

CAPITAL COMMUNITY COLLEGE COURSE OUTLINE

Prealgebra: Number Sense, Geometry and Introductory Algebra Combined

SECTION I

SUBJECT AREA & COURSE NUMBER: MAT* G096

COURSE TITLE: *Prealgebra: Number Sense Geometry and Introductory Algebra Combined*

COURSE CATALOG DESCRIPTION: *Prealgebra: Number Sense, Geometry and Introductory Algebra Combined* addresses the properties of real numbers with emphasis on whole numbers, integers, and rational numbers. The course continues with operations on algebraic expressions, solving linear equations and inequalities, operations on polynomials, laws of exponents, factoring, solving quadratic equations by factoring, graphing equations, finding equations of lines, applying algebra to geometry, introduction to metric system, converting between units of measure, and scientific notation.

Estimation, appropriate use of technology, and basic application problems are included. MAT* G096 combines the content of MAT* G075 with MAT* G094 into a one semester course. This course requires use of a scientific calculator.

LECTURE HOURS PER WEEK: 6

CREDIT HOURS: 0

PREREQUISITES: Qualifying score on Placement Test

SECTION II

A. SCOPE:

The overarching objective of *Prealgebra: Number Sense, Geometry and Introductory Algebra Combined* is to provide the student with an opportunity to acquire the level of understanding of numbers, arithmetic patterns, the variable concept, graphing, and algebraic methods that is required for study of *Intermediate Algebra*. This course addresses foundation topics such as the real number properties with emphasis on whole numbers, integers, and rational numbers as well as more advanced topics such as graphing, solving linear equations (and certain other equations reducible to linear form), solving linear inequalities, operating on polynomials, factoring, and solving quadratic equations by factoring. Other topics include the metric system, converting between units of measure, and scientific notation.

B. REQUIRED WORK: determined by the instructor as described in the course syllabus

C. ATTENDANCE AND PARTICIPATION: Students are expected to attend each class, arrive on time, take exams at the scheduled times, and participate in the in-class learning process. (Specific instructor policies are included on the course syllabus).

D. METHODS OF INSTRUCTION: The methods of instruction are determined by each instructor and may include but are not limited to lecture, lecture/discussion, small group collaborative learning, experiment/exploration, distance learning, student presentations, use of technologies such as audio-visual materials, computer, language laboratory, and calculator.

E. OBJECTIVES, OUTCOMES, ASSESSMENT

The following objectives and outcomes represent the department's core requirements for student achievement. NOTE: (*C identifies learning outcomes continued from prior school work)

LEARNING OBJECTIVES	LEARNING OUTCOMES	ASSESSMENT METHODS
To demonstrate an understanding of:	Student will	As measured by:
1) Number sense	a) Identify place value *C b) Convert between standard form and expanded form representations of numbers c) Add, subtract, multiply and divide whole numbers, integers, rational numbers and decimals *C d) Apply order-of-operation conventions e) Convert from one number representation (fraction, decimal, percent) to another f) Arrange real numbers in order *C g) Calculate b^n where b is a whole number, integer, fraction, or decimal and n is an integer with $n \geq -1$ h) Estimate answers by rounding components *C	Written in-class quizzes, tests, and examinations: presentations to the class; out-of-class projects; written reports; portfolios; class participation; homework assignments
2) The variable concept	a) Convert between English statements with "unknowns" and their mathematical equivalents b) Evaluate mathematical expressions c) Apply mathematical rules to specific cases	
3) The real number properties and how to apply them	a) Identify field properties b) Identify the zero-factor property c) Apply the field properties	
4) First degree equations in one variable	a) Simplify each side of an equation b) Apply the addition, subtraction, multiplication, and division properties of equality to reduce an equation to the form $x = k$ c) Check answer	
5) Basic applications	a) Formulate basic word problems, including those that involve ratios, proportions, and rates, as algebraic equations b) Find solutions and check results c) Use learning technologies as appropriate	
6) Basic geometry concepts	a) Measure length of a line segment *C b) Apply algebra to find the perimeter and area of a rectangle, square, triangle, and circle *C c) Apply algebra to find the perimeter and area of a parallelogram and trapezoid d) Apply algebra to find angle measure e) Apply algebra to find length using similar triangles f) Express and apply basic relationships among angles using degree measure	
7) Simple graphs	a) Read and interpret a variety of simple graphs b) Properly locate numbers on the Real number line c) Graph sets of ordered pairs d) Find the ordered pairs associated with a set of points	
8) Simple notation	Recognize and use: a) x^{-1} as the reciprocal of x b) $-x$ as the opposite of x c) $ x $ as the absolute value of x d) An expression enclosed by parentheses as "the quantity represented by the expression"	

