Course Outline

Course Title: Developmental Mathematics: A Modular Approach
Common Course Title: MAT0057
Effective Term: Spring 2017 (Jan 9, 2017)   Next Review : Aug 1, 2019
Credit Hours: 4 Units   Contact Hour Breakdown: *(Per 16 week Term)*

Total: 64
Lecture: Lab:
Clinic: Other:

Requirements

This course does not have any required pre-requisites or co-requisites.

Course Description:

This course is designed to satisfy the requirements of both MAT0018C and MAT0028C in one semester. The course is delivered in a guided, self-paced format.

Course Outline

UNITS and take a test after each unit. In addition, there is a final exam. **UNITS**

Unit 1 : Whole Numbers: Operations and Applications

General Outcome
1.0 The student shall be able to perform operations involving whole numbers and solve appropriate word problems without the aid of a calculator.

Specific Learning Outcomes
1.1 Graph whole numbers on a number line.
1.2 Identify the place values of each digit of a whole number.
1.3 Write whole numbers using words, and vice versa.
1.4 Round whole numbers to a given place value.
1.5 Determine which of two whole numbers is greater using inequality symbols.
1.6 Identify the properties and words/phrases associated with the operations of addition, subtraction, multiplication, division, and exponentiation of whole numbers (e.g. sum, quotient, less than, a multiple of, cubed).
1.7 Translate word phrases into mathematical expressions, and vice versa (e.g. five less than twice a number = 2n – 5).
1.8 Apply "shortcut rules" for divisibility by 2, 3, 5, 9, and 10.
1.9 Add, subtract, multiply, divide, and exponentiate whole numbers.
1.10 Simplify numerical expressions using the order of operations, including absolutevalue.
1.11 Define the terms "prime number" and "composite number."
1.12 Determine whether a whole number is prime, composite, or neither.
1.13 Determine all factors of whole numbers.
1.14 Determine the prime factorization of whole numbers.
1.15 Solve appropriate word problems using operations on whole numbers, includingperimeter and area.

Unit 2 : Integers: Operations and Applications

General Outcome
2.0 The student shall be able to perform operations involving integers and solve appropriate word problems without the aid of a calculator.

Specific Learning Outcomes
2.1 Graph integers on a number line.
2.2 Define the term "absolute value."
2.3 Evaluate the absolute value of numbers and of numerical expressions.
2.4 Determine which of two integers is greater using inequality symbols.
2.5 Identify the properties and words/phrases associated with the operations of addition, subtraction, multiplication, division, and exponentiation of integers.
2.6 Translate word phrases into mathematical expressions, and vice versa.
2.7 Add, subtract, multiply, divide, and exponentiate integers.
2.8 Simplify numerical expressions using the order of operations.
2.9 Solve appropriate word problems using operations on integers.

Unit 3 : Fractions and Mixed Numbers: Operations and Applications

General Outcome
3.0 The student shall be able to perform operations involving fractions and mixed numbers and solve appropriate word problems without the aid of a calculator.

Specific Learning Outcomes
3.1 Identify the numerator and denominator of fractions, and explain what each represents.
3.2 Represent fractions pictorially, and determine the fraction represented by a figure (e.g. the portion of a shaded figure).
3.3 Determine when a fraction is undefined.
3.4 Define the terms "proper fraction," "improper fraction," and "mixed number."
3.5 Identify fractions as proper or improper.
3.6 Write improper fractions as mixed numbers, and vice versa.
3.7 Graph fractions and mixed numbers on a number line.
3.8 Determine equivalent representations of integers, fractions and mixed numbers.
3.9 Reduce fractions and mixed numbers to lowest terms.
3.10 Determine the least common denominator of two fractions.
3.11 Identify which of two fractions/mixed numbers is greater using inequality symbols.
3.12 Determine the reciprocal of integers, fractions, and mixed numbers.
3.13 Identify the properties and words/phrases associated with the operations of addition, subtraction, multiplication, division, and exponentiation of fractions and mixed numbers.
3.14 Translate word phrases into mathematical expressions, and vice versa.
3.15 Add, subtract, multiply, divide, and exponentiate fractions and mixed numbers.
3.16 Simplify numerical expressions using the order of operations.
3.17 Solve appropriate word problems using operations on fractions and mixed numbers.

Unit 4 : Decimal Numbers: Operations and Applications

General Outcome
4.0 The student shall be able to perform operations involving decimal numbers and solve appropriate word problems without the aid of a calculator.

Specific Learning Outcomes
4.1 Graph decimal numbers on a number line.
4.2 Identify the place values of each digit of a decimal number.
4.3 Round a decimal number to a given place value.
4.4 Rewrite terminating decimal numbers as a fraction or a mixed number, and vice versa.
4.5 Rewrite appropriate fractions as repeating decimals.
4.6 Define the terms "rational number," "irrational number," and "real number."

