UNIVERSITY OF RHODE ISLAND

Department of Mathematics
and Applied Mathematical Sciences

Applied Mathematics and
Scientific Computing Seminar

Location: Lippitt Hall 205

Time: Wednesday, April 17, 2024, 1:00pm

(refreshments at 12:55 p.m.)

Inverse Problems for Matrix Polynomials
and Rational Matrices

by **Dr. D. Steven Mackey**, Professor Emeritus
Department of Mathematics, Western Michigan University

Abstract: Matrix polynomials arise in a variety of application areas, including the vibration analysis of mechanical structures, optimal control, and linear systems theory. The key structural data of a matrix polynomial in many such applications are its degree, its eigenvalues and elementary divisors (both finite and infinite), together with its left and right minimal indices. A fundamental inverse problem for matrix polynomials, then, is to *characterize the combinations of structural data that can be realized* by some matrix polynomial of the given degree. And when a list of structural data is realizable in principle, is it possible to simply construct a realization in such a way that the given *structural data is transparently visible*, in a manner analogous to the Jordan canonical form for matrices, or the Kronecker canonical form for matrix pencils? In this talk we discuss recent work on these questions, and as time permits the analogous questions for rational matrices.