

# MATH 0012 - COLLEGE ALGEBRA

## Catalog Description

Prerequisite: Completion of MATH D or Math G with grade of "C" or better, or placement by matriculation assessment process

Hours: 72 lecture (4 units); 108 lecture (6 units)

Description: Study of algebra topics beyond MATH D; including functions, graphs, logarithms, systems of equations, matrices, analytic geometry sequences, mathematical induction, and introduction to counting techniques. (CSU-with unit limitation, UC-with unit limitation)

## Course Student Learning Outcomes

- CSLO #1: Simplify expressions and solve equations of the following types: linear, quadratic (including some with complex solutions), rational, radical, absolute value, exponential, and logarithmic.
- CSLO #2: Interpret and construct graphs of quadratic, rational, exponential, logarithmic functions, and conic sections.
- CSLO #3: Translate, model, and solve applied problems utilizing polynomial, rational, radical, exponential, logarithmic functions, and matrix algebra.
- CSLO #4: Logically present clear, complete, accurate, and sufficiently detailed solutions to communicate reasoning and demonstrate the method of solving problems.
- CSLO #5: Apply techniques from linear algebra and combinatorics.

## Effective Term

Fall 2020

## Course Type

Credit - Degree-applicable

## Contact Hours

72,108

## Outside of Class Hours

144, 216

## Total Student Learning Hours

216, 324

## Course Objectives

Through homework assignments, quizzes, exams, projects and classroom discussions, the student will:

1. solve equations, including linear, quadratic, polynomial, rational, logarithmic, exponential, absolute value and equations with radicals;
2. simplify algebraic expressions using the order of operations, properties of exponents/radicals, and mechanics of fractions;
3. solve word problems leading to equations from outcome Number 1;
4. graph the solution to a system of linear or non-linear inequalities;
5. graph functions and equations and have the ability to discuss and find intercepts, vertices, and asymptotes (examples of functions: linear, quadratic, polynomial, rational, logarithmic, exponential, radical);
6. solve systems of equations using substitution, elimination

Cramer's Rule or matrices;

7. identify and graph conic sections, labeling the center, vertices, foci, directrices, and asymptotes when applicable;
8. perform binomial expansion using Pascal's Triangle or combinatorics; and
9. identify terms and find finite or infinite sums of arithmetic and geometric sequences and series.
10. utilize the additional time in the 6 unit course to develop prerequisite skills necessary to be successful in the above objectives.

## General Education Information

- Approved College Associate Degree GE Applicability
  - AA/AS - Comm & Analyt Thinking
  - AA/AS - Mathematical Skills
- CSU GE Applicability (Recommended-requires CSU approval)
  - CSUGE - B4 Math/Quantitative Reasoning
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)
  - IGETC - 2A Math/Quan Reasoning

## Articulation Information

- CSU Transferable
- UC Transferable

## Methods of Evaluation

- Objective Examinations
  - Example: Find the real and complex roots of a given polynomial equation. This question is graded based on the clarity, appropriate mathematical vocabulary, the correctness of the method used and of the roots found.
- Problem Solving Examinations
  - Example: Solve a system of equations by applying elementary row operations to reduce a matrix to Row-Echelon Form. This question is graded based on the clarity, appropriate mathematical vocabulary, and the correctness of the solutions found.
- Projects
  - Example: Given an arithmetic or geometric sequence, use Excel to estimate the nth partial sum of the sequence using a minimum of 100 terms. This project is graded based on the clarity, appropriate mathematical vocabulary, the use of the correct formula, and the correct sum of the sequence.

## Repeatable

No

## Methods of Instruction

- Lecture/Discussion
- Distance Learning

Lecture:

1. In class, small group collaborative learning activity - Students will compare how different types of functions can be used in modeling data sets from business, science, and nature. They will then choose the most appropriate model in each case, and make predictions based on the chosen models. (Objective 3)
2. Interactive lecture format is used to develop the concept of sequences. To help students understand the commonalities

and differences between arithmetic and geometric sequences, the instructor will illustrate the concepts both graphically and algebraically. Students will participate verbally and will work several examples. (Objective 9)

#### Distance Learning

1. Assign students to groups using the "People" feature of LMS labeling the "Group Set" name with the "group" feature allows students to have discussion with only members of their group. The assignment can be graded as a group. After reading about the orbits of planets, each group will select a planet and create an elliptical model of the equation of the path of that planet about the sun. (Objective 7)
2. The instructor will do a conference with the students showing the collected responses. They will discuss the different paths, foci, vertices, and perihelion and aphelion for each planet. Students will submit a group summary prompted by questions given by the instructor. (Objective 7)

## Other materials and-or supplies required of students that contribute to the cost of the course.

## Typical Out of Class Assignments

### Reading Assignments

1. In the text read about real world applications of parabolas. Note the significance of the placement of the focus and the importance of the length of the focal diameter.
2. Using mathematical journals found in the library, research the applications of and patterns found in Pascal's Triangle and prepare a presentation about your findings to the class.

### Writing, Problem Solving or Performance

1. Find all zeros for a given 5th degree polynomial using the Rational Zeros Theorem, synthetic division, and other relevant theorems. Use your results to sketch a graph of the function.
2. After the release of radioactive material into the atmosphere from a nuclear power plant at Chernobyl (Ukraine) in 1986, the hay in Austria was contaminated by iodine 131 (half-life 8 days). If it is safe to feed the hay to cows when 10% of the iodine 131 remains, how long did the farmers need to wait to use the hay?

## Other (Term projects, research papers, portfolios, etc.)

### Required Materials

- College Algebra
  - Author: Sullivan
  - Publisher: Pearson/Prentice Hall
  - Publication Date: 2016
  - Text Edition: 10th
  - Classic Textbook?: No
  - OER Link:
  - OER:
- College Algebra
  - Author: Stewart
  - Publisher: Cengage
  - Publication Date: 2016
  - Text Edition: 7th
  - Classic Textbook?: No
  - OER Link:
  - OER: