



HOUSATONIC COMMUNITY COLLEGE

COURSE NAME Elementary Algebra Foundations INTENSIVE

COURSE NUMBER MAT095I

CREDITS 6 credit hours

CATALOG DESCRIPTION

Beginning algebra course including signed numbers, algebraic exponents, order of operations, linear equations and inequalities, word problems, formulas, polynomials, and graphing. This course is equivalent to the first year of high school algebra. This course will not satisfy graduation requirements.

PREREQUISITE A satisfactory score on the placement test or successful completion of transitional program in mathematics

General Education Competencies Satisfied:

HCC General Education Requirement Designated Competency Attribute Code(s):

None

Additional CSCU General Education Requirements for CSCU Transfer Degree Programs:

None

Embedded Competency(ies):

None

Discipline-Specific Attribute Code(s):

None

Course objectives:

General Education Goals and Outcomes:

None

COURSE SPECIFIC OBJECTIVES:

1. To add, subtract, multiply, and divide signed numbers
2. To evaluate algebraic expressions
3. To add, subtract, and multiply polynomials
4. To solve first degree equations
5. To solve first degree inequalities
6. To solve application problems involving first degree equations
7. To apply laws of exponents
8. To factor polynomials
9. Exhibit perseverance, ability, and confidence to use mathematics to make sense of and solve problems
10. Perform mental arithmetic and use proportional reasoning
11. Analyze problem situations through numerical, graphical, symbolic and/or verbal approaches and modeling
12. Use appropriate tools strategically in solving problems
13. Recognize patterns, draw inferences
14. Communicate and interpret results
15. Demonstrate an understanding and appreciation of the usefulness of mathematics in everyday life

COURSE OUTLINE

Rational Number:

- a) Identify and distinguish between rational and irrational numbers
- b) Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram and estimate the value of expressions (ea. Pi square, square root of 8)

Expressions and Equations with Polynomials, Rational and Radical Expressions and Integers Exponents:

- a) Interpret parts of an expression, such as terms, factors, and coefficients and evaluate expressions for a given replacement value
- b) Add, subtract, and multiply polynomials. Divide polynomials by a monomial
- c) Construct and interpret equations as two expressions set equal to each other
- d) Manipulate formulas to highlight a quantity of interest, using the same reasoning as in solving equations. ea. rearrange Ohm's Law $V=IR$ to highlight resistance R
- e) Know and apply the properties of integer exponents to generate equivalent numerical expressions. Ea. $3^2 \times 3^{-5} = 3^{-3} = 1/27$
- f) Use square root symbols to represent solutions to equations of the form $X^2 = p$, where P is a positive rational number
- g) Evaluate square roots of perfect squares
- h) Know that numbers such as the square root of 2 are irrational
- i) Express very large or very small quantities in scientific notation

- j) Perform operations with numbers expressed in scientific notation

Linear Equations in One Variable:

- Solve linear equations and inequalities in one variable
- Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms
- Create linear equations and inequalities in one variable and use them to solve real world applications
- Recognize examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions

Linear Equations in Two Variables:

- Interpret the rate and unit rate as the slope of the graph
- Derive the equation $y=mx+b$ for a line intercepting the vertical axis at b and having a slope of m (optional point slope formula: $y-y_1=m(x-x_1)$)
- Identify parallel and perpendicular lines based on their slopes
- Graph a linear equation in two variables
- Construct a linear equation to model a linear relationship between two quantities. Determine and interpret the rate of change and initial value from a description of a relationship or two (x,y) values, including reading these from a table or graph (introduce graphing calculator)
- Construct linear equations given a graph, a description of a relationship, or two input-output pairs (include reading these from a table) using point-slope form and slope-intercept form

System of Linear Equations:

- Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs
- Solve systems of two linear equations in two variables algebraically (using both substitution and addition methods), graphically (by hand and graphing calculator). Solve simple cases by inspection. Ea. $3x+2y=5$ and $3x+2y=6$ have no solution because $3x+2y$ cannot simultaneously be 5 and 6
- Recognize systems of linear equations with one solution, infinitely many solutions, or no solutions
- Solve real-world problems leading to two linear equations in two variables

Functions:

- Understand that a function is a rule that assigns to each input exactly one output and that the graph of a function is the set of ordered pairs consisting of an input and the corresponding output
- Interpret the equation $y=mx+b$ as defining a linear function, whose graph is a straight line
- Use functions to model linear relationships between quantities
- Use function notation to evaluate functions for inputs in their domains
- Graph linear functions and show intercepts
- Recognize that linear functions have a constant rate of change and interpret the rate of change in the context of the problem

Applications:

- a) Apply geometrical formulas for two and three-dimensional figures such as rectangles, circles, rectangular solids, cylinders, spheres, etc.
- b) Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two dimensions

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