

**CUYAMACA COLLEGE**  
**COURSE OUTLINE OF RECORD**

**MATHEMATICS 110 – INTERMEDIATE ALGEBRA FOR BUSINESS, MATH, SCIENCE AND ENGINEERING MAJORS**

5 hours lecture, 5 units

**Catalog Description**

The second of a two-course sequence in algebra. This course completes some topics from the first course, such as factoring and operations on rational and radical expressions, and includes the addition of new topics such as absolute value equations, exponential and logarithmic expressions and equations, conic sections, and an introduction to matrices and sequences and series. The concept of functions is developed including composition and inverses. Quadratic functions are covered in depth. Computational techniques developed in beginning algebra are prerequisite skills for this course. This course is appropriate for students with knowledge of beginning algebra or who have had at least two years of high school algebra but have not used it for several years. Graphing calculators are required for this course.

**Prerequisite**

Appropriate placement

**Entrance Skills**

Without the following skills, competencies, and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Operations, simplification and manipulation
  - a. Real numbers
  - b. Polynomials
  - c. Variables with integer exponents
  - d. Square roots of variables
  - e. Factoring (greatest common factor, difference of squares, trinomials)
- 2) Solving mathematical statements
  - a. Linear equations in one or two variables
  - b. Linear inequalities
  - c. System of linear equations in two variables
  - d. Quadratic equations (real solutions)
- 3) Graphing
  - a. Points
  - b. Lines (slope-intercept form)
  - c. Linear inequalities
- 4) Modeling and applications
  - a. Interpreting numeric, analytic and graphical data
  - b. Associated with linear relationships

**Course Content**

- 1) Graphing of linear, absolute value, quadratic and radical functions
- 2) Writing equations from the graphs of linear and quadratic functions
- 3) Using graphic, numeric and analytic methods to solve linear and quadratic equations and inequalities
- 4) Using linear regression and linear interpolation and extrapolation to model, interpret and solve application problems

- 5) Fundamental operations with exponents and radicals and solving equations with same
- 6) Applications involving rational expressions and solving equations with same
- 7) Linear and non-linear systems of equations and inequalities
- 8) Elementary matrices and their application to solving systems
- 9) Graphing elementary conic sections
- 10) Exponential and logarithmic functions, their graphs, their inverse relationship and applications
- 11) Sequences and series
- 12) Historical contributions of number and mathematical concepts from diverse cultures

### Course Objectives

Students will be able to:

- 1) Simplify or reorganize expressions by:
  - a. Performing operations on rational expressions
  - b. Performing operations on radical expressions
  - c. Applying properties of rational exponents
  - d. Applying properties of logarithms and/or
  - e. Performing operations on complex numbers
- 2) Solve each of the following:
  - a. Absolute value equations
  - b. Quadratic equations
    1. By extracting roots
    2. By completing the square
    3. Using the quadratic formula
  - c. Rational equations
  - d. Radical equations
  - e. Exponential equations
  - f. Logarithmic equations and/or
- 3) Solve system of two or three equations
  - a. Algebraically and/or
  - b. Using a graphing calculator
- 4) Recognize and graph elementary conics
  - a. Circle
  - b. Ellipse and/or
  - c. Parabola
- 5) Use the graphing calculator to solve equations graphically
- 6) Apply critical thinking and mathematical reasoning to analyze, translate and solve applied problems involving:
  - a. Quadratic
  - b. Rational
  - c. Radical
  - d. Exponential and/or
  - e. Logarithmic equations
- 7) Simplify or reorganize functions given a
  - a. Sum
  - b. Difference
  - c. Product
  - d. Quotient and/or
  - e. Composition of two functions
- 8) Inspect and analyze a graph in order to
  - a. If the graph represents a function or is a 1-to-1 function
  - b. Evaluate the function
  - c. Determined the domain and range of a function
  - d. Determine the max or min of a quadratic function
- 9) Find the domain and range of the following functions:

- a. Rational functions
- b. Polynomial functions
- c. Functions involving radicals

10) Apply coursework management skills to succeed in this class.

11) Make consistent and regular preparations to maximize learning inside and outside the classroom.

### **Method of Evaluation**

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Independent exploration activities which measure students' ability to analyze the connections between the numeric, algebraic, and verbal representations of various types of algebraic expressions, equations, inequalities, functions, and systems of equations and/or inequalities when applied to real-world problems and data analysis.
- 2) Quizzes and exams (including a comprehensive in-class final exam) which measure students' ability to work independently using graphic, numeric, and algebraic techniques to simplify algebraic expressions; formulate, analyze and solve algebraic equations, inequalities, and systems of equations and inequalities; identify and analyze algebraic, exponential, and logarithmic functions; use all of the above in solving real-world application problems; and recognize and graph elementary conics.
- 3) Homework and computer assignments in which students apply graphic, numeric and algebraic principles discussed in class to a series of practice problems to help them formulate questions and receive feedback from the instructor, tutors, or classmates.
- 4) Computer laboratory assignments in which students apply algebraic principles and problem-solving techniques discussed in class to help students identify gaps in their skill attainment and concept mastery and to improve their symbolic manipulation abilities and problem-solving skills.

### **Special Materials Required of Student**

Graphing calculator

### **Minimum Instructional Facilities**

- 1) Smart classroom with writing boards, overhead projector/screen, graphing utility overhead viewing panels
- 2) Basic skills math lab with computers, writing boards, overhead projector/screen, appropriate software for integrated computer instruction (word processing, spreadsheet and other workplace software)

### **Method of Instruction**

- 1) Lecture and discussion
- 2) Teamwork
- 3) Computer-facilitated instruction

### **Out-of-Class Assignments**

- 1) Problem sets
- 2) Exploratory activities and/or projects
- 3) Reading and/or writing assignments

### **Texts and References**

- 1) Required (representative example): Bittinger, et al. *Elementary and Intermediate Algebra*. Custom edition. Pearson, 2013.
- 2) Supplemental: None

**Exit Skills**

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Operations, simplification and manipulation
  - a. Polynomials
  - b. Factoring
  - c. Rational expressions
  - d. Complex numbers
  - e. Logarithms
  - f. Variables with rational exponents
  - g. Algebraic expressions involving radicals
  - h. Matrices
- 2) Solving mathematical statements
  - a. Linear equations
  - b. Quadratic equations
  - c. Polynomial equations (factorable)
  - d. Rational equations
  - e. Logarithmic equations
  - f. Exponential equations
  - g. Radical equations
  - h. Absolute value equations
  - i. Linear and non-linear systems of equations
  - j. Linear inequalities
- 3) Graphing
  - a. Relations
  - b. Functions and their inverses
  - c. Conic sections
- 4) Modeling and applications
  - a. Functions
  - b. Problem-solving strategies and techniques
  - c. Sequence and series

**Student Learning Outcomes**

Upon successful completion of this course, students will be able to:

- 1) Use analytical, numerical, and graphical methods to solve intermediate algebra problems
- 2) Solve multi-disciplinary application problems and interpret the results in context