



COURSE OUTLINE

DIVISION: Natural Sciences and Business

COURSE: MTH 1009 Structure of Number Systems I

Date: Spring 2019

Credit Hours: 3

Prerequisite(s): 1) Math 0920 Intermediate Algebra: Foundations of STEM Mathematics and MTH 0908 Geometry, both with a "C" or better, or the equivalent college course; or 2) Another approved placement option.

Delivery Method:

<input checked="" type="checkbox"/> Lecture	3 Contact Hours (1 contact = 1 credit hour)
<input type="checkbox"/> Seminar	0 Contact Hours (1 contact = 1 credit hour)
<input type="checkbox"/> Lab	0 Contact Hours (2-3 contact = 1 credit hour)
<input type="checkbox"/> Clinical	0 Contact Hours (3 contact = 1 credit hour)
<input type="checkbox"/> Online	
<input type="checkbox"/> Blended	

Offered: Fall Spring Summer

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>:

CATALOG DESCRIPTION:

This course is a study of the basic structure of the real number system, set theory, basic algorithms, informal geometry, and problem solving. The goal of this course is to increase the student's knowledge and understanding of mathematical theories and concepts. This is not a course in computational arithmetic skills. This course is recommended for students majoring in elementary or junior high education.

GENERAL EDUCATION GOALS ADDRESSED

[See last page for Course Competency/Assessment Methods Matrix.]

Upon completion of the course, the student will be able:

[Choose up to three goals that will be formally assessed in this course.]

- To apply analytical and problem solving skills to personal, social, and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To construct a critical awareness of and appreciate diversity.
- To understand and use technology effectively and to understand its impact on the individual and society.
- To develop interpersonal capacity.
- To recognize what it means to act ethically and responsibly as an individual and as a member of society.
- To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
- To connect learning to life.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals. See last page for more information.]

Upon completion of the course, the student will be able to:

1. Students will demonstrate knowledge of Critical Thinking
 - 1.1. Students will be able to distinguish between different explorations with patterns.
 - 1.2. Students will be able to discuss mathematics and problem solving.
 - 1.3. Students will be able to apply algebraic thinking to problem solving situations.
 - 1.4. Students will be introduced to the concept of logic as it applies to mathematics.

2. Students will demonstrate knowledge of Sets and Whole Numbers
 - 2.1. Students will be able to describe sets in different ways.
 - 2.2. Students will be able to apply set operations and their properties to real world applications.
 - 2.3. Students will be introduced to techniques for understanding addition and subtraction of whole numbers at an elementary level.
 - 2.4. Students will be introduced to techniques for understanding multiplication and division of whole numbers at an elementary level.
 - 2.5. Students will be able to use functional notation to describe mathematical relationships.

3. Students will demonstrate knowledge of Whole Number Computation.
 - 3.1. Students will be introduced to other cultural numeration systems.
 - 3.2. Students will be introduced to algorithms for whole number addition and subtraction, including use of manipulatives and clock arithmetic; and addition and subtraction of numbers in bases other than ten.
 - 3.3. Students will be introduced to algorithms for whole number multiplication and division, including use of manipulatives; and multiplication in bases other than 10.
 - 3.4. Students will be able use mental mathematics and estimation techniques to better understand whole number operations including strategies for front-end, clustering, rounding, and nice number estimation.

4. Students will demonstrate knowledge of Number Theory.
 - 4.1. Students will be able to use different tests of divisibility vital to understanding the concept of factoring.
 - 4.2. Students will understand the concepts of prime and composite numbers and how they relate to applications.
 - 4.3. Students will be able to determine a set of numbers greatest common divisor and least common multiple.

5. Students will demonstrate knowledge of Integers.
 - 5.1. Students will understand representations of integers with colored counters, mail-time scenarios, and number lines; also, include absolute value.
 - 5.2. Students will understand the operations of addition and subtraction of integers using various representations.
 - 5.3. Students will understand the operations of multiplication and division of integers using various representations.

6. Students will demonstrate knowledge of Fractions and Rational Numbers.
 - 6.1. Students will be able to define and use the set of rational numbers including identifying equivalent fractions, simplifying fractions, and ordering rational numbers.
 - 6.2. Students will be able to add and subtract fractions and mixed numbers.
 - 6.3. Students will be able to multiply and divide fractions using various algorithms and express reciprocals as multiplicative inverses.
 - 6.4. Students will be able to use the properties of addition, subtraction, multiplication, and division of rational numbers including the density property of rational numbers, estimations, and mental arithmetic.

