MATH 341 Theory of Numbers

1. Catalog Description

MATH 341 Theory of Numbers **4 units**

Prerequisite: MATH 248 with a grade of C- or better or consent of instructor.

Properties of numbers. Euclid's Algorithm, greatest common divisors, diophantine equations, prime numbers, congruences, number theoretic functions, the quadratic reciprocity laws, primitive roots and indices. 4 lectures.

2. Required Background or Experience

Math 248 with a grade of C- or better or consent of instructor

3. Learning Objectives

The student should:

a. Develop a better understanding of the elementary properties of numbers.
b. Develop a better understanding of the number system and the manipulations of numbers.
c. Be able to formulate postulates and definitions.
d. Be able to solve elementary indeterminate equations.
e. Develop a better understanding and appreciation of the importance of postulates in mathematical thinking.

4. Text and References

Text to be chosen by instructor.

5. Minimum Student Materials

Paper, pencils, and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

   a. Mathematical induction

   b. The binomial theorem

   c. Early number theory

   d. Divisibility theory and the integers

   e. Primes and their distribution

   f. The theory of congruences

   g. Fermat's theorem

   h. Wilson's theorem

   i. The functions τ and σ.

   j. Euler's generalization of Fermat's theorem

   k. Primitive roots and indices

   l. The quadratic reciprocity laws

8. Methods of Assessment

   Comprehensive final exam, mid-term exams or quizzes, homework.