

MATH 227 Mathematics for Elementary Teaching I

1. Catalog Description

MATH 227 Mathematics for Elementary Teaching I

4 units

GE Area B1

Prerequisite: Passing score on ELM examination, or an ELM exemption, or credit in MATH 96 (formerly MATH 104).

Introduction to problem solving, set theory, number systems, arithmetic operations, models, and number theory. This class is designed for Liberal Studies majors. Other students will be admitted only by consent of instructor. 4 lectures. Fulfills GE B1; for students admitted Fall 2016 or later, a grade of C- or better in one GE B1 course is required to fulfill GE Area B.

2. Required Background or Experience

Passing score on ELM examination, or an ELM exemption, or credit in MATH 104.

3. Learning Objectives

Mathematical Content

Students should:

- a. Be introduced to problem-solving strategies for mathematics.
- b. Develop a deep understanding of place-value and its role in operations.
- 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).
- 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.
- h. Be able to justify the divisibility tests for 2, 3, 4, 5 and 10.
- i. Understand counting in and be able to perform operations in other bases (e.g. base-3 and base-5).
- j. Understand the structure of base counting systems including operations within this system and multiple ways of representing numbers and operations in different bases.
- k. Investigate the development of children's mathematical thinking.
- l. Other topics appropriate to teaching K-8 mathematics may be included at the instructor's discretion.

Mathematical Understanding

Students will deepen their understanding of mathematics by:

- a. Participating in investigative experiences in mathematics.
- b. Developing multiple representations (physical, pictorial, and symbolic) for mathematical ideas.
- c. Explaining why mathematics makes sense by integrating the English language with conventional mathematical notation, mathematical definitions, and concrete representations.
- d. Writing and solving mathematical problems and exercises.
- e. Watching and analyzing video of K-8 students and teachers engaging with mathematics.
- f. Addressing their fears and apprehensions towards mathematics.

4. Text and References

- Sowder, J., Sowder, L. & Nickerson, S. Reconceptualizing Mathematics for Elementary School Teachers, 3rd edition, W.H. Freeman and Co., New York, NY.

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

Content

Lectures

Chapter 1: Reasoning About Quantities

4

1.1 – Ways of Thinking About Solving Story Problems

1.2 - Quantitative Analysis

1.3 - Problem Solving

1.4 - Issues for Learning: Ways of Illustrating Story Problems

Chapter 2: Numeration Systems

8

2.1 – Ways of Expressing Values of Quantities

2.2 – Place Value

2.3 – Bases Other Than Ten

2.4 – Operations in Different Bases

Chapter 3: Understanding Whole Numbers Operations	13
3.1 – Ways of Thinking About Addition and Subtraction	
3.2 – Children’s Ways of Adding and Subtracting	
3.3 – Ways of Thinking About Multiplication	
3.4 – Ways of Thinking About Division	
3.5 – Children Finding Products and Quotients	
3.6 – Issues for Learning: Developing Number Sense	
Chapter 11: Number Theory	11
11.1 – Factors and Multiples, Primes and Composites	
11.2 – Prime Factorization	
11.3 – Divisibility Tests to Determine Whether a Number is Prime	
11.4 – Greatest Common Factor, Least Common Multiple	
Total	<u>36</u>

Method

Lecture, discussion, and activity.

8. Methods of Assessment

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