

## 2007 REU Projects

The 2007 REU in number theory will address questions related to the arithmetic of function fields  $\mathbb{F}_q(T)$ . There are many analogies between these fields and number fields, finite-degree extensions of  $\mathbb{Q}$ .

The first team will consider questions analogues to famous theorems and open problems regarding the distribution of prime numbers. The polynomial ring  $\mathbb{F}_q[T]$  has many of the same properties as the ring of integers. In particular, every polynomial  $f \in \mathbb{F}_q[T]$  can be factored uniquely as

$$f = u \prod_{i=1}^n p_i^{e_i}$$

where  $u \in \mathbb{F}_q^\times$  is a unit, and the  $p_i$  are monic irreducible polynomials, the primes of  $\mathbb{F}_q[T]$ . Many questions about the distribution of prime numbers have analogues in this context, which are frequently easier to address.

The second team will consider questions regarding the arithmetic of rank 2 Drinfeld modules. Drinfeld modules are function field analogues of elliptic curves over  $\mathbb{Q}$ . Elliptic curves feature prominently in the proof of Fermat's Last Theorem, and in studying the congruent number problem: when is a squarefree integer  $n$  the area of a right triangle with rational sides? Participants on the second team will study questions regarding the distribution of supersingular Drinfeld modules, which are analogues to theorems of Atkin on supersingular elliptic curves.