

# GRADUATE SEMINAR

Adam Gorr

## Eigenvalues of $k$ -Uniform Hypergraphs

*MSc Student supervised by Dr. Shaun Fallat and Dr. Karen Meagher*

July 10, 2017

3:30 PM - 4:30 PM

Math Lounge (CW 307.20)

**Abstract:** Classical graph theory is a well-studied area of interest. Of particular interest are the eigenvalues of graphs. By representing a graph as a matrix, we may determine the eigenvalues of said matrix using various techniques from linear algebra. These eigenvalues can be used to help characterize some of the invariant parameters of graphs and consequently can be used to help better understand the structure of graphs from a more general point of view.

A newer area of interest is known as hypergraph theory. Hypergraphs are an extension of graphs in that they too are made up a set of vertices, but the edges of ordinary graphs are replaced with hyperedges.  $k$ -uniform hypergraphs are hypergraphs whose hyperedges all contain  $k$  vertices. In this talk, I will define the characteristic polynomial of  $k$ -uniform hypergraphs and provide an algorithm for calculating this polynomial. I will also show that several specific eigenvalues exist for  $k$ -uniform hypergraphs.