Title: One-and-half difference sets

Abstract: Combinatorial design theory has not only a deep respected and advanced mathematical heritage but also has produced genuine new applications that attract many engineers. Designs find applications in signal processing, dealing with radar problems, error-correction codes, optical orthogonal codes and image processing. Difference sets method play a central role in the study of designs, error-correction codes and binary sequences.

A (v, k, λ)-difference set is a subset S of size k of a group G of order v such that every nonidentity element of G can be expressed as a difference $d_1 - d_2$ of elements of S in exactly λ ways.

In this talk, we will introduce a generalization of (v, k, λ)-difference sets. This new method produces a symmetric $1\frac{1}{2}$-design whose automorphism group has a subgroup that is transitive on blocks and points of the incidence structure. We will also provide preliminary results concerning $1\frac{1}{2}$-difference sets and the group rings and characters.