

# College Algebra

## Course Text

Miller, Julie, and Donna Gerken. *College Algebra*, 2nd edition, McGraw-Hill, 2017, ISBN: 9780077836344

The text is provided digitally as part of the course enrollment. Students may find used, new, or rental print copies by searching for the ISBN.

## Course Description

This course provides a working knowledge of college-level algebra and its applications. Emphasis is placed upon the solution and the application of linear and quadratic equations, word problems, polynomials, and rational and radical equations. Students perform operations on real numbers and polynomials and simplify algebraic, rational, and radical expressions.

Arithmetic and geometric sequences are examined, and linear equations and inequalities are discussed. Students learn to graph linear, quadratic, absolute value, and piecewise-defined functions and solve and graph exponential and logarithmic equations. Other topics include solving applications using linear systems as well as evaluating and finding partial sums of a series.

## Course Objectives

After completing this course, students will be able to:

- Perform operations on real numbers and polynomials.
- Simplify algebraic, rational, and radical expressions.
- Solve both linear and quadratic equations and inequalities.
- Solve word problems involving linear and quadratic equations and inequalities.
- Solve polynomial, rational, and radical equations and applications.
- Solve and graph linear, quadratic, absolute value, and piecewise-defined functions.
- Perform operations with functions as well as find composition and inverse functions.
- Graph quadratic, square root, cubic, and cube root functions.
- Graph and find zeroes of polynomial functions.
- Perform vertical and horizontal shifts and reflections of a basic graph.
- Perform stretches and compressions on a basic graph.
- Transform the graph of a general function.
- Graph quadratic functions by completing the square, using the vertex formula, and using transformations.

- Solve and graph exponential and logarithmic equations.
- Solve systems of linear equations and inequalities.
- Model and solve applications using linear systems.
- Evaluate and find partial sums of a series.
- Evaluate and find sums of arithmetic and geometric sequences.
- Solve application problems involving arithmetic and geometric sequences and series.
- Solve applications involving the various types of equations and inequalities.

## Course Prerequisites

It is suggested, though not required, that students take Introductory Algebra or its equivalent before enrolling in College Algebra.

## Important Terms

In this course, different terms are used to designate tasks:

- **Practice Exercise:** A non-graded assignment to assist you in practicing the skills discussed in a topic.
- **Graded Exam:** A graded online test.

## Academic Integrity Statement

Academic integrity is the pursuit of scholarly activity in an honest, truthful and responsible manner. Violations of academic integrity include, but are not limited to, plagiarism, cheating, fabrication and academic misconduct. Failure to comply with the Academic Integrity Policy can result in a failure and/or zero on the attempted assignment/examination, a removal from the course, disqualification to enroll in future courses, and/or revocation of an academic transcript.

## Course Completion Policy

In order for a course to be considered complete, all required coursework must be attempted, submitted, and graded. Required coursework consists of graded assignments. Any Academic Integrity Policy violations may prevent a course from being considered complete.

## Course Evaluation Criteria

Your score provides a percentage score and letter grade for each course. A passing percentage is **70%** or higher.

There are a total of 1000 points in the course:

Topic	Assessment	Points Available
2	Graded Exam #1	175
5	Graded Exam #2	175
9	Graded Exam #3	175

Topic	Assessment	Points Available
14	Graded Exam #4	175
16	Final Graded Exam	300
Total		1000

