Math 0095: Developmental Emporium Mathematics

Course Titles: **Math 0099: Early Foundations of College Mathematics**
Math 0100: Foundations of College Mathematics
Math 0101: Foundations of College Algebra

Credit hours: **4 remediation (in-house) credits.**
Prerequisites: **Completion of, or concurrent enrollment in, ENGL 0850 earning a C or better; or, placement into ENGL 0890 or higher**

Course Description

Math 0099: Early Foundations of College Mathematics
This modular emporium course provides a thorough foundation in the topics of whole numbers, fractions, decimals, ratios and proportions, percentages, and measurement. This course also introduces the real number system, and the properties for solving linear equations and inequalities.

Math 0100: Foundations of College Mathematics
This course provides a thorough foundation in the topics of whole numbers, fractions, decimals, ratios and proportions, percentages, and measurement. This course also introduces the real number system, the properties for solving linear equations and inequalities, the rearrangement of formulas, the rectangular coordinate system, and the graphs of linear equations in two variables, as well as an introduction to basic probability and statistics.

Math 0101: Foundations of College Algebra
This modular emporium course contains additional modules beyond those required for Math 0099 and Math 0100. This course only serves as a remedial prerequisite to Math 1200 and Math 1179. Topics include the properties of exponents, and an introduction to polynomials, factoring, quadratic equations, rational expressions, rational equations, and application problems.

Course Objectives

1. Become proficient in basic arithmetic and basic algebra
2. Form the computational expertise necessary for success in a gateway college mathematics course
3. Develop the critical thinking and study skills necessary for success in a gateway college mathematics course
4. Make the transition from developmental mathematics to college level mathematics
5. Reach a level of mathematical maturity necessary for success in additional math courses
6. Acquire the skills necessary to utilize mathematics in the other disciplines

Learning Outcomes

The learning outcomes for Math 0099, Math 0100, and Math 0101 are organized by module:

Mastery of modules 1-4 is equivalent to completion of Math 0099.
Mastery of modules 1-6 is equivalent to completion of Math 0100.
Mastery of modules 1-8 is equivalent to completion of Math 0101.

Learning Outcomes for each Module:

Module 1:

1) Become confident with addition and multiplication facts (the "times tables").
2) Perform arithmetic operations using whole numbers, including carrying, borrowing, and remainders.
3) Correctly apply the rules for the order of operations.
4) Solve whole number application problems, including perimeter, area and volume.

Module 2:

1) Perform arithmetic operations using fractions, mixed numbers, and decimals.
2) Correctly apply the order of operations when working with fractions, mixed numbers, and decimals.
3) Convert among fractions, mixed numbers, and decimals.
4) Solve fraction, mixed number, and decimal application problems, including perimeter, circumference and area.

Module 3:

1) Write and simplify ratios and rates.
2) Solve proportions for an unknown number.
3) Convert among fractions, decimals, and percentages.
4) Solve percent problems for percentage, rate, base, percent increase, and percent decrease.
5) Convert within the English and metric systems of measurement.

Module 4:

1) Perform arithmetic operations on integers and rational numbers, including the order of operations.
2) Understand the concept of a variable and evaluate algebraic expressions given values for the variables.
3) Solve linear equations and inequalities, involving whole numbers and integers, in one variable.
4) Use a number line to show the solution set to a linear inequality in one variable.

Module 5:

1) Solve linear equations and inequalities, involving decimals and fractions, in one variable.
2) Sketch the graph of the solution set of a linear equation in two variables, including vertical and horizontal lines.
2) Calculate the slope of a line.
3) Write the equation of a line in slope-intercept form and standard form.
5) Solve a right triangle using the Pythagorean Theorem.

Module 6:

1) Solve problems involving the perimeter, circumference, and area of circles, rectangles, and triangles.
2) Solve problems involving the volume of rectangular solids and cylinders.
2) Determine the mean, median, and mode of a data set.
3) Organize and present data.
4) Recognize and interpret information from circle graphs.
5) Compute theoretical and empirical probability.

Module 7:

1) Simplify expressions using the rules of exponents for whole number exponents.
2) Perform arithmetic operations on polynomials.
3) Factor a given polynomial using the GCF, difference of two squares, and trinomials.
4) Solve quadratic equations by factoring.
5) Solve application problems involving quadratic equations.

Module 8:

1) Find values for which a rational expression is undefined.
2) Reduce rational expressions to lowest terms.
3) Perform operations on rational expressions.
4) Solve equations involving rational expressions.
5) Solve application problems involving rational expressions.

