

MAC1105 Course Outline

College Algebra(3) (P)

Description: This course includes the study of relations; linear, quadratic, exponential, logarithmic, radical, absolute value, rational and polynomial functions, including their properties and graphs; radicals, exponents, complex numbers, and absolute values; and systems of equations and inequalities.

General Education Learning Outcome: The primary General Education Learning Outcome (GELO) for this course is Quantitative Reasoning, which is to understand and apply mathematical concepts and reasoning, and analyze and interpret various types of data. The GELO will be assessed through targeted questions on either the comprehensive final or an outside assignment.

Prerequisite: MAT1033 or MAT1034 with a grade of "C" or better, OR the equivalent.

Rationale: In an increasingly complex world, mathematical thinking, understanding, and skill are more important than ever. This course provides students with skills for proficiency in subsequent mathematics courses and the opportunity to learn to communicate and reason mathematically.

Impact Assessment: From the perspective of graphs, tables, equations, and verbal descriptions, *College Algebra* provides students with skills for proficiency and conceptual understanding of a variety of relations and functions. Many concepts will be introduced using real world data from various areas; and other concepts will be reinforced by applying them to problems in the areas of science, business, economics, and medicine. The course applies toward the General Education mathematics requirement area A for an Associate of Arts degree. MAC1105 is a prerequisite for MAC1114, MAC1140, MAC1147 and MAC2233, and is required for many degrees and programs.

Broad Course Objectives: This course supports the following goals of the Math Department:

- Engage students in sound mathematical thinking and reasoning. This should include students finding patterns, generalizing, and asking/answering relevant questions.
- Provide a setting that prepares students to read and learn mathematics on their own.
- Explore multiple representations of topics including graphical, symbolic, numerical, oral, and written. Encourage students to make connections among the various representations to gain a richer, more flexible understanding of each concept.
- Analyze the structure of real-world problems and plan solution strategies. Solve the problems using appropriate tools.
- Develop a mathematical vocabulary by expressing mathematical ideas orally and in writing.
- Enhance and reinforce the student's understanding of concepts through the use of technology when appropriate.

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As a result of successfully completing MAC1105, students should be able to demonstrate the following:

- Analyze/interpret quantitative data verbally, graphically, symbolically and numerically.
- Communicate quantitative data verbally, graphically, symbolically and numerically.
- Appropriately integrate technology into mathematical processes.
- Use mathematical concepts in problem-solving through integration of new material and modeling.

Topical Outline with Specific Course Objectives:

I. Number Work and Simplifying Skills

- A. Use the properties of radicals, complex numbers, and exponents within the context of solving equations and graphing.
- B. Decide when an exact answer is needed and when an estimate is acceptable. Estimate to a reasonable degree of accuracy.
- C. Define, use and recognize absolute value as distance on the coordinate line.
- D. Discuss the historical and scientific basis for the number “e”.

II. Functions and Relations

- A. Recognize and model linear, quadratic, exponential, logarithmic, absolute value, radical, rational and polynomial functions in various settings including applications.
- B. Know the properties, graphs, and equations of linear, quadratic, exponential, logarithmic, absolute value, radical, rational and polynomial functions.
- C. Identify the domain, range, and inverse for functions or relations expressed graphically or symbolically.
- D. Analyze situations, functions and data from charts, tables and graphs for the purpose of describing behavior (e.g., increasing, decreasing), identifying specific information (e.g., maximum, minimum values), and making predictions (e.g., predicting future trends).
- E. Determine the major characteristics of graphs such as intercepts and asymptotes.
- F. Deduce the possible shape of the graph from a given equation and vice-versa.
- G. Use the algebra of functions and be able to relate it to the graphical representations.
- H. State and illustrate the fundamental properties of inverse functions. Discuss the concept of inverses in a broad context and give examples.
- I. Recognize, use, and discuss the inter-relationships among roots of polynomial functions, factors of polynomials, and solutions of polynomial equations.
- J. Discuss the historical and scientific basis for the logarithm.
- K. Use the properties of exponential and logarithmic functions to solve equations, including equations which arise in applied settings.

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III. *Equations and Systems of Equations and Inequalities*

- A. Choose and apply appropriate methods for solving systems of equations and inequalities, and describe the situation graphically where possible. Justify choice of method.
- B. Describe the relationships among the discriminant, solutions of quadratic equations, and intercepts of parabolas.
- C. Apply appropriate methods for solving quadratic equations, and discuss the advantages and disadvantages of each method.

Evaluation: Each instructor will determine the specific criteria for determining the final course grade. These criteria will be delineated in the first day handout provided to each student. Each instructor will give a ***common*** comprehensive final exam during the assigned final exam period that will account for 25% of the course grade.

Commonality: All instructors will use the same textbook, cover all topics in the topical outline and give a common final exam. A graphing calculator will be required for this course. Either the TI-83 or the TI-84 line of calculators is recommended; any other graphing calculator will need to be approved by the instructor.