4.7 Define the terms "set" and "element" with regard to sets of numbers.
4.8 Classify sets of numbers.
4.9 Identify which of two decimal numbers is greater using inequality symbols.
4.10 Identify the properties and words/phrases associated with the operations of addition, subtraction, multiplication, division, and exponentiation of decimal numbers.
4.11 Translate word phrases into mathematical expressions, and vice versa.
4.12 Add, subtract, multiply, divide, and exponentiate decimal numbers.
4.13 Estimate sums, differences, products, and quotients of decimal numbers by rounding.
4.14 Add, subtract, multiply, divide, and exponentiate rational numbers presented in any mixture of formats, and simplify numerical expressions using the order of operations.
4.15 Identify the associative, commutative, distributive, identity, and inverse properties of numbers, and manipulate numerical and algebraic expressions using these properties
4.16 Solve appropriate word problems using operations on real numbers.

Unit 5 : Linear Equations and Inequalities in One Variable

General Outcome
5.0 The student shall be able to (1) solve linear equations and inequalities in one variable, (2) express solutions to linear inequalities in one variable using inequality notation, interval notation, and a number-line graph and (3) solve appropriate word problems.

Specific Learning Outcomes
5.1 Write an algebraic expression and simplify.
5.2 Simplify and evaluate algebraic expressions involving one variable.
5.3 Determine if a given variable value is a solution to an equation or inequality in one variable.
5.4 Solve one-step and multi-step linear equations in one variable. Include equations that involve any mixture of numbers (i.e. integers, fractions, mixed numbers and decimals)
5.5 Solve one-step and multi-step linear inequalities in one variable.
5.6 Solve linear equations and inequalities in one variable with variables on both sides of the equal sign.
5.7 Solve linear equations and inequalities in one variable requiring use of the distributive property.
5.8 Identify linear equations in one variable as conditional, a contradiction, or an identity and identify the solutions as a real number, the empty set, or all real numbers.
5.9 Solve appropriate algebraic and geometric word problems by modeling them with linear equations in one variable.
5.10 Solve literal equations for a specified variable.
5.11 Present solutions to linear inequalities in one variable in three ways: inequality notation, interval notation, and graphically on a number line.

Unit 6 : Ratios, Rates, Proportions, and Percents

General Outcome
6.0 The student shall be able to (1) write, simplify, and manipulate ratios, rates, and percentages, (2) create and solve proportions, and (3) solve appropriate word problems without the aid of a calculator.

Specific Learning Outcomes
6.1 Define the terms "ratio," "rate," and "proportion."
6.2 Write ratios using reduced-fraction notation.
6.3 Write rates using reduced-fraction notation.
6.4 Determine if two rational numbers are proportional.
6.5 Set up and solve proportions.
6.6 Set up and solve appropriate word problems using ratios, rates, and proportions.
6.7 Define the term "percent."
6.8 Rewrite a percent as a decimal number and as a fraction or a mixed number, and vice versa.

6.9 Solve basic percent problems using linear equations in one variable and/or proportionalities. For example: Twelve is 15% of what number? What percent of 10 is 35?
6.10 Solve appropriate word problems involving percents, including percent increase/decrease, taxes, commissions, and simple interest.

Unit 7 : Rules of Integer Exponents

General Outcome
7.0 The student shall be able to simplify product and quotient expressions incorporating variables with integer exponents using appropriate rules of integer exponents.

Specific Learning Outcomes
7.1 Apply the product rule for exponents to simplify appropriate variable expressions.
7.2 Apply the quotient rule for exponents to simplify appropriate variable expressions.
7.3 Apply the power rules for exponents to simplify appropriate variable expressions.
7.4 Apply the zero-exponent rule to simplify appropriate variable expressions.
7.5 Apply the negative-exponent rule to simplify appropriate variable expressions.
7.6 Apply any combination of exponent rules to simplify appropriate variable expressions.
7.7 Express standard numbers in scientific notation and vice versa.

Unit 8 : Polynomial Expressions, Quadratic Expressions, and Quadratic Equations

General Outcome
8.0 The student shall be able to (1) identify, perform operations on, and factor polynomial expressions; (2) solve quadratic equations in one variable; and (3) solve appropriate word problems.

