COURSE OUTLINE

MATH 115 - MATHEMATICS FOR ELEMENTARY TEACHERS I

Prepared By: Alice K. Reed
A. **TITLE:** Mathematics for Elementary Teachers I

B. **COURSE NUMBER:** MATH 115

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** N/A

E. **COURSE LENGTH:** 15 weeks

F. **SEMESTER(S) OFFERED:** Fall / Spring

G. **HOURS OF LECTURE, LABORATORY, RECITATION, TUTORIAL, ACTIVITY:** Three hours per week.

H. **CATALOG DESCRIPTION:** The study of the development, meaning, and representations of numeration systems, operations on whole numbers, number theory and the real number system. The focus of the course will be on mathematical representations for K-8 topics via problem solving. This course is open to all students but will be of primary interest to those enrolled in the elementary education transfer program and Early Childhood. The majority of the course will be activity-based (exploration of topics through problem solving activities).

I. **PRE-REQUISITES:** Intermediate Algebra (MATH 106) with a grade of C or better, or 2 high school regents math courses with a grade of 75 or above on the second New York State Regents mathematics examinations, or permission of instructor.

J. **GOALS (STUDENT LEARNING OUTCOMES):**

By the end of this course, the student will be able to:

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<th>Course Objective</th>
<th>Institutional SLO</th>
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<tr>
<td>a. Represent and perform arithmetic operations in various bases including converting numbers from one base to another</td>
<td>1. Communication 2. Critical Thinking</td>
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<td>b. Perform the four fundamental operations of arithmetic and determine why particular algorithms work</td>
<td>1. Communication 2. Critical Thinking</td>
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<td>c. Classify a number by the number of its factors and test for divisibility</td>
<td>1. Communication 2. Critical Thinking</td>
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<td>d. Model operations with fractions</td>
<td>1. Communication 2. Critical Thinking</td>
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<td>e. Recognize equivalent fractions by creating fraction manipulatives</td>
<td>1. Communication 2. Critical Thinking</td>
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L. **REFERENCES:** None
M. **EQUIPMENT:** Internet connection, VCR, DVD player, manipulatives (pattern blocks, tiles, base five pieces, base ten pieces, fraction bars), calculator for elementary students, and other miscellaneous items.

N. **GRADING METHOD:** A – F

O. **MEASUREMENT CRITERIA/METHODS:**
   - in-class activities/lab work
   - oral reports
   - weekly journals about mathematical concepts encountered outside of the classroom
   - concept maps on the main topics
   - mini-projects (based on evaluations of K-8 textbooks problems, videos of elementary classroom discussions and elementary student work samples)
   - portfolio
   - hourly exams

P. **DETAILED COURSE OUTLINE:**

I. Numeration Systems
   1. Represent numbers in various numeration systems
   2. Represent a number in various bases (compose and decompose)
   3. Convert a numeral from base ten to another base
   4. Convert a numeral from one base to base ten
   5. Perform arithmetic operations with numerals in bases other than ten.

II. Operations with Natural Numbers, Whole Number, and Integers
   1. Determine what properties hold for a set of numbers
   2. Classify word problems by operation type
   3. Perform arithmetic operations with integers
   4. Determine why particular algorithms work (addition, subtraction, multiplication, and division)

III. Number Theory
   1. Find all factors of a number
   2. Write the prime factorization of a number
   3. Classify a number by the number of its factors
   4. Test whether one number is divisible by another number
   5. Find the greatest common factor of two or more numbers
   6. Find the least common multiple of two or more numbers
   7. Perform arithmetic operations in modulo m
   8. Represent figurate numbers symbolically

IV. The Real Number System
   1. Recognize equivalent fractions
   2. Model fractions with region, linear, and set models
   3. Model operations with fractions
   4. Simplify fractions
   5. Classify word problems by operation category
   6. Find a number between two other numbers
   7. Represent quantities as ratios
   8. Solve proportions
   9. Convert fractions to decimals and decimals to fractions
   10. Represent quantities as percents
   11. Perform operations with decimals and percents
   12. Find a number on the real number line

Q. **LABORATORY OUTLINE:** N/A