Departmental Syllabus
Math 4330 -- Theory of Numbers

Textbook: Elementary Number Theory (Seventh Edition), by David M. Burton

Prerequisites: MATH 2730 or 3330 with a grade of “C-” or better.

Calculators: A calculator may be required. Calculators with Computer Algebra Systems (CAS), (e.g. the TI-89, TI-92 and TI-Nspire with CAS keypad, or their equivalent), are not allowed in any math classes. On occasion, individual instructors may restrict the use of any type of calculator.

Course Description: Integers, divisibility, prime numbers, Euclidean algorithm, linear Diophantine equations, congruences, Wilson’s and Euler’s theorems, Fermat’s Little Theorem, and other selected topics.

Student Learning Outcomes: Students should be able to:
- interpret concepts in elementary number theory;
- solve systems of linear congruences;
- write rigorous proofs of number theoretical theorems; and
- provide counterexamples to false statements.

Topics and sections to be covered:
1.1 Mathematical Induction
1.2 The Binominal Theorem

2.1 Early Number Theory
2.2 The Division Algorithm
2.3 The Greatest Common Divisor
2.4 The Euclidean Algorithm
2.5 The Diophantine Equation $ax + by = c$

3.1 The Fundamental Theorem of Arithmetic
3.2 The Sieve of Eratosthenes

4.1 Carl Friedrich Gauss (optional)
4.2 Basic Properties of Congruence
4.4 Linear Congruences and The Chinese Remainder Theorem

5.1 Pierre de Fermat (optional)
5.2 Fermat’s Little Theorem and Pseudoprimes (optional for Pseudoprimes)
5.3 Wilson's Theorem

6.1 The Sum and Number of Divisors
6.2 The Inversion Möbius Formula (optional)
6.3 The Greatest Integer Function (optional)

7.1 Leonhard Euler (optional)
7.2 Euler Phi-Function
7.3 Euler Theorem
7.4 Some Properties of the Phi-Function

8.1 The Order of an Integer Modulo n (optional)
8.2 Primitive Roots For Primes (optional)

If you require an accommodation due to a disability, please make an appointment to see me as soon as possible to discuss arrangements for the accommodations. You will need a Verified Individualized Services and Accommodations (VISA) form from Services for Students with Disabilities.