I. GENERAL DESCRIPTION
   A. Approval Date          December 2011
   B. Department             Mathematics
   C. Course Number          MATH 60
   D. Course Title           Intermediate Algebra
   E. Course Outline Preparer(s) Kerin Keys, Mary Bravewoman, Guy De Primo, Amy McLanahan, Cindy Moody, Sara Peterson
   F. Department Chair       Dennis Piontkowski
   G. Dean                   David Yee

II. COURSE SPECIFICS
   A. Hours                  Lecture: 4 weekly (70 total)
                              Conference: 1 weekly (17.5 total)
   B. Units                  4
   C. Prerequisites          MATH 40 or placement in MATH 60
   Corequisites              None
   Advisories                MATH 50 or MATH 55
   D. Course Justification   This course meets the associate degree requirement for mathematics and is the prerequisite for courses that meet the CSU/UC quantitative reasoning requirement. This course provides basic mathematical computation and reasoning skills that are used in many other disciplines as well as later mathematics courses.
   E. Field Trips            No
   F. Method of Grading      Letter
   G. Repeatability          0

III. CATALOG DESCRIPTION
Polynomial and rational expressions; radicals and rational exponents; complex numbers; equations and inequalities; systems of linear equations; distance formula, lines, circles, and parabolas; introduction to functions; introduction to exponential functions and logarithms; and applications. Emphasis on strengthening mathematical communication skills, problem solving skills, and use of multiple representations of functions.

IV. MAJOR LEARNING OUTCOMES
Upon completion of this course a student will be able to:
   A. Demonstrate fluency in simplifying and performing addition, subtraction, multiplication, and division with absolute value, polynomial, exponential, and radical expressions.
   B. Demonstrate competence in simplifying and performing addition, subtraction,
multiplication, and division of rational expressions.

C. Demonstrate proficiency in solving linear, literal, quadratic, higher order polynomial (factorable), absolute value, rational, and radical equations, as well as linear, absolute value, quadratic, and rational inequalities.

D. Identify functions, interpret functions, use function notation, and find domains and ranges of functions specified by tables of values, graphs, equations in two variables, and verbal descriptions.

E. Use substitution to solve 2x2 linear systems, to factor polynomials, and to compute function values.

F. Identify key features of and sketch the graphs of lines, parabolas, basic exponential functions, square root functions, the reciprocal function, and circles.

G. Use a generalized problem-solving process to solve applications of linear equations, 2x2 linear systems, rational equations, and quadratic equations.

V. CONTENTS

A. The Real Numbers
   1. Review of the basic subsets of the real numbers: natural numbers, whole numbers, integers, rational numbers, and irrational numbers
   2. Sets
      a. Language and notation
      b. Union and intersection
      c. Interval notation
   3. Review of inequality notation
   4. Review of opposite and absolute value
   5. Review of order of operations

B. Review of Simplifying Algebraic Expressions
   1. Combining like terms
   2. Distributive law

C. Linear and Absolute Value Equations and Inequalities
   1. Review of solving linear equations in one variable
   2. Solving literal equations for a specified variable
   3. Solving absolute value equations
   4. Solving inequalities in one variable
      a. Review of solving single inequalities
      b. Solving compound inequalities and double inequalities
      c. Solving absolute value inequalities
      d. Interval notation including unions
      e. Graphing solutions on the number line