## Course Topics and Objectives

Topic	Lesson	Subtopics	Objectives
1	Geometry and Measurement	<ul style="list-style-type: none"> <li>Construction and Measurement of Geometric Solids</li> </ul>	<ul style="list-style-type: none"> <li>Identify the characteristics of different geometric shapes.</li> <li>Apply formulas to measure geometric shapes.</li> </ul>
2	Basic Algebraic Operations	<ul style="list-style-type: none"> <li>Real Numbers and Polynomials</li> <li>Rational Expressions</li> <li>Rational Exponents and Radicals</li> </ul>	<ul style="list-style-type: none"> <li>Identify and use properties of real numbers.</li> <li>Simplify algebraic expressions.</li> <li>Identify and classify polynomial and Radicals expressions.</li> <li>Perform operations on polynomials.</li> <li>Factor polynomials.</li> <li>Write a rational expression in simplest form</li> <li>Compute rational expressions.</li> <li>Simplify radical expressions.</li> <li>Multiply and divide radical expressions.</li> </ul>
3	Linear Equations and Inequalities in One Variable	<ul style="list-style-type: none"> <li>Linear Equations and Applications</li> <li>Linear Inequalities and Applications</li> <li>Absolute Value in Equations and Inequalities</li> </ul>	<ul style="list-style-type: none"> <li>Solve linear equations by using all properties of equality and the rules.</li> <li>Solve word problems using linear equations.</li> <li>Solve and graph linear inequalities.</li> <li>Solve an application using inequalities.</li> <li>Solve absolute value equalities and inequalities.</li> </ul>
4	Quadratic Equations	<ul style="list-style-type: none"> <li>Factoring and solving Quadratic Equations using Factoring</li> <li>Completing the Square</li> <li>Quadratic Formula and Applications of the Quadratic Equations</li> </ul>	<ul style="list-style-type: none"> <li>Write a quadratic equation in the standard form.</li> <li>Solve quadratic equations by factoring.</li> <li>Solve quadratic equations by the square root property.</li> <li>Solve quadratic equations by completing the square.</li> </ul>

Topic	Lesson	Subtopics	Objectives
			<ul style="list-style-type: none"> <li>Solve quadratic equations by using the quadratic formula.</li> <li>Solve word problems involving quadratic equations.</li> <li>Use the discriminant to identify the number of solutions.</li> </ul>
5	Polynomial and Other Equations	<ul style="list-style-type: none"> <li>Polynomial Equations and Applications</li> <li>Equations Involving Radicals and Rational Exponents</li> <li>Complex Numbers</li> </ul>	<ul style="list-style-type: none"> <li>Solve polynomial equations using the zero factor property.</li> <li>Solve rational equations.</li> <li>Solve radical equations.</li> <li>Identify and simplify complex numbers.</li> <li>Add and subtract complex numbers.</li> <li>Multiply and divide complex numbers.</li> </ul>
6	Functions and Graphs	<ul style="list-style-type: none"> <li>Rectangular Coordinates and the Graph of a Line</li> </ul>	<ul style="list-style-type: none"> <li>Use a table of values to graph linear equations.</li> <li>Determine when lines are parallel or perpendicular.</li> <li>Use linear graphs in an applied context.</li> <li>Identify functions and state their domain and range.</li> <li>Use function notation.</li> <li>Write a linear equation in function form.</li> <li>Use function form to identify the slope.</li> <li>Use slope-intercept form to graph linear functions.</li> <li>Write a linear equation in point-intercept form.</li> <li>Use the function form, the slope-intercept form, and the point-intercept form to solve applications.</li> </ul>
7	Operations and Functions	<ul style="list-style-type: none"> <li>The Algebra and Composition Functions</li> <li>One-to-One and Inverse Functions</li> </ul>	<ul style="list-style-type: none"> <li>Compute a sum or difference of functions and determine the domain of the result.</li> <li>Compose two functions and find the domain.</li> <li>Identify one-to-one functions.</li> <li>Find inverse functions using an algebraic method.</li> <li>Graph a function and its inverse.</li> </ul>

Topic	Lesson	Subtopics	Objectives
			<ul style="list-style-type: none"> <li>Graph factorable quadratic equations.</li> <li>Graph the square root, cubic, and cube root functions.</li> <li>Compute a product or quotient of functions and determine the domain of the result.</li> </ul>
8	Analyzing Graphs	<ul style="list-style-type: none"> <li>Piecewise-Defined Functions</li> <li>Graphs and Symmetry</li> <li>Transformations</li> </ul>	<ul style="list-style-type: none"> <li>State the domain of a piecewise-defined function.</li> <li>Evaluate piecewise-defined functions.</li> <li>Graph functions that are piecewise defined.</li> <li>Identify different symmetry types.</li> <li>Use symmetry as an aid to graphing.</li> <li>Perform vertical and horizontal shifts of a basic graph.</li> <li>Perform vertical and horizontal reflections of a basic graph.</li> <li>Perform stretches and compressions on a basic graph.</li> <li>Transform the graph of a general function.</li> </ul>
9	Graphing Polynomial Functions	<ul style="list-style-type: none"> <li>Graphing General Quadratic Functions</li> <li>Graphing Polynomial Functions</li> <li>Applications of Polynomial Functions</li> </ul>	<ul style="list-style-type: none"> <li>Graph quadratic functions by completing the square and using transformations.</li> <li>Graph a general quadratic function using the vertex formula.</li> <li>Solve applications involving quadratic functions.</li> <li>Graph polynomial functions.</li> <li>Describe the end behavior of a polynomial graph.</li> </ul>
10	Graphing Rational Functions	<ul style="list-style-type: none"> <li>Asymptotes and Rational Functions</li> <li>Graphing Rational Functions</li> <li>Applications of Rational Functions</li> </ul>	<ul style="list-style-type: none"> <li>Graph the reciprocal and reciprocal quadratic functions.</li> <li>Identify horizontal and vertical asymptotes.</li> <li>Use asymptotes to graph transformations.</li> <li>Use asymptotes to determine the equation of a rational function from its graph.</li> </ul>

