

**University Studies Program
Southeast Missouri State University**

**Department of Mathematics
Title of Course: Mathematics I**

**Course No. MA 118
DATE: Fall 2009**

I. Catalog Description and Credit Hours of Course:

Introduction to problem solving strategies, sets, whole numbers and their operations and properties, number theory, numeration systems, computer usage, and the historical significance and applications of these topics in the K-9 mathematics curriculum. (3 hours)

II. Prerequisites:

MA102 with a grade of 'CR' or MA 095 with a grade of 'C' or higher, or ACT Math subscore of 18-20 with MA 095 placement score of 14 or higher, or ACT Math subscore of 21 or higher. Declared education major in elementary, early childhood, exceptional child, middle school, or secondary mathematics or human environmental studies: child development option major. Any required developmental mathematics courses must be completed before enrolling in this course.

III. Purposes and Objectives of the Course:

The course is in the Logical Systems category of the University Studies Program and meets the first mathematics course requirement in any K-9 teacher education degree program.

The primary objectives of the course are to

- (a) meet the nine University Studies objectives.
- (b) identify and use problem solving strategies.
- (c) develop the concepts of sets and investigate their logical implications.
- (d) examine the whole numbers and their foundational properties.
- (e) review the historical aspects of numeration systems including different number bases.
- (f) identify and use algorithms and methods of computation of whole numbers.
- (g) describe the historical and cultural significance of some of the mathematical principles usually taught in grades K-9.
- (h) identify different aspects of the philosophy and nature of mathematics illustrated in the K-9 curriculum.
- (i) use technology as a learning tool.

IV. Expectations of Students:

- A. Regular class attendance.
- B. Participation in class activities.
- C. Read all assigned material.
- D. Adequate mastery of course content on examinations.

V. Course Outline:

Topics	Class Hours
A. MATHEMATICAL REASONING Problem solving strategies (including guess and check, pattern searches, models, related problems, formulas, algorithms, simulations, simpler cases, subgoals, indirect reasoning, and working backward) and applications of strategies in traditional and nontraditional problems. Inductive and representational reasoning, sequences, algebraic thinking, solving equations. (Sections 1.1-1.6)	4
B. PRE-NUMBER CONCEPTS, NUMERATION, NUMBER SYSTEMS Properties of joining, separating, and comparing sets; greater and less than concepts; one to one correspondences; set equivalence; set inclusion; cardinal numbers. The use of set concepts in problem solving (Venn diagrams, exhaustive listings,...). Historical role of number systems, base ten numeration system, other number bases, place value and its relation to grouping in operations, functions. (Sections 2.1, 2.2, 3.1, 3.2, 8.1)	10
C. WHOLE NUMBER COMPUTATION Order and operations, exponents, and rules for exponents. Models for each of the four basic operations, properties of the basic operations, algorithms (historical and modern) for each operation, estimation, algorithms in other bases, student error patterns. (Sections 2.3, 2.4, 3.3-3.5)	14
D. NUMBER THEORY Divisibility history of number theory, prime and composite numbers, sieve of Eratosthenes, infinitude of primes, divisibility rules for whole numbers, LCM, GCD, the Euclidean algorithm, prime factorization, Fundamental Theorem of Arithmetic. (Sections 4.1-4.3)	6
E. GEOMETRIC SHAPES Polygons and their properties, symmetry, lines and planes, angles and their measures, and three-dimensional shapes. (Sections 11.1-11.3)	7
F. REVIEW AND ASSESSMENT	$\frac{4}{45}$

VI. **Textbook:** Long, C.T., De Temple, D.W., and Millman, R.S. (2009) *Mathematical Reasoning for Elementary Teachers*(5th ed), Pearson Education, Inc.

VII. Basis of Student Evaluation:

A. Classroom participation	15 %
B. Homework	20 %
C. Examinations/Final exam	65 %