WINONA STATE UNIVERSITY
COLLEGE OF SCIENCE AND ENGINEERING
DEPARTMENT OF MATHEMATICS AND STATISTICS
Course Outline - MATH 203

Course Title: Numbers and Number Systems

Frequency of Offering: Each Semester  Prerequisite(s): MATH 202 or higher

Grading: For Elementary Education majors and minors, offered on a “Grade Only” basis. P/NC is available to others. Scale: 100-91% A, 90-81% B, 80-71% C, 70-61% D, Below 60% F

Course Applicable: Elementary Education major, required.

Catalog Description: The study of concepts and properties of operations essential to mathematics in the elementary and middle school grades. This is a university studies course satisfying requirements for the Mathematics/Statistics flag. For more information, see http://course1.winona.edu/kvogen/US%20Courses/Index.htm. Prerequisite: MATH 202 or higher math. Offered each semester.

Number of Credits: 3 Semester Hours


Optional Readings: To be determined by the instructor.

Standards Included: Minnesota law requires the Elementary Education program include topics appropriate to issues encountered in grades K-6. This course is designed to help students develop competencies outlined in the Minnesota Rule 8710.3200.

Additional Requirements: None
**Course Description:** The major focus of this course is to provide students with
(1) foundational knowledge in developing, investigating, exploring, discussing, using, illustrating, and explaining mathematics.
(2) exposure to and modeling of the NCTM Principles and Standards for School Mathematics.

**Student Learning Outcomes:**
1. Students will problem solve to investigate and understand mathematical content.
2. Students will formulate and solve problems from both mathematical and everyday situations.
3. Students will communicate mathematical ideas orally and in writing using everyday along with mathematical language and symbols.
4. Students will use models, properties, relationships and patterns to explain their mathematical reasoning.
5. Students will show an understanding of the interrelationships within mathematics by connecting mathematics to other disciplines and real world situations.
6. Students will model, explain, and develop computational algorithms.
7. Students will understand the meaning of the four basic operations and use them to solve problems.
8. Students will use algebra to describe patterns, relations, and functions, in addition to model and solve problems.
9. Students will use estimation and calculators in working with quantities, computation, and problem solving,
10. Students will use a variety of manipulative and visual materials for exploration and development of numbers and their relationships, four basic operations with positive and negative rational numbers, and algebraic concepts.
11. Students will demonstrate conceptual and procedural understanding of all basic mathematics up to and including functional relationships.

**Course Outline of the Major Topics and Subtopics:**

I. An Introduction to Problem Solving (Weeks 1-2)
   A. Mathematics and Problem Solving (1-1)
   B. Explorations with Patterns (1-2)
   C. Reasoning and Logic (1-3)

II. Numeration Systems and Sets (Weeks 3-4)
   A. Numeration Systems (2-1)
   B. Describing Sets (2-2)
   C. Other Set Operations and Their Properties (2-3)

III. Whole Numbers and Their Operations (Weeks 5)
   A. Addition and Subtraction of Whole Numbers (3-1)
   B. Algorithms for Whole-Number Addition and Subtraction (3-2)
   C. Multiplication and Division of Whole Numbers (3-3)
   D. Algorithms for Whole-Number Multiplication and Division (3-4)
   E. Mental Mathematics and Estimation for Whole-Number Operations (3-5)

IV. Number Theory (Week 6-7)
   A. Divisibility (4-1)
   B. Prime and Composite Numbers (4-2)
   C. Greatest Common Divisor and Least Common Multiple (4-3)

V. Integers (Weeks 8-9)
A. Integers and the Operations of Addition and Subtraction (5-1)
B. Multiplication and Division of Integers (5-2)

VI. Rational Numbers and Proportional Reasoning (Weeks 10-11)
   A. The Set of Rational Numbers (6-1)
   B. Addition, Subtraction, and Estimation with Rational Numbers (6-2)
   C. Multiplication and Division of Rational Numbers (6-3)
   D. Ratios, Proportions, and Proportional Reasoning (6-4)

VII. Decimals: Rational Numbers and Percent (Weeks 12-13)
    A. Introduction to Decimals (7-1)
    B. Operations on Decimals (7-2)
    C. Nonterminating Decimals (7-3)
    D. Percents and Interest (7-4)

VIII. Real Numbers and Algebraic Thinking (Weeks 14-15)
     A. Real Numbers (8-1)
     B. Variables (8-2)
     C. Equations (8-3)
     D. Functions (8-4)
     E. Equations in a Cartesian Coordinate System (8-5)

Method of Instruction: The course is a math content course, not a methods course. The majority of class time should be spent covering material from the Billstein text. Instruction may model a variety of methods and strategies such as group activities, whole class discussion, student presentations, or student guided discussion.

General Expectations: All students are expected to attend class on a regular basis, to be active participants in class and to be readers of the texts and related writings. Students will be expected to demonstrate their knowledge of the subject matter through writing, problem solving, presentations, peer teaching, projects, and at least three examinations.

Methods of Assessment: Assessments will vary in style, and may include teacher’s evaluation of written exams, written homework, individual or group problems, written reaction papers, and in-class group and individual problems.

Additional References:

i.  www.NCTM.org
ii. Navigation Series booklets from NCTM.
iii. Journals— Teaching Children Mathematics
     Mathematics Teaching in the Middle School