D. Linear Equations in Two Variables and Their Graphs
   1. Linear equations in two variables
      a. Review of slope-intercept form
      b. Point-slope form
      c. Standard form
   2. Graphing linear equations in two variables
      a. Review of making tables of values and plotting at least two points
      b. Review of x- and y-intercepts
      c. Slope as rate of change
d. Relationship of slopes of parallel and perpendicular lines
e. Review of graphing using slope and one point on the line
3. Finding the equation of a line satisfying given conditions
E. Review of Solving 2 x 2 Systems of Linear Equations
1. Graphing
2. Substitution
3. Elimination by addition
F. Problem Solving
1. Applications of linear equations and systems of linear equations
   a. Mixture problems
   b. Rate problems
   c. Shared work problems
   d. Linear model and break-even problems
   e. Interpreting information from linear graphs in terms of real world situations
2. Applications of rational equations
   a. Rate problems
   b. Shared work problems
3. Applications of quadratic equations
   a. Area problems
   b. Pythagorean theorem problems
G. Exponents
1. Exponent definitions
   a. Review of natural number exponents
   b. Review of integer exponents
   c. Rational exponents
2. Properties of Exponents
3. Simplifying exponential expressions
H. Functions
1. Definition of a function
2. Function notation
3. Domain and range of a function
   a. Definition of domain and range
   b. Identifying domain and range from a graph
   c. Finding domains algebraically of polynomial, rational, radical, and exponential functions
4. Finding function values from a graph of a function
5. Interpreting given functions in context of applied problems
6. Graphing non-linear functions (avoiding transformations)
   a. Absolute value function
   b. Power functions with natural number exponents
   c. Square root functions
   d. Reciprocal function
   e. Exponential functions with rational bases
I. Polynomials and Polynomial Equations
1. Operations on polynomial expressions
   a. Review of addition, subtraction, multiplication
   b. Multiplication using special product rules
c. Long division of polynomials
2. Factoring polynomials
   a. Factoring out the greatest common factor
   b. Factoring by grouping
   c. Factoring trinomials
   d. Factoring the difference of squares
   e. Factoring perfect square trinomials
   f. Factoring the sum and difference of cubes
   g. Factoring polynomials quadratic in form by substitution
3. Solving polynomial equations by factoring
J. Rational Expressions, Equations, and Inequalities
   1. Simplifying rational expressions
   2. Adding and subtracting rational expressions
   3. Multiplying and dividing rational expressions
   4. Simplifying complex fractions
   5. Solving rational equations
   6. Solving rational inequalities in one variable
K. Radical Expressions and Equations
   1. Computing roots of constants
   2. Properties of radicals
   3. Simplifying radical expressions
   4. Multiplying and dividing radical expressions
   5. Adding and subtracting radical expressions
   6. Rationalizing denominators
   7. Solving radical equations
   8. Introduction to complex numbers
L. Complex Numbers
   1. Definition
   2. Arithmetic of complex numbers
   3. Complex conjugates
M. Quadratic Equations, Inequalities, and Functions
   1. Solving quadratic and quadratic-in-form equations with complex solutions
      a. Factoring
      b. Square root method
      c. Completing the square
      d. The quadratic formula
   2. Graphing quadratic functions (avoiding transformations)
      a. Plotting points
      b. Intercepts
      c. Symmetry
      d. Vertex
      e. Opening direction
   3. Solving factorable quadratic inequalities in one variable
N. Exponential Functions and Logarithms
   1. Exponential functions with rational bases
      a. Definition
      b. Graphing by plotting points
2. Exponential and logarithmic expressions and equations
   a. Evaluating logarithmic expressions
   b. Converting between exponential and logarithmic statements
   c. Solving a logarithmic equation for a missing base, argument, or result

O. Circles
   1. Distance formula
   2. Midpoint formula
   3. Finding equations in standard form for circles satisfying given conditions
   4. Graphing circles

VI. INSTRUCTIONAL METHODOLOGY
A. Assignments
   1. Regular out-of-class reading assignments from the textbook
   2. Regular homework that provides students with review and practice on the topics and procedures taught such as solving absolute value equations, solving 2x2 linear systems of equations, multiplying and dividing rational expressions, solving quadratic equations by completing the square, graphing quadratic functions, and solving word problems.
   3. Regular in-class student practice with topics and procedures taught such as those described above.

B. Evaluation
   1. Exams - six or seven exams suggested during the semester to assess each student's proficiency in topics such as simplifying algebraic expressions, solving equations and inequalities, graphing basic functions by using key features, identifying functions and including their domains and ranges, and solving word problems using a generalized problem solving process.
   2. Comprehensive final examination in key topics such as simplifying algebraic expressions, solving equations and inequalities, graphing basic functions, and solving word problems.

C. Textbooks and other instructional materials
   2. The Mathematics Department's textbook list indicates the current textbook.
   3. A calculator may be required.
   4. An online homework system may be required.

VII. TITLE 5 CLASSIFICATION
CREDIT/DEGREE APPLICABLE (meets all standards of Title 5. Section 55002(a)).