

# Syllabus: Introduction to Number Theory

- **Description**

Integers, divisibility, prime numbers, unique factorization, congruences, quadratic reciprocity, Diophantine equations and arithmetic functions.

- **Prerequisites**

One Variable Calculus

- **Topics**

## **The integers**

Divisibility

Prime numbers

Greatest common divisor

Euclidean algorithm

Unique factorization

## **Congruences**

Basic properties

Modular arithmetic

Euler's phi function

Fermat's, Euler's and Wilson's theorems

Chinese remainder theorem

## **Quadratic Reciprocity**

Quadratic residues

Legendre and Jacobi symbols

Law of quadratic reciprocity (possibility skip proof to allow time for other topics)

## **Additional Topics, (as time allows)**

Diophantine equations: Pythagoras, Fermat, Pell

Primitive roots: Lagrange's Theorem

Primality testing

Factoring

RSA Algorithm

Arithmetic functions, Moebius inversion formula, Mersenne primes