

## Math 8025C: Introduction to College Mathematics

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

**Prerequisites: Placement in ACCUPLACER grid 1 or MATH 0099 with a grade of C or better.**

**\*\* Math 8025C: Introduction to College Mathematics with MATH 8825C: Support for Intro to College Math**

### Course Description

Covering the development of the real number system and the fundamental concepts of algebra and geometry, this course is suitable for prospective elementary school teachers or anyone desiring an introduction to college mathematics.

### Course Objectives

1. Introduce students, particularly those on a non-STEM pathway, to set theory, algebra, trigonometry and finance
2. Develop problem solving strategies for students to apply to their course of study
3. Enhance critical thinking skills for non-STEM students

### Learning Outcomes

1. Understand set theory terminology
2. Perform set operations and construct Venn diagrams with two or more sets
3. Investigate the common sets of numbers (natural, whole, integer, rational, irrational, and real)
4. Apply arithmetic operations to the common sets of numbers (see 3)
5. Utilize scientific notation
6. Solve algebraic equations and inequalities in one variable
7. Graph linear equations in two variables
8. Compute calculations with decimals and percentages
9. Calculate sales tax, percent increase/decrease, simple interest, compound interest, and future value
10. Explore basic definitions of geometry, triangle relationships, similar triangles, right triangles, the Pythagorean Theorem, and right triangle trigonometry
11. Solve application problems using any or all the above information

### Course Topics

#### I. INTRODUCTION TO SETS

##### A. Set notation

- a. Definitions of sets and notation
- b. Symbol "is an element of" and "is not an element of"
- c. Cardinal number
- d. Equivalent and equal sets
- e. Finite and infinite sets
- f. Applications

##### B. Venn Diagrams and subsets

- a. Subset and proper subset

- b. Venn diagrams
- c. Applications
- C. Set operations
  - a. Universal set
  - b. Complement
  - c. Intersection
  - d. Union
  - e. Operations with two and three sets
  - f. Applications involving Venn Diagrams
- D. Survey and cardinal numbers
  - a. Using A Venn diagram to visualize survey results
  - b. Applications

## II. NUMBER THEORY AND REAL NUMBER SYSTEM

- A. Prime and composite numbers
  - a. Rules of divisibility
  - b. Prime factorization
  - c. Greatest common divisor
  - d. Least common multiple
  - e. Applications on GCD and LCM
- B. Integers and the order of operations
  - a. Graphing integers on number line
  - b. Using  $<$  and  $>$  symbols to compare values
  - c. Absolute value
  - d. Operations with integers
  - e. Simplifying expressions
  - f. Applications involving order of operations
- C. The rational numbers
  - a. Reduce rational numbers
  - b. Convert between mixed numbers and improper fractions
  - c. Convert between fractions and decimals
  - d. Perform operations with rational numbers
  - e. Applications involving rational numbers
- D. The irrational numbers
  - a. Simplifying square roots
  - b. Problem solving with irrational numbers
- E. Real numbers and their properties
  - a. Subsets of the real numbers
  - b. Properties of the real numbers
  - c. Applications
- F. Exponents and scientific notation
  - a. Properties of exponents
  - b. Simplifying and evaluating exponential expressions
  - c. Convert between scientific and decimal notation

d. Applications

III. INTRODUCTION TO ALGEBRA

- A. Algebraic expressions and formulas
  - a. Evaluate and simplify algebraic expressions and formulas
  - b. Applications
- B. Linear equations
  - a. Solve linear equations
  - b. Applications
- C. Problem solving
  - a. Translating English phrases to algebraic expressions and equations
  - b. Applications
- D. Ratio and proportions
  - a. Solve proportions
  - b. Applications

IV. ALGEBRA: GRAPHING LINEAR EQUATIONS

- A. Graphing and functions
  - a. Rectangular coordinate system
  - b. Plotting coordinates
  - c. Evaluating functions
- B. Linear functions and their graphs
  - a. Intercepts
  - b. Slope and rate of change
  - c. Vertical and horizontal lines
  - d. Graphing linear functions

V. PERCENT AND APPLICATIONS

- A. Percent and sales tax
  - a. Convert between percent, decimal, and fraction
  - b. The percent formula,  $A=PB$
  - c. Sales tax and discounts
  - d. Applications
- B. Simple interest
  - a. Calculate simple interest
  - b. Future and present value
  - c. Applications
- C. Compound interest
  - a. Future and present value
  - b. Effective annual yield
  - c. Comparing investments
  - d. Applications

VI. GEOMETRY

- A. Points, lines, planes, and angles
  - a. Solving problems involving angle measures
  - b. Parallel lines and transversals
  - c. Applications
- B. Triangles
  - a. Angle relationships in a triangle
  - b. Similar triangles
  - c. Pythagorean theorem
  - d. Applications
- C. Right triangle geometry
  - a. Trigonometric ratios
  - b. Finding missing parts using trig ratios
  - c. Applications