

Lake Zurich High School

Mathematics Department

H - Algebra II

Course Description

Prerequisites:	H – Algebra I and H – Geometry (with a B or better in each)
Open To:	9, 10, 11, 12
Credit:	1 unit
Level:	Honors

This course is an accelerated course in Algebra II for the student with greater aptitude and interest in math. Topics of Algebra II are studied in much greater depth and intensity using a variety of mathematical methods. These topics include: systems of equations, matrices, linear and quadratic functions, polynomials, conics, logarithms, sequences and series, and probability. Further development of critical thinking skills is stressed. This course prepares the student for Pre-Calculus. Students are required to bring a TI-83 or TI-84 graphing calculator to class on a daily basis.

Textbook

Title:	Algebra 2
Publisher:	McDougal Littell
Author(s)	Larson, Boswell, Kanold, Stiff
Copyright date:	2007 / 2008
ISBN number:	(0-618-59541-4) (978-0-618-59541-9)

Course Objectives

At the end of the course, the student will be able to:

1. Evaluate and simplify expressions to solve problems involving linear, absolute value, and inequality models.
2. Recognize relations, functions, and graph and write linear equations and inequalities of two variables.
3. Solve systems of equations and inequalities using a variety of methods.
4. Graph, write, and solve quadratic functions using a variety of methods.
5. Graph, solve, and perform operations with polynomial functions.
6. Graph and perform operations with rational exponents, inverse functions, and radical functions, and solve radical equations.
7. Solve and graph exponential & logarithmic functions.
8. Graph and solve rational functions.
9. Graph and write equations of conic sections.
10. Apply counting techniques and find probabilities using permutations and combinations.
11. Analyze sequences, find sums of series, and apply recursive rules.
12. Apply trigonometric functions of the right triangle.

Course Syllabus

1st Semester

Chapter	Topic
1	Equations and Inequalities
2	Linear Equations and Functions
3	Linear Systems and Matrices
4	Quadratic Functions and Factoring
5	Polynomials and Polynomial Functions
6	Rational Exponents and Radical Functions

2nd Semester

Chapter	Topic
7	Exponential and Logarithmic Functions
8	Rational Functions
9	Quadratic Relations and Conic Sections
13	Trigonometric Ratios and Functions (right triangles & Law of Sines)
10	Counting Methods and Probability
12	Sequences and Series

Chapter and Unit Objectives

Chapter # 1 Equations and Inequalities

Major objective: Evaluate and simplify expressions to solve problems involving linear, absolute value, and inequality models.

Detailed Unit objectives:

- 1.1 Apply properties of real numbers
- 1.2 Evaluate and simplify algebraic expressions involving real numbers
- 1.3 Solve linear equations
- 1.4 Rewrite and evaluate formulas and equations
- 1.5 Set up and solve problems using verbal models, formulas, patterns, or diagrams.
- 1.6 Solve and graph simple and compound linear inequalities
- 1.7 Solve and graph absolute value equations and inequalities

Chapter # 2 Linear Equations and Functions

Major objective: Recognize relations, functions, and graph and write linear equations and inequalities of two variables.

Detailed Unit objectives:

- 2.1 Represent relations and functions
- 2.2 Find slope and rate of change
- 2.3 Graph equations of lines
- 2.4 Write equations of lines
- 2.5 Model direct variation
- 2.6 Draw scatter plots and best-fitting lines
- 2.7 Use absolute value functions and transformations
- 2.8 Graph linear inequalities in two variables

Chapter # 3 Linear Systems and Matrices

Major objective: Solve systems of equations and inequalities using a variety of methods.

Detailed Unit objectives:

- 3.1 Solve linear systems graphically
- 3.2 Solve linear systems algebraically
- 3.3 Graph systems of linear inequalities
- 3.4 Solve systems of linear equations in three variables
- 3.5 Perform basic operations with matrices
- 3.6 Multiply matrices
- 3.7 Evaluate determinants of matrices and apply Cramer's Rule
- 3.8 Use inverse matrices to solve linear systems

Chapter # 4 Quadratic Functions and Factoring

Major objective: Graph, write, and solve quadratic functions using a variety of methods.

