WINONA STATE UNIVERSITY

COLLEGE OF SCIENCE AND ENGINEERING

DEPARTMENT OF MATHEMATICS AND STATISTICS

**Course Outline - MATH 203**

**Course Title:** Number and Number Systems

**Catalog Description:** The study of concepts and properties of operations essential to mathematics in the elementary and middle school grades. Prerequisite: [MATH 202 - Elements of Mathematics](http://catalog.winona.edu/preview_course_nopop.php?catoid=14&coid=25838) or [MATH 140 - Applied Calculus](http://catalog.winona.edu/preview_course_nopop.php?catoid=14&coid=24758). Grade only.

**Number of Credits**: 3

**Text:**  *A Problem Solving Approach to Mathematics for Elementary School Teachers,*

***12th edition*** by Billstein, Libeskind, and Lott

**Topics Covered**

I. Numeration Systems and Sets

1. Numeration Systems
2. Describing Sets
3. Other Set Operations and Their Properties

II. Whole Numbers and Their Operations

1. Addition and Subtraction of Whole Numbers
2. Algorithms for Whole-Number Addition and Subtraction
3. Multiplication and Division of Whole Numbers
4. Algorithms for Whole-Number Multiplication and Division
5. Mental Mathematics and Estimation for Whole-Number Operations

III. Number Theory

1. Divisibility
2. Prime and Composite Numbers
3. Greatest Common Divisor and Least Common Multiple

IV. Integers

1. Integers and the Operations of Addition and Subtraction
2. Multiplication and Division of Integers

V. Rational Numbers and Proportional Reasoning

1. The Set of Rational Numbers
2. Addition, Subtraction, and Estimation with Rational Numbers
3. Multiplication and Division of Rational Numbers
4. Ratios, Proportions, and Proportional Reasoning

**Listing of Sections in Departmental Text to be Covered**

Chapter 2 - Introduction to Logic and Sets – only sections 2-2 and 2-3

Chapter 3 – Numeration Systems and Whole Number Operations – all sections

Chapter 4 – Number Theory – all sections

Chapter 5 – Integers – all sections

Chapter 6 – Rational Numbers and Proportional Reasoning – all sections

Chapter 7 – Rational Numbers as Decimals and Percent - all sections except

Computing Interest (as time permits)

**Approximate pace of coverage:**

One 50 minute class period should be sufficient time for each section.

More time may be spent on Sections 2-3, 3-4, 3-5, and all 4 sections of Chapter 6.

**Method of Instruction:** Lecture/presentation, discussion, question and answer sessions, use of calculators and/or computers, extended and in-class group work.

**Evaluation Procedure:** Homework, quizzes, projects, midterm exams, and a final exam.

**Rationale for Math/Stat Intensive Course:** The purpose of this course is to develop mathematical reasoning skills and understanding in pre-service elementary teachers. It is geared to enhancing their knowledge of mathematical models and underlying concepts of elementary mathematics. The entire focus of the course is dealing with problem solving in a 4-part cyclical process: data collection, analyzing data, determining mathematical formulas, and communicating these results based on elementary mathematical content.

**Minnesota Transfer Curriculum:** *The following language should appear on each**instructor’s syllabus for the course:*

**Student Learning Outcomes and Assessment by category:**

***Category 1: Practice the correct application of mathematical or statistical models that are appropriate to their prerequisite knowledge of those areas***

1. Students will use models, properties, relationships and patterns to explain their mathematical reasoning.

**Assessment: Students will be assessed on their ability to identify patterns and find a model to represent the pattern.**

1. Students will model, explain, and develop computational algorithms.   
   **Assessment: Students will be assessed over their understanding of arithmetic and geometric sequences.**
2. Students will demonstrate conceptual and procedural understanding of all basic mathematics up to and including functional relationships.

**Assessment: Students will be assess over their mathematical understanding of mathematical content including percents, fractions, and their ability to determine functional relationships.**

***Category 2: Make proper use of modern mathematical or statistical methods appropriate to their level of prerequisite knowledge,***

1. Students will understand the meaning of the four basic operations and use them to solve problems.

**Assessment: Students will be assessed over their ability to demonstrate understanding of the four operations in base ten, other bases, and through the use of multiple algorithms.**

1. Students will use algebra to describe patterns, relations, and functions, in addition to model and solve problems.

**Assessment: Students will be assessed over their ability to describe patterns both in writing, through developing pictures, and in their ability to write equations to extend the patterns to the nth term.**

1. Students will use estimation and calculators in working with quantities, computation, and problem solving.

**Assessment: Students will be assessed over their ability to use problem solving in multiple situations. Part of the problems solving process is developing a sense of number to help them estimate if their results are reasonable.**

1. 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.

**Assessment: Students will be assessed over their ability to demonstrate fluency with materials such as two color counters, base ten bocks, algebra tiles, and balance scales.**

**Last Revised:** Spring 2018 by the Math Ed Subgroup