

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

MATHEMATICS 175 – COLLEGE ALGEBRA

4 hours lecture, 4 units

Catalog Description

College level course in algebra for majors in science, technology, engineering, and mathematics: polynomial, rational, radical, exponential, absolute value, and logarithmic functions; systems of equations; theory of polynomial equations; and analytic geometry. *Successful completion of MATH 170 and 175 is equivalent to the successful completion of MATH 176. Maximum of 7 units can be earned for successfully completing any combination of MATH 170, 175, 176.*

Prerequisite

Appropriate Placement or Intermediate Algebra

Entrance Skills

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

- 1) Identifying and/or simplifying:
 - a. Linear, quadratic, rational, radical, absolute value, exponential and logarithmic equations
 - b. Polynomial expressions
 - c. Rational expressions
 - d. Algebraic expressions involving radicals and/or rational exponents
 - e. Logarithmic expressions
 - f. Complex numbers
 - g. Basic mathematical formulas from related disciplines
- 2) Solving:
 - a. Algebraic equations
 - b. Logarithmic and exponential equations
 - c. Systems of equations and inequalities
 - d. Applications to a variety of disciplines
- 3) Factoring polynomials
- 4) Functions:
 - a. Determine the domain and range
 - b. Find the inverse
 - c. Perform basic operations
- 5) Graphing, transforming, and/or operating on the following:
 - a. Polynomial, absolute value, exponential and logarithmic functions and their inverses
 - b. Linear and quadratic inequalities
 - c. Systems of equations and inequalities
- 6) Mathematical reasoning and problem solving:
 - a. Inductive and deductive reasoning
 - b. Effective communication of mathematical arguments

Course Content

- 1) Functions including linear, polynomial, rational, radical, exponential, absolute value, logarithmic: definitions, evaluation, domain and range
- 2) Inverses of functions
- 3) Algebra of functions

- 4) Graphs of functions including asymptotic behavior, intercepts, vertices
- 5) Transformations of quadratic, absolute value, radical, rational, logarithmic, exponential functions
- 6) Equations including rational, linear, polynomial, radical, exponential, absolute value, logarithmic
- 7) Linear, nonlinear, and absolute value inequalities
- 8) Systems of equations and inequalities
- 9) Characterization of the zeros of polynomials
- 10) Properties and applications of Complex numbers
- 11) Properties of conic sections
- 12) Sequences and series

Course Objectives

Students will be able to:

- 1) Analyze and investigate properties of functions;
- 2) Synthesize results from the graphs and/or equations of functions;
- 3) Apply transformations to the graphs of functions;
- 4) Recognize the relationship between functions and their inverses graphically and algebraically;
- 5) Solve and apply rational, linear, polynomial, radical, absolute value, exponential, and logarithmic equations and solve linear, nonlinear, and absolute value inequalities;
- 6) Solve systems of equations and inequalities;
- 7) Apply techniques for finding zeros of polynomials and roots of equations;
- 8) Apply functions and other algebraic techniques to model real world STEM applications;
- 9) Analyze conics algebraically and graphically; and
- 10) Use formulas to find sums of finite and infinite series.

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) Exploration activities (both independent and group) which measure students' ability to discover how different parameters affect the graphs or behaviors of linear, quadratic, polynomial, rational, absolute value, exponential, logarithmic and piecewise-defined functions as well as inverse functions and conic equations.
- 2) Homework assignments which measure students' ability to compute with and graph a variety of functions and conics, as well as construct a plan and carry out the plan to solve a diverse collection of real-world application problems.
- 3) Exams, including a comprehensive final exam and quizzes which measure students' ability to:
 - a. Calculate and solve with linear, quadratic, polynomial, rational, absolute value, exponential, logarithmic and piecewise-defined functions as well as inverse functions.
 - b. Sketch graphs of linear, quadratic, polynomial, rational, absolute value, exponential, logarithmic and piecewise-defined functions and inverse functions as well as discuss the functions' domain and range; also sketch graphs of conics.
 - c. Construct functions that models collected data or real-world application problems.
 - d. Utilize sequence and series formula to solve for a sequence term, calculate a sum or solve a sequence related application problem.

Special Materials Required of Student

Graphing calculator

Minimum Instructional Facilities

Smart classroom with whiteboards, graphing utility/viewscreen, overhead projector

Method of Instruction

- 1) Lecture and discussion
- 2) Teamwork
- 3) Instructor-guided discovery and 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): Connolly, Hughes-Hallet, Gleason, et al. *Functions Modeling Change: A Preparation for Calculus*. 6th edition. Wiley, 2019.
- 2) Supplemental: None

Exit Skills

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

- 1) Identifying and/or performing:
 - a. Range and domain of functions
 - b. Operations on functions
 - c. Inverses of functions
 - d. Operations with complex numbers
- 2) Solving:
 - a. Algebraic and absolute value equations and inequalities
 - b. Logarithmic and exponential functions
 - c. n^{th} order systems of equations and inequalities
 - d. Applications from a variety of disciplines
- 3) Analyzing and graphing:
 - a. Algebraic and absolute value functions and inequalities
 - b. Logarithmic and exponential functions
 - c. Conic sections
 - d. Family of curves

Student Learning Outcomes

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

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

*For the complete list of **learning objectives**, please see the **Course Objectives** section