Detailed Unit objectives:

- 4.1 Graph quadratic functions in standard form
- 4.2 Graph quadratic functions in vertex form or intercept form
- 4.3 Solve quadratic equations ($x^2 + bx + c = 0$) by factoring
- 4.4 Solve quadratic equations ($ax^2 + bx + c = 0$) by factoring
- 4.5 Solve quadratic equations by finding square roots
- 4.6 Perform operations with complex numbers
- 4.7 Solve quadratic equations by completing the square
- 4.8 Solve quadratic equations using the quadratic formula
- 4.9 Solve and graph quadratic inequalities
- 4.10 Write quadratic functions and models

Chapter # 5 Polynomials and Polynomial Functions

Major objective: Graph, solve, and perform operations with polynomial functions.

Detailed Unit objectives:

- 5.1 Simplify expressions using properties of exponents
- 5.2 Evaluate and graph other polynomial functions
- 5.3 Add, subtract and multiply polynomials
- 5.4 Factor and solve polynomial equations
- 5.5 Apply the Remainder and Factor Theorems
- 5.6 Find rational zeroes of a polynomial function
- 5.7 Apply the Fundamental Theorem of Algebra
- 5.8 Analyze graphs of polynomial functions
- 5.9 Write polynomial functions and models

Chapter # 6 Rational Exponents and Radical Functions

Major objective: Graph and perform operations with rational exponents, inverse functions, and radical functions, and solve radical equations.

Detailed Unit objectives:

- 6.1 Evaluate n^{th} roots and use rational exponents
- 6.2 Apply properties of rational exponents
- 6.3 Perform functions operations and composition
- 6.4 Use inverse functions
- 6.5 Graph square root and cube root functions
- 6.6 Solve radical equations

Chapter # 7 Exponential and Logarithmic Functions

Major objective: Solve and graph exponential & logarithmic functions.

Detailed Unit objectives:

- 7.1 Graph and use exponential growth functions
- 7.2 Graph and use exponential decay functions
- 7.3 Graph and evaluate functions with the natural base e
- 7.4 Graph and evaluate logarithmic functions
- 7.5 Expand and condense logarithmic expressions
- 7.6 Solve exponential and logarithmic equations
- 7.7 Write and apply exponential and power functions

Chapter # 8 Rational Functions

Major objective: Graph and solve rational functions.

Detailed Unit objectives:

- 8.1 Write and evaluate inverse and joint variation models
- 8.2 Graph simple rational functions
- 8.3 Graph general rational functions
- 8.4 Multiply and divide rational expressions
- 8.5 Add and subtract rational expressions
- 8.6 Solve rational equations

Chapter # 9 Quadratic Relations and Conic Sections

Major objective: Graph and write equations of conic sections.

Detailed Unit objectives:

- 9.1 Apply the distance and midpoint formulas
- 9.2 Graph and write equations of parabolas
- 9.3 Graph and write equations of circles
- 9.4 Graph and write equations of ellipses
- 9.5 Graph and write equations of hyperbolas
- 9.6 Translate and classify conic sections
- 9.7 Solve quadratic systems

Chapter # 10 Counting Methods and Probability

Major objective: Apply counting techniques and find probabilities using permutations and combinations.

Detailed Unit objectives:

- 10.1 Apply the counting principle and permutations
- 10.2 Apply combinations and the Binomial Theorem
- 10.3 Define and use probabilities
- 10.4 Find probabilities of disjoint and overlapping events
- 10.5 Find probabilities of independent and dependent events
- 10.6 Construct and interpret binomial distributions

Chapter # 12 Sequences and Series

Major objective: Analyze sequences, find sums of series, and apply recursive rules.

Detailed Unit objectives:

- 12.1 Write function rules from number patterns
- 12.2 Analyze arithmetic sequences and series
- 12.3 Analyze geometric sequences and series
- 12.4 Find the sums of infinite geometric sequences and series
- 12.5 Analyze recursive rules for sequences and functions

Chapter # 13 Trigonometric Ratios and Functions

Major objective: Apply trigonometric functions, use trigonometry with right triangles

Detailed Unit objectives:

- 1. Use trigonometry with right triangles
- 2. Apply the Law of Sines