Effective Implementation date: Spring 2018, 201830

Course Prefix and Number: MAT155
Course Title: Integrated Math I
Course Credits: 3
Course Description: This course… engages students in the concepts underlying elementary level mathematics. The course emphasizes depth of understanding, critical thinking, and applications. Topics include the structure of number systems, an analysis of numerical operations, set properties, numerical and geometric patterns and a variety of problem solving skills.

Guaranteed Transfer (GT) Pathways Course Statement:
The Colorado Commission on Higher Education has approved MAT155 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-MA1 category. For transferring students, successful completion with a minimum C– grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to https://highered.colorado.gov/academics/transfers/gtpathways/curriculum.html.

GT-MA1: MATHEMATICS CONTENT CRITERIA

Students should be able to:

a) Demonstrate good problem-solving habits, including:
   - Estimating solutions and recognizing unreasonable results.
   - Considering a variety of approaches to a given problem, and selecting one that is appropriate.
   - Interpreting solutions correctly.
b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.
c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.
d) Apply mathematical concepts, procedures, and techniques appropriate to the course.
e) Recognize and apply patterns or mathematical structure.
f) Utilize and integrate appropriate technology.

GT-MA1 COMPETENCY & STUDENT LEARNING OUTCOMES

Competency: Quantitative Literacy:
Students should be able to:

1. **Interpret Information**
   a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
2. **Represent Information**
   a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

3. **Perform Calculations**
    a. Solve problems or equations at the appropriate course level.
    b. Use appropriate mathematical notation.
    c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.
4. **Apply and Analyze Information**
    a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.
    b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.
    c. Make judgments based on mathematical analysis appropriate to the course level.
5. **Communicate Using Mathematical Forms**
    a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

REQUIRED COURSE LEARNING OUTCOMES

I. Analyze the structure of number systems.
II. Model multiple approaches to the four operations on whole numbers.
III. Model multiple approaches to the four operations on integers.
IV. Model multiple approaches to the four operations on fractions.
V. Model multiple approaches to the four operations on decimals.
VI. Utilize basic set properties and operations.
VII. Analyze patterns using algebraic tools.
VIII. Choose an appropriate problem solving strategy.
IX. Use technology as appropriate.

REQUIRED TOPICAL OUTLINE

1. Structure of number systems
    a. Numbers in base ten and other bases
    b. Place value
    c. Rounding
    d. Scientific Notation
    e. Operations in other bases
    f. Number systems from various cultures
    g. Subsets of the real numbers including natural, whole, integer, rational, and irrational
    h. Divisibility of integers including prime and composite numbers
    i. Greatest common factor, least common multiple
    j. Concrete and pictorial representations of numbers including partitioning of rectangles and circles into equal shares
    k. Comparison between integer, fraction, decimal, and percentage values and their representation on number lines
    l. Properties of the four main operations
    m. Order of operations

2. Multiple approaches to the four operations on whole numbers
    a. Various concrete and pictorial representations of addition and subtraction including base 10 blocks, other base blocks, number lines, partial sums, scratch method, and bundles of sticks
    b. Various subtraction concepts including missing addends, comparison method, and takeaway
    c. Various concrete and pictorial representations of multiplication and division including area models, number line manipulations, and partial products
    d. Various division concepts including sharing and subtractive
    e. Reasoning behind standard and non-standard algorithms for the four operations on whole numbers
    f. "Mental math" techniques
3. Multiple approaches to the four operations on integers
    a. Inverse property of addition
    b. Absolute value
    c. Various concrete and pictorial representations of the four operations including charged fields/particles, two color chips, and number lines
    d. Applying positive and negative sign concepts to four operations with whole numbers
    e. Applications of integers such as money and temperature
    f. "Mental math" techniques
4. Multiple approaches to the four operations on fractions
    a. Inverse property of multiplication
    b. Various concrete and pictorial representations of the four operations
    c. Reasoning behind algorithms for the four operations on fractions
    d. Equivalent fractions
    e. Applications of fractions including ratios, and proportions
    f. "Mental math" techniques
5. Multiple approaches to the four operations on decimals
    a. Decimal squares
    b. Reasoning behind algorithms for the four operations on decimals
    c. Connections among decimals, percentages, and fractions
    d. Applications of decimals
    e. "Mental math" techniques
6. Set properties and set operations
    a. Union and intersection
    b. Set notation
    c. Venn diagrams
    d. Introduction to one-to-one correspondence and cardinality
    e. Subsets
7. Analysis of patterns using algebraic tools
    a. Identification and prediction of patterned sequences
    b. Pictorial patterns

8. Problem solving
    a. Steps to problems solving
    b. Concrete strategies
    c. Pictorial strategies
    d. Numerical strategies
    e. Analytical strategies
    f. Communication of results
9. Technology use as appropriate.