

DRP– Algebraic Number Theory

Abstract- In the 19th century, attempts to solve Fermat's Last Theorem and search for higher reciprocity laws led to a period of tremendous discovery in Number Theory. This project will serve as an introduction to many of the ideas in Algebraic Number Theory that were discovered during this time. Applications include solutions to Diophantine equations including certain cases of Fermat's Last Theorem, Dirichlet's theorem on arithmetic progressions, and elliptic curves.

Structure- We will start with an introduction to fundamental concepts like unique factorization, number fields, algebraic numbers and algebraic integers, and finite fields. Next, we will cover quadratic reciprocity, cubic and biquadratic reciprocity, and also introduce affine and projective space. Using all of this, we will see applications to Diophantine equations and equations over finite fields. Time permitting, we will cover L functions and applications to Dirichlet's theorem on arithmetic progressions, and properties of elliptic curves.

Textbook- A Classical Introduction to Modern Number Theory by Kenneth Ireland and Michael Rosen (2nd Edition)

Prerequisites- Math 311 required. Math 419 recommended.