

Course: MATH 2213, Survey of Mathematical Structures I

Catalog Description: The fundamental element of this course is the understanding of the underlying concepts of elementary mathematics topics including patterns, word problems, sets, basic mathematical operations, integers, rational numbers, and real numbers. Discussion and demonstration of strategies for introducing elementary mathematics along with appropriate manipulatives will be demonstrated by students in the class as they prepare and present an elementary or middle school math lesson and /or submit an independent research project. This course is designed for students planning to major in elementary education or middle school education at a senior institution. This course will not satisfy the math elective requirement for the Associate of Science degree at NWACC. Depending on the semester, computer-assisted, WWW, and hybrid versions of this course may be offered in addition to the traditional format.

Prerequisite: MATH 1204 with a grade of C or better, or appropriate placement scores.

Credit/Contact/Load Hours: 3 credit hours, 3 contact hours, 3 load hours

Target Audience and Transfer: This course is designed for students enrolled in certain education programs and/or majoring in Elementary or Middle School Education. This course will not satisfy the mathematics elective requirement to receive an AS degree.

Student Learning Outcomes

Upon successful completion of this course students should exhibit mastery of certain knowledge and basic skills. Successful Survey of Mathematical Structures I students will be able to:

1. Formulate and read Venn diagrams
2. Exhibit basic understanding of symbolic logic and create truth tables
3. Exhibit problem solving strategies and critical thinking skills
4. Understand our number systems and their properties
5. Understand arithmetic computations in both base 10 and other bases and perform these calculations without the aid of a calculator
6. Exhibit understanding of basic algebraic concepts and graphs
7. Identify and present core mathematics skills, topics, and strategies for teaching elementary students, and explain why mathematics is done as it is. This includes an introduction to manipulatives keeping in mind that this is not a methods course and the emphasis is on understanding the mathematical concepts.
8. Prepare and present core mathematics lesson(s) and/or submit a research project related to teaching mathematics.

Required Text: Math in Our World, Third Edition, Sobecki/Bluman

Required Text Coverage (for both standard lecture and WWW course):

- 2.1 The Nature of Sets
- 2.2 Subsets and Set Operations
- 2.3 Using Venn Diagrams to Study Set Operations
- 2.4 Using Sets to Solve Problems
- 3.1 Statements and Quantifiers
- 3.2 Truth Tables
- 3.3 Types of Statements
- 3.4 Logical Arguments
- 3.5 Euler Circles
- 4.1 Early and Modern Numeration Systems
- 4.3 Base Number Systems
- 4.4 Operations in Base Number Systems Chapter
- 5.1 The Natural Numbers
- 5.2 The Integers
- 5.3 The Rational Numbers
- 5.4 The Irrational Numbers
- 5.5 The Real Numbers
- 5.6 Exponents and Scientific Notation
- 6.1 The Fundamentals of Algebra
- 6.2 Solving Linear Equations
- 6.3 Applications of Linear Equations

Recommended if time permits (for both standard lecture and WWW course):

1.1, 1.2, 1.3, 2.5, 4.2, 5.7, 6.4, 6.5

A variety of application problems from each required topic should be assigned.

Required Instructional Activities: A project incorporating the above topics into an elementary mathematics lesson plan created by the student must be assigned in both lecture and WWW formats of the course.

Required Forms of Assessment: Each instructor will include a set of departmental final exam questions on his or her final exam. These questions will be in direct support of the Student Learning Outcomes 1-7. The questions will compose at least 10% of the students' overall grade in the course and will be graded according to a standard grading rubric. Student Learning Outcome 8 will be assessed via a common grading rubric developed by and made available to all faculty members. The results of the departmental questions, lesson project, and overall student performance will be reported when final grades are reported.

Instructor Resources:

- 1) Instructor's Annotated Edition
- 2) Instructor's Solutions Manual
- 3) Instructor's Testing Manual

Student Resources:

- 1) Student's Solutions Manual