

**WEBSTER UNIVERSITY**

**COURSE SYLLABUS**

**MTHC 5450.01**  
**COURSE NUMBER AND SECTION**

**Andrea Rothbart**  
**INSTRUCTOR**

**Topics in Number Theory**

**TERM: Spring, 2004**

**1. Course Description**

This course, designed for secondary school and community college math teachers will examine topics in number theory with an emphasis on the modular systems and their application to a variety of topics.

**2. Learning Outcomes**

The ideas examined in this course will provide teachers with increased number sense, with a deeper understanding of algebra, and with experience applying mathematics to a variety of interesting mathematical and empirical problems. It will also provide teachers with some effective materials for helping their own students better understand algebra and the behavior of numbers (including negative numbers).

**3. Schedule**

CLASS 1: Introduction to remainders. The Black Magic Device  
Mod. 11 arithmetic; remainder tests for division by 11; Mod 11 algebra.

CLASS 2: The Arithmetic of Other Modular Systems; Zero divisors; Basic concepts of number theory.

CLASS 3 Examining the question: Are most fractions reduced? The unique factorization theorem, irrationality of the square root of 2 and the infinitude of primes.

CLASS 4: The algebraic structure of the modular systems.

CLASS 5: Quiz 1

CLASS 6: Application: Developing remainder tests.

- CLASS 7: Application: Solving Linear Diophantine Equations
- CLASS 8: Application: The Orbit Problem
- CLASS 9: The Orbit Problem (continued)
- CLASS 10: Application: Determining the periods of repeating decimals (base 10)
- CLASS 11 Application: Determining the periods of repeating decimals (other Bases)
- CLASS 12 Quiz 2
- CLASS 13 Quadratic Reciprocity
- CLASS 14 Quadratic Reciprocity (continued)
- CLASS 15 Modular Field Extensions
- CLASS 16 Quiz 3

4. Resources:

Text Used: "The Theory of Remainders" by A. Rothbart  
Other materials to be distributed by the instructor

5. EVALUATION: Based upon class participation, homework assignments and quizzes.

**This syllabus is subject to change at the discretion of the instructor.  
Therefore, regular attendance is required.**