



Pacific Institute for the
Mathematical Sciences



MATHEMATICS & COMPUTER SCIENCE COLLOQUIUM

ROBERT CRAIGEN

University of Manitoba



Bio: Prof. Craigen obtained his PhD in Waterloo in 1991 and was a faculty at the University of Lethbridge from 1993 to 1995. He is a faculty at the University of Manitoba since 1999. His research interests are in Combinatorial Matrix Theory. He is also very involved in rallying parents, citizens, employers, scientists, mathematicians, and educators to improve the K-12 mathematics education in Western Canada through the WISE initiative (Western Initiative for Strengthening Education in Math).

Title: *Hadamard Matrices, Projective Planes and Everything In-between*

Abstract: Finite configurations are studied for many reasons, not the least of which are their compelling aesthetic appeal and theoretical power. They also provide numerous meat-and-potatoes applications of mathematics in our day, from keeping your data safe on your hard drive, to wireless communications, to designing experiments, to the nascent field of quantum computing. Renowned for its beautiful objects and hard puzzles, this field is notoriously littered with apparently sporadic rules and objects -- things that ostensibly shouldn't exist, but do and things that should exist, but don't, against a background of symmetry and regularity. Sometimes by digging into the underlying structure we find reasons that elucidate oddball behaviour and provide a greater sense of the harmony at work. This is the story of a surprising, elegant yet little-known, web of connections between two kinds of objects which, in a certain large and important class of configurations, are as distant as possible -- yet viewed the right way seem more like next-door neighbours, existing in tandem in ways that shed light on the larger field.

We shall visit many combinatorial structures old and new. I hope to spark in others the fascination expressed by J.J. Sylvester when he described a key object among those we shall encounter as *...furnishing interesting food for thought, or a substitute for the want of it, alike to the analyst at his desk and the fine lady in her boudoir...*

Friday—March 4, 2016

12:00 to 12:50 p.m.

UHall D634