, and graphically.
• Describe the properties of a piecewise function involving linear, absolute value, and step functions.
• Interpret and solve problems involving piecewise functions including linear, absolute value, and step functions.
• Perform operations on functions, including determining the composition of two functions.
• Determine the inverse of a function.
• Determine whether two functions are inverses analytically and graphically.
• Describe the effect of transformations of the graph of $f(x)$ including $a * f(x)$, $f(x-h)$, and $f(x)+k$.

Unit 2: Systems of Equations and Matrices

• Solve systems of two or more linear equations using a variety of methods.
• Represent a system of two or more linear equations in matrix form.
• Perform operations on matrices.
• Determine whether a square matrix has a multiplicative inverse.

Unit 3: More on Functions
• Write a polynomial function given its real zeros or a graph with real zeros.
• Describe and compare the characteristics of polynomial functions, given numerical, graphical, and algebraic representations, including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, zeros and their multiplicity, and turning points.
• Apply finite differences to find the degree of polynomial functions.
• Solve polynomial equations using graphs, the factor theorem, rational root theorem, and the quadratic formula.
• Solve polynomial inequalities using the graph of the related polynomial function.
• Solve polynomial inequalities of degree 2 graphically.
• Make predictions using quadratic mathematical models given a set of data.
• Choose appropriate models based on an analysis of the pattern of change in data.
• Apply the Fundamental Theorem of Algebra.
• Represent complex numbers numerically and graphically.
• Identify numbers as real or complex; distinguish among rational, irrational, imaginary, and complex numbers.
• Perform operations on complex numbers.

Unit 4: Sequences and Series
• Represent arithmetic and geometric sequences explicitly and recursively.
• Determine the sum and nth term of an arithmetic or geometric series.

Unit 5: Radical Functions
• Write a radical function or expression as an equivalent power function or expression.
• Represent radical functions numerically, algebraically, and graphically.
• Describe the properties of radical functions.
• Describe the effect of transformations on the graphs of radical functions,
• Solve radical equations graphically or algebraically, and check for extraneous roots.
• Interpret and solve problems involving radical functions.
• Write equivalent expressions involving radicals and exponents, including negative exponents.
• Evaluate expressions involving radicals and exponents.

Unit 6: Exponential and Logarithmic Functions
• Represent exponential functions, including base e, numerically, algebraically, and graphically.
• Represent logarithmic functions, including base e, numerically, algebraically, and graphically.
• Describe the properties of exponential functions including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, asymptotes, and zeros.
• Describe the properties of logarithmic functions including domain and range, increasing, decreasing, continuous, maximum and minimum values, end behaviors, symmetry, asymptotes, and zeros.
• Describe the inverse relationship between exponential and logarithmic functions numerically, graphically, and algebraically.
• Describe the effect of transformations on graphs of exponential functions.
• Solve exponential equations using graphs, the laws of exponents, or the inverse relationship with logarithms.
Solve logarithmic equations using graphs and the inverse relationship with exponents.
• Interpret and solve problems involving exponential functions.
• Write equivalent forms for exponential and logarithmic expressions and equations.
• Evaluate logarithmic expressions.

• Make predictions using quadratic, exponential, or logarithmic mathematical models given a set of data.
• Choose appropriate models, quadratic, exponential, or logarithmic, based on an analysis of the patterns of change in data.

Unit 7: Rational Functions

• Write a rational function or expression in the form $\frac{1}{x^n}$ as an equivalent power function or expression.
• Graph rational functions with numerators and/or denominators that are linear polynomials and describe their properties.
• Write a rational function or expression in equivalent form.
• Describe the properties of rational functions with numerators and/or denominators that are linear polynomials, including domain, range, continuity, end behavior, horizontal asymptotes, and vertical asymptotes.
• Solve rational equations with linear denominators graphically, numerically, and algebraically.
• Interpret and solve problems involving rational equations, including inverse and combined variation.

Unit 8: Conic Sections

• Write the equation and describe the characteristics of a circle, ellipse, and hyperbola centered at the origin and parabola with vertex at the origin given its graph.
• Represent circles, ellipses, and hyperbolas centered at the origin and parabolas with vertex at the origin algebraically and graphically.
• Describe the properties of circles, ellipses, and hyperbolas centered at the origin and parabolas with vertex at the origin.
• Describe circles, ellipses, parabolas, and hyperbolas as a locus of points.