

STUDENT PRESENTATION

Mathematics & Computer Science



Kai Fender
Wednesday – April 13, 2016
Time: 12:00 to 12:50 pm
Room: D631

Title: Recursively-constructed unit Hadamard: their excess and a resulting family of BIBDs

Abstract:

A *unit Hadamard matrix* is a square matrix H with unimodular entries and mutually orthogonal row vectors. If the entries of H are all roots of unity, H is a *Butson Hadamard matrix*. If the entries of H are all 1 or -1, H is a *Hadamard matrix*. In the second half of the twentieth century, interest arose in finding the maximal modulus of the sum of the entries, or the *excess*, of a unit Hadamard matrix. In this talk, we will give a recursive construction for infinite classes of Hadamard, Butson Hadamard and unit Hadamard matrices. We will proceed to use these classes to obtain several lower bounds for the maximal excess problem. Finally, we will show that some of our recursively-constructed Hadamard matrices can be used to construct an infinite class of *balanced incomplete block designs*, another important combinatorial object.