COMMON COURSE OUTLINE: Course discipline/number/title: MATH 1115: College Algebra

A. CATALOG DESCRIPTION
1. Credits: 3
2. Hours/Week: 3
3. Prerequisites (Course discipline/number): Successful completion of MATH 0099 or MATH 0100 or equivalent with a grade of B or higher (for either course or appropriate score on RCTC placement test. College level reading.
4. Co-requisites (Course discipline/number): None
5. MnTC Goals (if any): Goal 2/Critical Thinking, Goal 4/Mathematics/Logical Reasoning

This first college level algebra course. Topics include but are not limited to: Polynomials, Rational, Exponential, and Logarithmic functions and their inverses, solving and graphing higher order equations, optimization applications, methods of solving systems or equations, and conic sections.

B. DATE LAST REVISED (Month, year): February, 2014

C. OUTLINE OF MAJOR CONTENT AREAS:
1. Equations and inequalities
2. Functions
3. Conic sections
4. Graphing
5. Systems of equations
6. Applications
7. Review Topics

D. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Solve equations and inequalities
   a) Polynomials with rational, real, and non-real roots (know techniques of long and synthetic division, the rational root theorem, and factoring). Use DesCartes Rule of sign, upper/lower bounds theorem, the conjugate pair theorem as appropriate.
   b) Quadratic in form.
   c) Rational and fractional equations.
   d) Equations involving radicals and rational exponents.
   e) Exponential and Logarithmic equations.
   f) Non-Linear inequalities by the use of the boundary point (signed graph) method.
2. Understand and apply functions
   a) Understand and apply function notation
   b) Domain and range
   c) Algebra of functions including add/subtract/multiply/divide
   d) Composition of functions
   e) Inverse functions. Be able to find inverse by Switch and Solve.
3. Understand and apply conic sections
   a) Complete the square, use concepts of transformations, a graphics calculator is generally introduced and included
      i. Parabolas (find and identify vertex, focus, directrix, axis of symmetry, direction of opening, min/max theory)
      ii. Circles (find and identify center, radius)
      iii. Ellipses (find and identify center, asymptotes, major/minor axes, foci)
      iv. Hyperbolas (find and identify center, asymptotes, foci, vertices)
4. Understand and apply techniques of graphing
   a) Polynomials (intercepts, turnaround points, end behavior)
   b) Rational functions (intercepts, vertical asymptotes, horizontal and oblique of slant asymptotes).
   c) General shapes of: exponential, logarithmic, absolute value, greatest integer, and piecewise defined functions.
   d) Transformations including translations, stretching, compression, symmetries, and reflections.
   e) Lines as a review only-include all forms such as point-slop, slope-intercept, and standard form.
D. **LEARNING OUTCOMES (GENERAL):** The student will be able to:

   - Know the formulas for slope including parallel and perpendicular, midpoint of a line segment, and distance between points
   - Conics from recognized forms and use of a graphics calculator.
   - Understand and apply the relation of inverse functions to functions.

5. Solve systems of equations with three or more variables
   - Understand and apply techniques of solving including: substitution and elimination.
   - Understand and apply matrix notation (rows, columns, entries, multiplication of matrices, equivalences of matrices, determinants).
   - Understand and apply Gauss-Jordan elimination, inverses, Cramer’s Rule for solving matrices.
   - Solve systems of non-linear equations.
   - Apply to the use of a graphics calculator.

6. Apply techniques to real-life examples
   - Understand and apply optimization problems (min, ax)
   - Find and simplify the difference quotient.
   - Understand and apply ratio/proportion/variation problems (including: direct, inverse, as square of, joint).

7. Review topics
   - Review as necessary; complex (non-real) numbers-add, subtract, multiply, divide; simplify radicals-add, subtract, multiply, divide.

E. **LEARNING OUTCOMES (MNTC):**

   **Goal 2:** Critical Thinking: The student will be able to:
   1. Gather factual information and apply it to a given problem in a manner that is relevant, clear, comprehensive, and conscious of possible bias for the information given.
   2. Imagine and seek out a variety of possible goals, assumptions, interpretations, or perspectives, which can give alternative meanings or solutions to given situations or problems.
   3. Analyze the logical connections among the facts, goals, and implicit assumptions relevant to a problem or claim; generate and evaluate implications that follow from them.
   4. Recognize and articulate the value assumptions, which underlie and affect decisions, interpretations, analyses, and evaluations made by ourselves and others.

   **Goal 4:** Mathematics/Symbolic Systems: The student will be able to:
   1. Illustrate historical and contemporary applications of mathematics/logical systems.
   2. Clearly express mathematical/logical ideas in writing.
   3. Explain what constitutes a valid mathematical/logical argument (proof).
   4. Apply higher order problem solving and/or modelling strategies.

F. **METHODS FOR EVALUATION OF STUDENT LEARNING:**

   1. Tests
   2. Quizzes
   3. Homework
   4. Group assignments
   5. Comprehensive Final Exam

G. **RCTC CORE OUTCOME(S) ADDRESSED:**

   - Communication
   - Critical Thinking
   - Global Awareness/Diversity
   - Civic Responsibility
   - Personal/Professional Accountability
   - Aesthetic Response

H. **SPECIAL INFORMATION (if any):** A graphics calculator is required. TI is supported.