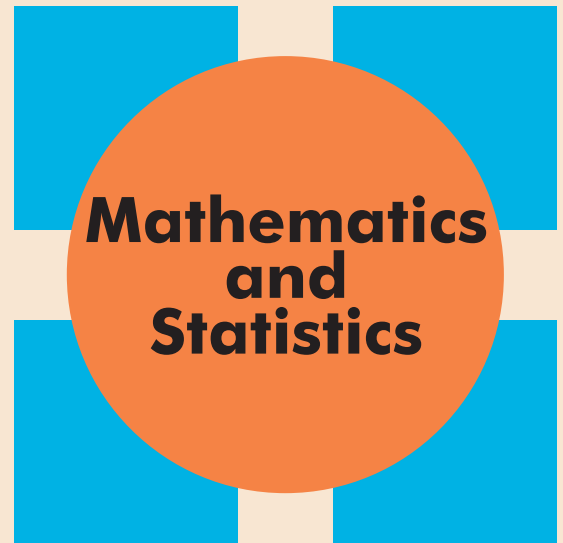


**PRAIRIE MATHEMATICS
COLLOQUIUM**

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University of Regina

**Recent Trends on the
Inverse Eigenvalue
Problem for Graphs**



Date: **Thursday** November 5, 2020

Time: Social tea break at 2:00 PM, talk at 2:30 PM

Zoom link: <https://zoom.us/j/95446214700>

Abstract: Given a simple graph $G = (V, E)$ with $V = \{1, 2, \dots, n\}$, we associate a collection of real n -by- n symmetric matrices governed by G , and defined as $S(G)$ where the off-diagonal entry in position (i, j) is nonzero iff i and j are adjacent.

The inverse eigenvalue problem for G (IEP- G) asks to determine if a given multi-set of real numbers is the spectrum of a matrix in $S(G)$. This particular variant on the IEP- G was born from the research of Parter and Wiener concerning the eigenvalue of trees and evolved more recently with a concentration on related parameters such as: minimum rank, maximum multiplicity, minimum number of distinct eigenvalues, and zero forcing numbers. An exciting aspect of this problem is the interplay with other areas of mathematics and applications. A novel avenue of research on so-called “strong properties” of matrices, closely tied to the implicit function theorem, provides algebraic conditions on a matrix with a certain spectral property and graph that guarantee the existence of a matrix with the same spectral property for a family of related graphs.

In this lecture, we will review some of the history and motivation of the IEP- G . Building, on the work Colin de Verdière, we will discuss some of these newly developed “strong properties” and present a number of interesting implications pertaining to the IEP- G .

This event is supported by PIMS.