

# Math 1200: College Algebra

**Credit hours:** 3 credits (4 class hours per week)

**Prerequisites:** Placement in ACCUPLACER Grid 4 or MATH 0101 with a grade of C or better

## Course Description

Designed for students who eventually plan to study quantitative business analysis or calculus, this course covers functions and graphs, systems of equations and inequalities, quadratic equations, polynomial and rational expressions, radical, exponential and logarithmic forms.

## Course Objectives

1. Become proficient in higher level algebra, to build a firm foundation in mathematics and continue a business or STEM (Science, Technology, Engineering, and Mathematics) pathway
2. Develop critical problem-solving skills necessary for advanced mathematics
3. Apply algebraic skills to students' related course of study

## Learning Outcomes

1. Solve linear equations including absolute value equations
2. Solve linear inequalities and compound inequalities in one variable
3. Graph linear equations and inequalities in two variables
4. Solve systems of linear equations in two variables using graphing, substitution, and elimination
5. Solve systems in three variables using substitution and elimination
6. Perform arithmetic operations on polynomials
7. Factor using GCF, difference of two squares, sum or difference of two cubes, trinomials, grouping
8. Solve quadratic equations by factoring
9. Perform arithmetic operations on rational and radical expressions and functions
10. Solve quadratic equations by completing the square, using the quadratic formula, and graphing
11. Apply the rules of exponents to simplify algebraic expressions
12. Perform arithmetic operations on rational expressions, radical expressions and functions
13. Solve rational equations including those with extraneous roots
14. Convert between exponential and logarithmic functions and apply the properties of logarithms

## Course Topics

### I. SETS

- A. Define set, element, finite and infinite sets
- B. Relations between sets: subset, proper subset, equal sets
- C. Set operations: union, intersection and complement
- D. Empty Set-builder notation
- E. The set of natural numbers
- F. The set of integers
- G. The set of rational numbers
- H. The set of real numbers

### II. LINEAR EQUATIONS AND INEQUALITIES IN ONE VARIABLE

- A. Review of techniques for solving linear equations and inequalities in one variable
- B. Review solving literal equations for a specified variable
- C. Absolute value

1. Definition and examples
  2. Equations of the form  $|ax + b| = c$
  3. Inequalities of the form  $|ax + b| < c$
  4. Inequalities of the form  $|ax + b| > c$
- D. Word problems (mixture, distance, age, money, and interest)

### III. LINEAR EQUATIONS AND INEQUALITIES IN TWO AND THREE VARIABLES

- A. Definition and examples of linear equations
- B. Review of the rectangular coordinate system
- C. Graphing linear equations in two variables
  1. Intercept method
  2. The slope concept
  3. The slope-intercept form
- D. Systems of linear equations in two variables
  1. Classification of systems: Consistent, inconsistent, and dependent
  2. Representation by graphs
  3. Substitution
  4. Elimination by addition
- E. Systems of linear equations in three variables
  1. Classification: unique solution, no solution, infinite number of solutions
  2. Substitution
  3. Elimination by addition
- F. Solving graphically linear inequalities in two variables
- G. Solving graphically systems of linear inequalities in two variables

### IV. POLYNOMIALS IN ONE OR MORE VARIABLES

- A. Laws of integral exponents; multiplication of monomials
- B. Addition and subtraction
- C. Multiplication of two polynomials, including FOIL method
- D. Special products
  1. Square of a binomial
  2. Multiplying the sum and difference of two terms
- E. Division
  1. Polynomial by a monomial
  2. Polynomial by a polynomial (i.e. long division)
- F. Factoring
  1. Polynomials with a common factor
  2. The difference of two squares
  3. Perfect square trinomials
  4. General trinomials
  5. Sum and difference of perfect cubes
  6. Factoring by grouping

### V. ALGEBRAIC FRACTIONS

- A. Multiplication and division
- B. Simplest form of a fraction, restrictions on the variable
- C. Least common multiple
- D. Addition and subtraction
- E. Complex fractions
- F. Fractional equations that reduce to linear equations

### VI. EXPONENTS AND RADICALS

- A. Radicals
  1. Definitions

2. Properties of radicals
3. Simplest radical form
- B. Operations with radical expressions
  1. Addition and subtraction
  2. Multiplication
  3. Division: rationalizing denominator (including conjugates and roots other than the square root)
- C. Rational exponents
  1. Definitions
  2. Laws of exponents
  3. Simplifying expressions involving rational exponents
- D. Solving equations involving radicals that reduce to linear equations

## VII. QUADRATIC EQUATIONS

- A. Review of solving by factoring
- B. Factoring by completing the square
- C. Quadratic formula (derivation and use)
- D. Word problems
  1. Number problems
  2. Area problems
- E. Graphing parabolas
  1. Vertex
  2. Intercepts
  3. Symmetry
- F. Solving quadratic inequalities
- G. Solving fractional and radical equations that reduce to quadratic equations

## VIII. RELATIONS AND FUNCTIONS

- A. Definition and examples
- B. Domain and range
- C. Graphs
- D. Functions
  1. Definition and examples
  2. Notation
  3. Graphs and the vertical-line test

## IX. LOGARITHMS

- A. Definition of logarithm
- B. Base ten logarithms and antilogarithms (computation kept to a minimum)
- C. Laws of logarithms
  1. Product to Sum
  2. Quotient to Difference
  3. Power Rule
  4. Change of Base\*
  5. Solving simple exponential and logarithmic equations\*

\*Optional