

Mathematical Concepts for Elementary School Teachers - Number Systems

TCSU MATH 120

A. Description

This course focuses on the development of quantitative reasoning skills through in-depth, integrated explorations of topics in mathematics, including: real numbers system and subsystems, patterns and sequences, basic set theory, logic, and mathematical induction. Emphasis is on comprehension and analysis of mathematical concepts and applications of logical reasoning.

B. Prerequisites

Completion of two years of high school algebra and appropriate placement score or completion of course in Intermediate Algebra with a grade of C or better.

C. References

ESM Content Specifications in Mathematics, Domain 1; CSU EO 595
This course must be approved for CSU General Education-Breadth Area B4.

D. Course Topics

In conformity with ESM standards, topics must include, but are not limited to:

1. Basic set theory and logic: set operations, relations and functions, Venn diagrams, DeMorgan's Laws, truth tables, equivalent statements, deductive reasoning, contradictions, tautologies;
2. Numeration systems: history, Hindu-Arabic numeration system, other place values systems, computations in different bases;
3. Integers: structure and basic properties, computational algorithms;
4. Modular arithmetic: operations, divisibility;
5. Basic number theory: prime and composite numbers, prime factorization, fundamental theorem of arithmetic, least common multiple and greatest common divisor;
6. Rational numbers: structure and properties, ratio and proportion;
7. Real numbers: structure and basic properties, arithmetic operations, rational and irrational numbers, decimal representation, number line representation;
8. Patterns and sequences: arithmetic sequences, geometric sequences, mathematical induction.

E. Student Learning Outcomes

In conformity with ESM standards, course outcomes must include, but are not limited to:

1. Analyze multiple approaches to solving problems from elementary and advanced levels of mathematics, using concepts and tools from sets, functions, and logic.
2. Compare numeration systems, including their historical development, with attention to base numeration systems, exponents, scientific notation, and place values.

3. Evaluate the equivalence of numeric algorithms and explain the advantages and disadvantages of equivalent algorithms in different circumstances.
4. Analyze algorithms from number theory to determine divisibility in a variety of settings, such as different base systems and modular arithmetic.
5. Analyze the structure of least common multiples and greatest common divisors and their role in standard algorithms.
6. Explain the concept of rational numbers, using both ratio and decimal representations; analyze the arithmetic algorithms for these two representations; and justify their equivalence.
7. Analyze the structure and properties of whole, rational, and real number systems; define the concept of rational and irrational numbers, including their decimal representation; and illustrate the use of a number line representation.

F. CAN Equivalent

CAN MATH 4 (Equivalency ends Fall 2010)