7. Students will demonstrate knowledge of Decimals, Proportional Reasoning, and Real Numbers.
 - 7.1. Students will understand how decimals are related to rational numbers; properties and manipulations of terminating and repeating decimals; irrational numbers; combine all number systems covered into the larger number system of real numbers.
 - 7.2. Students will be able to perform basic operations involving decimals including adding, subtracting, multiplying, and dividing; also introduced to scientific notation.
 - 7.3. Students will be introduced to proportional reasoning including the ratio, proportion, and applications.
 - 7.4. Students will understand the definition of a percent, how it relates to decimals and fractions, and work application problems involving percents, compound interest, and growth.

MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

Goals	Outcomes
Goal #1	
To apply analytical and problem solving skills to personal, social, and professional issues and situations.	<ol style="list-style-type: none"> 1. Students will demonstrate knowledge of Critical Thinking 2. Students will demonstrate knowledge of Sets and Whole Numbers 3. Students will demonstrate knowledge of Whole Number Computation. 4. Students will demonstrate knowledge of Number Theory. 5. Students will demonstrate knowledge of Integers. 6. Students will demonstrate knowledge of Fractions and Rational Numbers. 7. Students will demonstrate knowledge of Decimals, Proportional Reasoning, and Real Numbers.
Goal #2	
To communicate successfully, both orally and in writing, to a variety of audiences.	Present a lesson to the class covering one of the sections

COURSE TOPICS AND CONTENT REQUIREMENTS:

- I. Critical Thinking
 - A. Problem solving intro
 - B. Problem-solving principles
 - C. Problem-solving strategies, including algebra
 - D. Logic

- II. Sets and Whole Numbers
 - A. Describing sets and using set operations
 - B. Sets, counting, and the whole numbers
 - C. Whole number addition and subtraction
 - D. Whole number multiplication and division

- III. Numeration and Computation
 - A. Numeration Systems
 - B. Whole number addition and subtraction algorithms
 - C. Whole number multiplication and division algorithms
 - D. Mental arithmetic and estimation
 - E. Nondecimal positional systems including addition, subtraction, and multiplication

- IV. Number Theory
 - A. Divisibility, primes, and composites
 - B. Tests for divisibility
 - C. Greatest common divisor and least common multiple
- V. Integers
 - A. Representations of integers
 - B. Addition and subtraction of integers
 - C. Multiplication and division of integers
- VI. Rational Numbers and Fractions
 - A. Basics of fractions and rational numbers
 - B. Addition and subtraction of fractions
 - C. Multiplication and division of fractions
 - D. Rational number system
- VII. Decimals, Real Numbers, and Proportional Reasoning
 - A. Decimals and real numbers
 - B. Computatations with decimals
 - C. Proportional reasoning
 - D. Percent

INSTRUCTIONAL METHODS:

1. Lecture
2. Class discussion, participation, activities
3. Audio-visual aids - calculator, document camera, computers, etc.
4. Written assignments (reflection journals, etc)
5. Quizzes and examinations

INSTRUCTIONAL MATERIALS:

1. Text: Mathematical Reasoning for Elementary Teachers, 7th Edition, Long, DeTemple, Millman, 2015
2. Test bank
3. Computer with internet access
4. Scientific calculator
5. Instructor solutions manual
6. MyMathLab Student Access Kit

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

- A= 90-100
- B= 80-89
- C= 70-79
- D= 60-69
- F= 0-59

OTHER REFERENCES

Course Competency/Assessment Methods Matrix

(Dept/# Course Name)	Assessment Options																																		
For each competency/outcome place an “X” below the method of assessment to be used.	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations (1 sect lesson demo)	Pre-Post Tests	Quizzes (optional)	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects (1 sect lesson demo)	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment (Homework)			
	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D									
Students will demonstrate knowledge of Critical Thinking					X		X	X				X						X																	X
Students will demonstrate knowledge of Sets and Whole Numbers					X		X	X				X						X																	X
Students will demonstrate knowledge of Whole Number Computation					X		X	X				X						X																	X
Students will demonstrate knowledge of Number Theory					X		X	X				X						X																	X
Students will demonstrate knowledge of Integers					X		X	X				X						X																	X
Students will demonstrate knowledge of Fractions and Rational Numbers					X		X	X				X						X																	X

Students will demonstrate knowledge of Decimals, Proportional Reasoning, and Real Numbers						X		X	X			X																					X							X
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