Pacific Institute *for the* Mathematical Sciences

PIMS - UVic Distinguished Lecture

Leslie Hogben

Iowa State University and
American Institute of Mathematics

Thursday, March 22, 2018
3:30 pm
(pre-lecture refreshments @ 2:45 pm DTB A514)

Human and Social Development Building
room A264
University of Victoria

The Inverse Eigenvalue Problem of a Graph

Inverse eigenvalue problems appear in various contexts throughout mathematics and engineering, and refer to determining whether or not there is a matrix with a prescribed structure (e.g., tridiagonal) and prescribed spectral property (e.g., having a given nullity, or having few distinct eigenvalues). For a given graph G, the associated matrices are real, symmetric, and have off-diagonal nonzero entries exactly where G has edges. The inverse eigenvalue problem of G (abbreviated by IEPG) is to determine the collection of all possible spectra (multisets of eigenvalues) for such matrices. Inverse eigenvalue problems and the background of this problem will be described, together with techniques such as the fundamental work of Colin de Verdière and the Strong Arnold Property. Two recent extensions of the Strong Arnold Property that target a better understanding of all possible spectra and their associated multiplicities will be presented; these are referred to as the Strong Spectral Property and the Strong Multiplicity Property. Applications of these properties to the inverse eigenvalue problem of a graph will be discussed, including the solution of IEPG for all graphs of order at most five.

Leslie Hogben is the Dio Lewis Holl Chair in Applied Mathematics and Professor of Mathematics at Iowa State University, and the Associate Director for Diversity of the American Institute of Mathematics. She received her B.A. from Swarthmore College in 1974, and her Ph.D. in 1978 from Yale University. Her research areas include linear algebra, graph theory, and applications. Dr. Hogben is the author of more than 90 research papers and particularly enjoys introducing students to mathematical research. She has or is advising four postdoctoral associates, twenty doctoral students, nineteen master's students, and forty undergraduate researchers. She is the director of the NSF-sponsored ISU Math REU and developed an early graduate research (EGR) course for mathematics and applied mathematics graduate students at ISU. Dr. Hogben is a frequent co-organizer of meetings, workshops, and special sessions/mini-symposia. She is the Secretary/Treasurer of the International Linear Algebra Society, an associate editor of the journals Linear Algebra and its Applications and Electronic Journal of Linear Algebra, and a member of the Scientific Review Panel for the Atlantic Association for Research in the Mathematical Sciences.