

MA 1413

Structure of the Real Number System

Credit: 3 semester hours

Catalog Description: Three hours lecture. The nature of mathematics; introductory logic; structure and development of the real number system. (For Elementary and Special Education majors only. Prerequisite: a C or better in MA 1313 or an ACT math sub-score of 24)

Basic Skills Test:

You are required to pass (correctly answer 15 out of 20) a basic skills test in order to pass this class. You will be given four opportunities to successfully complete this. This test will be taken in the Math department computer lab using *My Math Lab*. Your instructor will inform you as to times when the lab will be available. If you do not pass this test on the fourth attempt you will automatically receive an F for the course. This requirement must be satisfied by the last day to withdraw for the current semester.

Conceptual Framework: This course is designed to give pre-service elementary school teachers a basic knowledge and understanding of real numbers and the logical process through which the system of numbers is constructed. It is also designed so that they will be able to use different models to demonstrate operations on real numbers.

Instructional Objectives:

1. The student will be able perform basic set operations.
2. The student will be able to add, subtract, multiply and divide whole numbers.
3. The student will gain an understanding of the properties of whole numbers.
4. The student will be able to read and write using Roman Numerals.
5. The student will be able to convert base ten numbers into other bases.
6. The student will be able to convert numbers in bases other than ten to base ten.
7. The student will be able to perform basic computations in bases other than ten.
8. The student will be able to add, subtract, multiply, and divide integers.
9. The student will gain an understanding of the properties of integers.

10. The student will understand and be able to use the divisibility properties.
11. The student will be able to distinguish between prime and composite numbers.
12. The student will be able to find and use the greatest common divisor and the least common multiple.
13. The student will be able to add, subtract, multiply, and divide rational numbers.
14. The student will gain an understanding of the properties of rational numbers.
15. The student will gain an understanding of the properties of the entire real number system.

Topics To Be Covered:

1. Sets and Operations – 11 hours
 - a. Basic definitions
 - b. Operations on sets
 - c. Operations on Whole numbers
 - d. Properties of Whole numbers
2. Numeration Systems – 8 hours
 - a. Ancient numeration systems
 - b. Roman numerals
 - c. Bases other than ten
 - d. Basic operations in bases other than ten
3. Integers – 11 hours
 - a. Operations on Integers
 - b. Properties of Integers
 - c. Divisibility tests
 - d. Prime and composite numbers
 - e. Greatest Common Divisor and Least Common Multiple
4. Rational Numbers – 7 hours
 - a. Operations on Rational numbers
 - b. Properties of Rational numbers
5. Decimals – 8 hours
 - a. Operations on decimals
 - b. Properties involving decimals
 - c. Non-terminating decimals
 - d. Real numbers

Suggested Student Activities:

The students will be placed in groups during the first class meeting. These groups can be used for study groups. They will be used for group projects (and for the Problem Based Learning cases). It is the responsibility of each student to get to know the other members of his or her group and establish contact times. The instructor for the course will set up email groups so that the students can make contact through that medium. These groups can be beneficial to all of the members if the students put forth the necessary effort.

Method of Instruction:

This is primarily a lecture-based course. There will be group projects and possible Problem Based Learning cases. Students will learn to use models for understanding and teaching operations on different types of numbers.

Text:

Mathematical Reasoning for Elementary School Teachers. 5th edition. Long, DeTemple, Millman. Addison Wesley Publishers.