

## **MATH 504 Investigations in Number Theory**

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### **Course description:**

The main purpose of this course is to explore the relationships in the multiplicative structure of the integers, with applications to rational and real numbers. We will use manipulative materials and activities to learn and learn how to teach number theory concepts to middle school and high school students.

This includes three responsibilities:

1. Participants will gain the understanding in depth with the content knowledge of number theory (e.g. counting numbers, divisibility of numbers, prime numbers and the prime factorization theorem, perfect number, Euler's function).
2. Participants will become familiar with a variety of manipulative materials and activities, which are applicable into the teaching of number theory in 5-12 mathematics classrooms.
3. Participants will gain familiarity with the 5-12 national and MT state mathematics standards relate to the learning and teaching mathematical concepts in number theory.
4. Participants will organize classroom presentations and develop units of instructional material that could be used with their students.

### **Resources:**

1. Oystein Ore, Number Theory and Its History, ISBN #: 0-486-65620-9
2. If you are a middle school teacher, NCTM's Navigating through Number and Operations in Grades 6-8, ISBN #: 0-87353-575-8; if you are a high school teacher, NCTM's Navigating through Number and Operations in Grades 9-12, ISBN #: 0-87353-585-5

### **Topic outline:**

1. What are the number systems?
2. How do we teach and assess concepts in number theory?
3. What place does number theory have in the 5-12 mathematics curriculum and national and MT state standards?
4. What does research say about the learning and teaching of number theory?

### **Projects / Course Requirements:**

There will be four assessment events:

1. Students will work on some mathematics problems in number theory.
2. Two papers will be written, one will be an analysis on the sequence of number theory laid out in one of the mathematics curricula and the other one will be a report on the standards on number theory.
3. One **short report**, which will include a presentation and a written page about at least one manipulative activity that you found or created. The most important feature of the short report is that it communicates some teaching strategy that you have found and can share with others in the class. All the activities will be available for teachers to take away.

4. A plan for an **instructional unit**. This will be a collection of material that could be used by your students to develop mathematical understanding in number theory. A unit should have specific goals for teaching a selected concept. All the instructional units will be available for teachers to take away.