Outline of Topics (Syllabus)

I. WHOLE NUMBERS

- B. Place value and word names
- C. Expanded notation and place value
- D. Addition, subtraction, multiplication, and division
- E. Order of Operations

II. PRIMES AND MULTIPLES

- A. Multiples
- B. Divisors and factors
- C. Divisibility tests: 2, 3, 5, 10
- D. Primes and composites
- E. Prime factorization
- F. Least common multiple

III. FRACTIONS AND MIXED NUMBERS

- A. Concept of a fraction
- B. Improper fractions to mixed numbers
- C. Mixed numbers to improper fractions
- D. Equivalent fractions
- E. Reducing fractions to lowest terms
- F. Multiplication with fractions and mixed numbers
- G. Division with fractions and mixed numbers
- H. Least common denominator
- I. Comparing fractions
- J. Addition and subtraction with fractions and mixed numbers
- K. Order of Operations

IV. DECIMALS

- A. Place value and word names
- B. Expanded notation
- C. Converting decimals to fractions and fractions to decimals
- D. Comparing decimals
- E. Approximation by rounding
- F. Addition, subtraction, multiplication and division with decimals
- G. Order of Operations

V. RATIO AND PROPORTION

- A. Concept of ratio and proportion
- B. Solving a proportion for the unknown

VI. PERCENT

- A. Concept of percent
- B. Converting decimals to percentages and percentages to decimals
- C. Converting fractions to percentages and percentages to fractions
- D. Finding percentage, rate, and base using the percent equation
- E. Finding percentage, rate, and base using the percent proportion
- F. Percent of increase/decrease problems

VII. MEASUREMENT

- A. English units
- B. Metric units
- C. Conversion of units within each system

IX. PERIMETER, AREA, SURFACE AREA, AND VOLUME

A. Perimeter and area for rectangles and triangles
B. Circumference and area for circles
C. Surface area and volume for rectangular solids and cylinders

X. PROBLEM SOLVING

A. Techniques for problem solving
B. Application problems involving whole numbers, fractions, decimals, percentages, ratios, proportions, and measurements

XI. ADDITION, SUBTRACTION, MULTIPLICATION, AND DIVISION OF INTEGERS AND RATIONAL NUMBERS

A. Introduction to sets, including definition of integer, rational number, and real number
B. Concept of absolute value
C. Order of operations including Basic Radicals
D. Algebraic expressions
    1. Variables
    2. Terms
    3. Factors
    4. Coefficients
E. Translating English expressions into algebraic expressions
F. Distributive property
G. Evaluating algebraic expressions
H. Combining elementary like terms

XII. SOLVING LINEAR EQUATIONS AND LINEAR INEQUALITIES

A. Techniques of solving
B. Word problems

XIII. GRAPHING LINEAR EQUATIONS IN TWO VARIABLES AND OTHER EQUATIONS

A. Coordinates
B. Plotting points
C. Slope
D. Methods of graphing linear equations
    1. Using a table
    2. Using intercepts
    3. Horizontal and vertical lines
    4. Introduction to graphing a nonlinear equation using a table
E. Slope-Intercept, point-slope, and standard forms
F. Interpreting graphs
G. Rearrange formulas in terms of another variable or other variables

XIV. THE PYTHAGOREAN THEOREM

A. Right Triangles
B. Solve a right triangle using the Pythagorean Theorem

XV. ORGANIZING DATA, MEASURES OF CENTER, AND PROBABILITY

A. Organizing data
    1. Present data with an appropriate display (e.g. bar graphs, circle graphs, etc.)
    2. Recognize deceptions in visual displays
B. Measures of Center
    1. Mean
    2. Median
    3. Mode
C. Compute Theoretical and Empirical probabilities

XV. EXPONENTS, POLYNOMIALS, AND QUADRATIC EQUATIONS

A. Apply the rules of exponents whole number exponents
B. Polynomials
    1. Definition
    2. Add and subtract polynomials by combining like terms
C. Factoring
    1. Greatest Common Factor
    2. Factoring by grouping
    3. Difference of two squares
    4. Trinomials
D. Solve quadratic equations by factoring
E. Applications of quadratic equations

XV. RATIONAL EXPRESSIONS

A. Determine the values for which a rational expression is undefined
B. Rewrite rational expressions in lowest terms
C. Add and subtract rational expressions
D. Solve rational equations
E. Applications of rational expressions