University of Victoria | Graduate Studies

PROGRAMME

The Final Oral Examination
for the Degree of

DOCTOR OF PHILOSOPHY
(Department of Mathematics & Statistics)

Garret Flowers

2011	University of Victoria	MSc (Math)
2009	Oberlin College	BA

"Embeddings of Configurations"

Tuesday, February 24, 2015
2:00PM
David Turpin Building, room A144

Supervisory Committee:

Dr. Peter Dukes, Department of Mathematics & Statistics, University of Victoria (Supervisor)
Dr. Jing Huang, Department of Mathematics & Statistics, UVic (Member)
Dr. Venkatesh Srinivasan, Department of Computer Science, UVic
(Outside Member)

External Examiner:
Dr. Gordon Williams, Department of Mathematics & Statistics, University of Alaska, Fairbanks

Chair of Oral Examination:
Dr. Chris Upton, Department of Biochemistry and Microbiology

Abstract

In this dissertation, we examine the nature of embeddings with regard to both combinatorial and geometric configurations. A combinatorial *[r,k]*-configuration is a collection of abstract points and sets (referred to as blocks) such that each point is a member of *r* blocks, each block is of size *k*, and these objects satisfy a *linearity* criteria: no two blocks intersect in more than one point. A geometric configuration requires that the points and blocks be realized as points and lines within the Euclidean plane. We provide improvements on the current bounds for the asymptotic existence of both combinatorial and geometric configurations. In addition, we examine the largely new problem of embedding configurations within larger configurations possessing regularity properties. Additionally, previously undiscovered geometric *[r,k]*-configurations are found as near-coverings of combinatorial configurations.

Awards, Scholarships, Fellowships

2013 – Graduate Award, *University of Victoria*
2010 – CMS Student Committee Postal Award
2009 – Rebecca Orr Memorial Prize

Presentations

1. Flowers, G. "Star Cocircularities of Knots." University of Victoria, Victoria, Canada. January 2011 (oral)

Publications

1. Flowers, G. "Satanic and Thelemic Circles on Knots." *The Journal of Knot Theory and its Ramifications* **2012**, *22 (5).*