Course Title: Vocational/Technical Mathematics
Prefix and Course Number: MATH 100

Course Learning Outcomes:
By the end of this course, a student should be able to:

– Perform basic operations (addition, subtraction, multiplication and division) on whole numbers.
– Convert between mixed numbers and improper fractions.
– Arrange a given set of fractions from smallest to largest.
– Perform order of operations on integers, decimals, and fractions.
– Solve inverse and direct variation problems.
– Convert between decimals, percent, and fractions.
– Solve linear equations in one variable.
– Understand multiplication of polynomials.
– Understand factoring of polynomials.
– Solve quadratic equations by factoring.
– Understand, solve, and graph linear equations in two variables.
– Construct tables, pie charts, bar graphs, and histograms as needed.
– Solve systems of linear equations.
– Perform angle measurement.
– Find area and perimeter of polygons and circles.
– Apply the Pythagorean Theorem.
– Solve right triangles.
– Find exact and approximate values for the sine, cosine, and tangent of an angle.
– Solve oblique triangles using geometry and trigonometry.
– Solve word problems relevant to the student's professional/technical area.
– Understand units of measure and perform conversions related to student's professional/technical area.

Course Outline:

I.   Whole Numbers
      A review of the four fundamental operations of arithmetic, including both pencil and paper algorithms and the use of the hand-held calculator; exponents, divisibility rules, and prime factorization. Problem solving related to the student's professional/technical goal.
      A. Write numeral form from word names.
      B. Write word names from numeral form.
      C. Find the sum of two or more whole numbers.
      D. Find the difference between two whole numbers.
II.   Fractions
      A review of the four fundamental operations using fractions and mixed numbers; algorithms for finding least common denominator; calculator algorithms.
      Problem solving related to the student's professional/technical goals.

     A. Write a function to describe parts of units (unit regions or unit groups).
     B. Change improper fractions to mixed numbers.
     C. Change mixed numbers to improper fractions.
     D. Find the product of two or more numbers written as fractions.
     E. Write a fraction with a required denominator that is equivalent to a given fraction.
     F. Arrange a given group of fractions in order of value from smallest to largest.
     G. Reduce a given fraction to lowest terms.
     H. Find the product of numbers written as fractions or mixed numbers and reduce the product to lowest terms.
     I. Find the reciprocal of a given natural number, fraction, or mixed number.
     J. Find the quotient of two numbers written as fractions, mixed numbers, or whole numbers.
     K. Find the sum of two or more numbers written as like fractions.
     L. Find the sum of two or more numbers written as unlike fractions.
     M. Find the sum of two or more numbers written as mixed numbers and/or whole numbers.
     N. Find the difference of two numbers written as fractions.
     O. Find the difference of two numbers written as mixed numbers.
     P. Perform any combination of operations (addition, subtraction, multiplication, division, and/or exponentiation) on numbers written in fraction form in the conventional order.
     Q. Solve problems in the student's professional/technical area using fractions, mixed numbers, and whole numbers.

III. Ratio, Proportion, and Percent
A review of ratio, proportion, and variation and applications of them related to the student's professional/technical goal. A review of percent and percent applications related to the student's professional/technical goal.

     A. Write a fraction that shows a ratio comparison of two numbers or two denominate numbers.
     B. Determine whether or not a given proportion is true.
     C. Find the missing number that will make a given proportion true.
     D. Solve word problems using proportions in the student's professional/technical area.
     E. Solve problems using direct variation.
     F. Solve problems using inverse variation.
     G. Write a percent to express a comparison of two numbers or quantities.
     H. Write a given decimal as a percent.
     I. Write a decimal which is equivalent to a given percent.
     J. Change a given fraction or mixed number to a percent.
     K. Change percents to fractions or mixed numbers.
     L. Write a percent as a decimal and as a fraction.
     M. Write a fraction as a decimal and as a percent.
     N. Write a decimal as a percent and as a fraction.
     O. Solve problems that are written in the form "A is R% of B" or "R% of B is A."
     P. Solve word problems involving percent in the student's professional/technical area.

IV. Review of Algebra
A review of basic algebraic concepts and problem solving strategies related to the student's professional/technical goals.
  A. Introduction to algebra.
  B. Solving linear equations.
  C. Introduction to products and factoring procedures.
  D. Solving quadratic equations by factoring.
  E. Graphing ordered pairs, linear equations and inequalities. Constructing tables, pie charts, bar graphs, and histograms.
  F. Solving systems of linear equations.
V. Geometry
  A. Angle measurement.
  B. Area and perimeter of polygons.
  C. Triangles, hexagons, and irregular polygons.
  D. Circles.
VI. Right Triangle Trigonometry
Definitions of the trigonometric functions in a right triangle, Law of Sines, Law of Cosines, with applications related to the student's professional/technical goals.
  A. Find the degree measure of the third angle in a triangle given two of the angles.
  B. Given any two sides of a right triangle find the sine, cosine, and/or tangent of either acute angle.
  C. Find the exact value of the sine, cosine, and/or tangent of an angle of 30, 45, and 60.
  D. Find the approximate value of the sine, cosine, and/or tangent of any acute angle from a table or a calculator with keys for trigonometric ratios.
  E. Find the acute angle, to the nearest tenth of a degree, given the value of its sine, cosine, and/or tangent.
  F. Solve a right triangle.
  G. Find the approximate value of the sine, cosine, and tangent of an obtuse angle using a table or calculator with trigonometric keys.
  H. Find the measure of an obtuse angle given the value of its sine, cosine, or tangent.
  I. Solve an oblique triangle given all three sides and no angles.
  J. Solve an oblique triangle given two sides and the angle formed by them.
  K. Solve an oblique triangle given any two sides and the angle opposite one of them.
  L. Solve an oblique triangle given any two angles and the side opposite one of them.
VII. Conversions and Units of Measure
Units of measure and conversions related to the specific professional/technical program will be introduced and such activities will be integrated throughout the curriculum.
VIII. Applications
Problem solving activities related to the specific professional/technical program will be introduced and such activities will be integrated throughout the curriculum.