COMMON COURSE OBJECTIVES FOR MATD 0370 ELEMENTARY ALGEBRA (Revised July 2004):

The following objectives are listed in a sequence ranging from the simple to the more complex. As such, this document should not be viewed as a chronological guide to the course, although some elements naturally will precede others. These elements should be viewed as mastery goals which will be reinforced whenever possible throughout the course.

Overall objectives:

A. Students will feel a sense of accomplishment in their increasing ability to use mathematics to solve problems of interest to them or useful in their chosen fields. Students will attain more positive attitudes based on increasing confidence in their abilities to learn mathematics.

B. Students will learn to understand material using standard mathematical terminology and notation when presented either verbally or in writing.

C. Students will improve their skills in describing what they are doing as they solve problems using standard mathematical terminology and notation.

1. Description and classification of whole numbers, integers, and rational numbers using sets and the operations among them
   a. identify and use properties of real numbers
   b. simplify expressions involving real numbers
   c. evaluate numerical expressions with integral exponents

2. Polynomials
   a. distinguish between expressions that are polynomials and expressions that are not
   b. classify polynomials in one variable by degree and number of terms
   c. simplify polynomials
   d. add, subtract, multiply, and divide polynomials (including the use of long division techniques and the distributive law)
   e. factor polynomials in one or more variables (including factoring out the greatest common factor, factoring by grouping, factoring trinomials in which the leading coefficient is one, factoring trinomials in which the leading coefficient is not one, and factoring the difference of two squares)
   f. understand and use the exponent laws involving integer exponents
   g. convert numbers into and out of scientific notation and perform multiplication and division with numbers written in scientific notation

3. Solve linear equations in one variable involving integral, decimal, and fractional coefficients and solutions

4. Solve and graph linear inequalities

5. Application problems
   a. write and evaluate linear expressions from verbal descriptions
b. solve application problems which lead to one of the following types of equations: linear equations in one variable, systems of two linear equations in two variables, quadratic equations

c. solve literal equations for a specified variable using addition and multiplication principles

d. use given data to estimate values and to evaluate geometric and other formulas

e. solve problems involving the Pythagorean theorem

6. Linear equations in two variables

a. identify the relationship between the solution of a linear equation in two variables and its graph on the Cartesian plane

b. understand and use the concepts of slope and intercept

c. determine slope when two data points are given

d. graph a line given either two points on the line or one point on the line and the slope of the line

e. write an equation of a line given one point on the line and the slope of the line, or two points on the line

f. identify lines given in standard, point-slope, or slope-intercept forms and sketch their graphs

g. solve systems of linear equations

7. Quadratic equations

a. find solutions to quadratic equations using the technique of factoring and using the principle of square roots

b. recognize a need to use the quadratic formula to solve quadratic equations and solve quadratic equations by using the quadratic formula when simplification of square roots other than perfect squares is not needed

8. Description and classification of irrational numbers

a. simplify perfect square radical expressions

b. use decimal approximations for radical expressions

9. Rational expressions

a. determine for which value(s) of the variable a rational expression is undefined

b. simplify rational expressions containing monomials, binomials, and trinomials

c. multiply and divide rational expressions containing monomials, binomials, and trinomials

d. add and subtract rational expressions with like denominators

10. Geometry

a. understand the difference between perimeter and area and be able to use formulas for these appropriately

b. solve application problems involving angles and polygons