Specific Learning Outcomes
8.1 Identify polynomial expressions.
8.2 Define the terms "leading term (of a polynomial)" and "degree (of a polynomial)."
8.3 Identify the leading term and the degree of polynomials.
8.4 Recognize if a given polynomial is a monomial, binomial, or trinomial.
8.5 Evaluate the numerical value of polynomial expressions given the value of the variable.
8.6 Add, subtract, and multiply polynomials.
8.7 Divide polynomials by monomials.
8.8 Factor out the GCF of polynomials' terms.
8.9 Factor polynomial expressions by grouping.
8.10 Factor binomial expressions that are differences of perfect squares.
8.11 Factor non-prime quadratic trinomials, including perfect square trinomials.
8.12 Solve non-prime polynomial equations in one variable by factoring.
8.13 Solve appropriate algebraic and geometric word problems by modeling them with non-prime quadratic equations in one variable.

Unit 9 : Rational Expressions

General Outcome
9.0 The student shall be able to identify and simplify rational expressions.

Specific Learning Outcomes
9.1 Determine value(s) of the variable for which rational expressions are undefined.
9.2 Simplify rational expressions by canceling common monomial and binomialfactors of the numerator and denominator.
9.3 Multiply rational expressions.

9.4 Divide rational expressions.
9.5 Add and subtract rational expressions with monomial denominators.

Unit 10 : Radical Expressions

General Outcome
10.0 The student shall be able to identify, simplify, and perform operations of addition and subtraction on radical expressions.

Specific Learning Outcomes
10.1 Define the terms "square root," "radical," and "radicand."
10.2 Simplify square root numerical expressions.
10.3 Identify the square root of a negative number as not real.
10.4 Simplify square root variable expressions.
10.5 Add and subtract square root expressions.
10.6 Multiply square roots.
10.7 Solve appropriate word problems using the Pythagorean Theorem.
10.8 Rationalize the denominator (monomial denominators only)

Unit 11 : Geometric Calculations

General Outcome
11.0 The student shall be able to name and calculate various measurements associated with basic two-dimensional shapes without the aid of a calculator.

Specific Learning Outcomes
11.1 Identify a triangle, parallelogram, rectangle, square, trapezoid and circle.
11.2 Define the terms "perimeter," "area," "radius," "diameter," and "circumference."
11.3 Calculate the perimeter of triangles, parallelograms, rectangles, squares, and trapezoids with appropriate units.
11.4 Solve geometric applications involving the circumference of circles (using
3.14 or 22/7 as approximations for π) with appropriate units.
11.5 Solve geometric applications involving the area of triangles, parallelograms, rectangles, squares, trapezoids, and circles (using
3.14 or 22/7 as approximations for π) with appropriate units.

Unit 12 : Measurements and Unit Analysis

General Outcome
12.0 The student shall be able to identify and convert among units of measurement without the aid of a calculator.

Specific Learning Outcomes
12.1 Convert between different U.S. system units for a given measurement using unit analysis.
12.2 Convert between different metric system units for a given measurement using decimal-point translation.
12.3 Convert units of measurement across measurement systems.

Unit 13 : The Rectangular Coordinate System

General Outcome
13.0 The student shall be able to (1) identify the quadrants of the rectangular coordinate system, (2) plot points corresponding to ordered-pair coordinates, and (3) identify the ordered-pair coordinates of points plotted on the rectangular coordinate system.

Jun 19, 2018 12:19 PM

Specific Learning Outcomes
13.1 Identify and draw the rectangular coordinate system axes.
13.2 Identify and name each quadrant of the rectangular coordinate system.
13.3 Define the term "origin," and identify the origin of the rectangular coordinate system.
13.4 Plot points on the rectangular coordinate system (including points on the axis) representing given ordered-pair coordinates.
13.5 Give the ordered-pair coordinates of points plotted on the rectangular coordinate system.

Unit 14 : Slopes and Lines

General Outcome
14.0 The student shall be able to (1) evaluate and interpret the slope of a line, (2) graph lines given two points or a point and the slope, (3) use the slope to determine additional points on a line, and (4) graph horizontal and vertical lines

Specific Learning Outcomes
14.1 Explain what it means to be a solution to an equation in two variables.
14.2 Determine if a given ordered pair is a solution to an equation in two variables.
14.3 Define the terms "x- (or horizontal) intercept" and "y- (or vertical) intercept."
14.4 Sketch the graphs of linear equations in two variables given any two points.
14.5 Sketch the graphs of linear equations in two variables given the x- and y- intercepts.
14.6 Sketch the graphs of linear equations in two variables using slope-intercept form.
14.7 Identify and determine the x- and y-intercepts of graphs of linear equations of two variables.
14.8 Sketch horizontal and vertical lines using their equations.
14.9 Determine the equations of horizontal and vertical lines.
14.10 Evaluate the slopes of horizontal, vertical, and diagonal lines from a graph, an equation, and using the slope formula.
14.11 Sketch graphs of linear equations in two variables given any point and the slope.
14.12 Use the slope to determine additional points on the graph of a line.

Jun 19, 2018 12:19 PM