E. OBJECTIVES, OUTCOMES, ASSESSMENT Continued:

Learning Objectives	Learning Outcomes	Assessment Methods
To demonstrate an understanding of:	Student will:	As measured by:
9) Foundation concepts for algebra	<ul style="list-style-type: none"> a) Identify and use real number properties, including the inverse and identity properties, and the zero factor property b) Add, subtract, multiply, and divide signed numbers, including rational numbers represented in fraction or decimal form c) Simplify algebraic expressions – application of properties, like terms, order of operations d) Evaluate powers having integer exponents e) Use laws of exponents where the exponents are integers 	Written in-class quizzes, tests, and examinations; presentations to the class; out-of-class projects; written reports; portfolios; class participation; homework assignments
10) Concepts related to equations and inequalities	<ul style="list-style-type: none"> a) Solve equations that can be reduced to a linear equation in one variable <ul style="list-style-type: none"> i) Apply addition, subtraction, multiplication and division properties of equality to reduce equations to the form, $x = k$ ii) Substitute given numbers in a formula to produce an equation in one variable b) Solve an equation in several variables for a first degree variable in terms of the remaining variables – concept of formula, literal equation c) Formulate a linear equation that models an authentic situation, and use the equation to explore the situation d) Write an inequality based on a given authentic situation e) Solve linear inequalities in one variable f) Solve a quadratic equation in one variable by factoring g) Define, find, and use real roots of numbers 	
11) Concepts related to polynomials	<ul style="list-style-type: none"> a) Identify a polynomial and use pertinent terminology b) Evaluate a polynomial c) Add, subtract, and multiply polynomials; divide a polynomial by a monomial d) Factor polynomials over the integers (common factor, difference of squares, general trinomials, perfect square trinomials, factoring by grouping) e) Solve an authentic problem that is modeled by a polynomial relationship 	
12) Concepts related to the graph of an equation in two variables	<ul style="list-style-type: none"> a) Find the solution of a linear equation in two variables – ordered pairs b) Properly label a coordinate system and set up scales for the axes c) Graph sets of ordered pairs on a coordinate system d) Graph a linear equation in two variables by plotting ordered pair solutions e) Graph a linear equation in two variables by plotting the x-and y-intercepts f) Calculate and interpret the slope of a line g) Graph the equation of a line using its slope and y-intercept h) Given two points on a line, find its equation in point-slope and slope-intercept form i) Formulate a linear equation in two variables that models an authentic situation and use the equation to explore the situation 	

E. OBJECTIVES, OUTCOMES, ASSESSMENT Continued:

Learning Objectives	Learning Outcomes	Assessment Methods
To demonstrate an understanding of:	Student will:	As measured by:
13) Applications of algebra to geometry and measurement	a) Apply algebra to find the volume of a rectangular prism, cylinder, cone, and sphere b) Apply algebra to find length using similar triangles c) Apply algebra to find length using the Pythagorean Theorem d) Solve an authentic situation that is geometry based, and use the solution to explore the situation e) Use the Metric System for area, volume/ capacity (units cubed, liters), mass, weight, temperature, time f) Convert between units of measure - use dimensional (unit) analysis g) Perform calculations using scientific notation <ul style="list-style-type: none"> • Convert from scientific notation to standard form and vice versa • Justify and use the following identities $(aA)(bB) = (ab)(AB)$ $\frac{aA}{bB} = \frac{a}{b} \cdot \frac{A}{B}$ • Carry out operations using scientific notation h) Solve a problem embedded in an authentic situation that involves measurement and convert between measurements expressed in different units	Written in-class quizzes, tests, and examinations; presentations to the class; out-of-class projects; written reports; portfolios; class participation; homework assignments

Note 1: The foregoing table of learning outcomes should not be considered exhaustive; other learning outcomes may also support the objectives. The list is not intended to limit the learning outcomes that can be used to achieve the objectives.

Note 2: The order in which the learning outcomes are addressed and the relative emphasis given to each will vary from instructor to instructor.

Note 3: There is no expectation that an instructor will employ all the assessment methods or any particular set of them. Also, the list of applicable assessment methods is not exhaustive. Other methods that measure the learning outcomes may be used.

Note 4: It is important to recognize that courses are not delivered in a social vacuum. Any bona fide assessment of a course must take account of out-of-class life demands on students that adversely impact academic success.

F. TEXTS AND MATERIALS: A text selected by the Mathematics Section of the Science and Mathematics Department with content and presentation that support the Objectives and Outcomes given in Part E above.

G. INFORMATION TECHNOLOGY: A scientific calculator