

## MATH 327 Mathematics for Elementary Teaching I

### 1. Catalog Description

#### **MATH 327, 328, 329 Mathematics for Elementary Teaching I, II, III (4) (4) (4)**

Introduction to set theory, number theory, real numbers, probability, statistics and geometry. Computer applications. 2 lectures, 2 activities. **MATH 327** prerequisite: Completion of ELM requirement, and passing score on appropriate Mathematics Placement Examination, or MATH 118 or equivalent. **MATH 328** prerequisite: MATH 327 with a grade of C- or better or consent of instructor. **MATH 329** prerequisite: MATH 328.

### 2. Required Background or Experience

Math 118 or equivalent.

### 3. Learning Objectives

#### **Mathematical Content**

Students will:

- a. Learn to identify and implement Polya's problem-solving strategies for mathematics.
- b. Understand fundamental relations (is a subset of, is equal to) and operations (union, intersection, complement) of sets. These understandings include both the ability to write word problems as well as the ability to solve those problems using multiple representations.
- c. Understand fundamental relations (greater than, less than, equal to) and operations (addition, subtraction, multiplication, and division) on whole numbers and integers. These understandings include both the ability to write word problems as well as the ability to solve those problems using multiple representations, standard algorithms, and nonstandard algorithms.
- d. Understand the properties of whole numbers and integers under different operations (i.e. the distributive property).
- e. Understand how to represent a function using multiple representations.
- f. Understand the special roles of 0 and 1 in number systems.
- g. Understand the role of prime numbers, composite numbers, greatest common divisors, and least common multiples as well as several algorithms for identifying such numbers.
- h. Understand the structure of base counting systems including operations within this system and multiple ways of representing numbers and operations in different bases.
- i. Understand the fundamental operations in clock arithmetic.
- j. Identify errors in given calculations and identify typical error patterns found in children's mathematical thinking.

#### **Mathematical Understanding**

Students will deepen their understanding of mathematics by:

- a. Experiencing concrete, investigative experiences in mathematics.
- b. Estimating and approximating to check the reasonableness of a solution.
- c. Developing and comparing physical, pictorial, and symbolic languages for representing mathematical ideas.
- d. Explaining why mathematics makes sense by integrating the English language with conventional mathematical notation, mathematical definitions, and concrete representations.
- e. Writing and solving mathematical problems and exercises.
- f. Watching and analyzing videos of young children solving mathematics problems.
- g. Addressing the fears and apprehensions of many people towards mathematics.

4. Text and References

Billstein, Rick, et al., Mathematics for Elementary School Teachers, 9th edition, Addison-Wesley, 2006.

5. Minimum Student Materials

Required text, and activity materials provided by instructor.

6. Minimum University Facilities

Mathematics education classroom equipped with materials and technology.

7. Content and Method

<u>Topic</u>	<u>Lectures</u>
Chapter 1: <b>An Introduction to Problem Solving</b> Mathematics and Problem Solving Explorations with Patterns Algebraic Thinking	3
Chapter 2: <b>Sets, Whole Numbers, and Functions</b> Describing Sets Other Set Operations and Their Properties Addition and Subtraction of Whole Numbers Multiplication and Division of Whole Numbers Functions	8
Chapter 3: <b>Numeration Systems and Whole Number Computation</b> Numeration Systems Algorithms for Whole-Number Addition and Subtraction Algorithms for Whole-Number Multiplication and Division Mental Mathematics and Estimation for Whole-Number Operations	13
Chapter 4: <b>Integers and Number Theory</b> Integers and the Operations of Addition and Subtraction Multiplication and Division of Integers Divisibility Primes and Composite Numbers Greatest Common Divisor and Least Common Multiple Clock and Modular Arithmetic	11
<b>Total</b>	35

Method

Lecture, discussion, and activity.

8. Methods of Assessment

Class activities, homework and lab assignments, term projects, midterm tests or quizzes, final examination.