Topic	Lesson	Subtopics	Objectives
			<ul style="list-style-type: none"> <li>Find the domain of a rational function.</li> <li>Find the intercepts of a rational function.</li> <li>Graph general rational functions.</li> <li>Solve applications involving rational functions.</li> </ul>
11	Exponential and Logarithmic Functions	<ul style="list-style-type: none"> <li>Exponential Functions</li> <li>Logarithms and Logarithmic Functions</li> <li>The Exponential Function and Natural Logarithm</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate an exponential function.</li> <li>Graph exponential functions.</li> <li>Solve certain exponential equations.</li> <li>Solve applications of exponential equations.</li> <li>Write exponential equations in logarithmic form.</li> <li>Graph logarithmic functions and find their domains.</li> <li>Solve applications of logarithmic functions.</li> <li>Evaluate and graph base exponential functions.</li> <li>Evaluate and graph the natural logarithm functions.</li> <li>Apply the properties of logarithms.</li> <li>Use the change-of-base formula.</li> </ul>
12	Exponential and Logarithmic Equations	<ul style="list-style-type: none"> <li>Exponential Equations</li> <li>Logarithmic Equations</li> <li>Applications of Exponential and Logarithmic Equations</li> </ul>	<ul style="list-style-type: none"> <li>Write logarithmic and exponential equations in simplified form.</li> <li>Solve exponential equations.</li> <li>Solve logarithmic equations.</li> <li>Solve applications involving exponential and logarithmic equations.</li> <li>Use exponential equations to find the interest compounded in times per year.</li> <li>Use exponential equations to find the interest compounded continuously.</li> <li>Solve exponential growth and decay problems.</li> </ul>
13	Systems of Linear Equations in Two Variables	<ul style="list-style-type: none"> <li>Solving Systems Graphically and by Substitution</li> </ul>	<ul style="list-style-type: none"> <li>Verify ordered pair solutions.</li> <li>Solve linear systems by graphing.</li> </ul>

Topic	Lesson	Subtopics	Objectives
		<ul style="list-style-type: none"> <li>Solving Systems using Elimination</li> <li>Applications of Linear Systems</li> </ul>	<ul style="list-style-type: none"> <li>Solve linear systems by substitution.</li> <li>Solve linear systems by elimination.</li> <li>Recognize inconsistent systems (no solutions) and dependent systems (infinitely many solutions).</li> <li>Use a system of equations to mathematically model and solve applications.</li> </ul>
14	Solving Linear Systems Using Augmented Matrices	<ul style="list-style-type: none"> <li>Matrices</li> <li>Solving Linear Systems using Matrix Equations</li> <li>More Applications of Linear Systems</li> </ul>	<ul style="list-style-type: none"> <li>State the size of a matrix and identify entries in a specified row and column.</li> <li>Form the augmented matrix of a system of equations.</li> <li>Recognize inconsistent and dependent systems.</li> <li>Model and solve applications using linear systems.</li> <li>Solve a system of equations using row operations.</li> </ul>
15	Sequences and Series	<ul style="list-style-type: none"> <li>Sequences and Series</li> <li>Arithmetic Sequences</li> <li>Geometric Sequences</li> </ul>	<ul style="list-style-type: none"> <li>Write out the terms of a sequence given the general term.</li> <li>Determine the general term of a sequence.</li> <li>Find the partial sum of a series.</li> <li>Use summation notation to write and evaluate the series.</li> <li>Solve applications using mathematical sequences.</li> <li>Find the sum of a geometric series.</li> <li>Solve application problems involving geometric sequences and series.</li> </ul>
16	Review and Graded Final Exam	<ul style="list-style-type: none"> <li>Course Review</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>

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