

# Seminar Talk

Charles Johnson Ph.D.  
Professor  
Department of Mathematics  
The College of William and Mary

Friday, February 12, 2016  
3:00 p.m. KH 224

**Title:** Eigenvalues, Multiplicities and Graphs

**Abstract:**

Let  $S(G)$  denote all the real symmetric (or complex Hermitian) matrices, the simple undirected graph of whose off-diagonal entries is the graph  $G$  on  $n$  vertices. Each matrix in  $S(G)$  has  $n$  real eigenvalues, counting multiplicities. Which "lists" of multiplicities that can occur depend upon the graph  $G$ . For example, an irreducible tridiagonal symmetric matrix ( $G$  is a path) can have no multiplicity greater than 1. We explore constraints on the possible multiplicities and describe how all lists can be found for many classes of trees. The maximum multiplicity and the minimum number of distinct eigenvalues are characterized.

**Bio:**

Prof. Charles Johnson obtained his BA in Mathematics and Economics with distinction from Northwestern University in 1969, and his PhD also in Mathematics and Economics from Caltech in 1972. He is currently the Class of 1961 Professor in the Department of Mathematics at the College of William and Mary. His areas of specialization are matrix analysis and its applications; combinatorial mathematics; mathematical modeling; mathematical economics and priority setting methodology. He has also held visiting appointments at universities in the US (MIT, Caltech, Johns Hopkins University, Brigham Young University), Israel (Technion, Tel Aviv University), Germany (University of Bielefeld), Spain (University Carlos III), and Brazil (University of Campinas). He has published over 300 journal articles and numerous books, including two widely used and referenced textbooks with Roger Horn on Matrix Analysis and Topics in Matrix Analysis published by Cambridge University Press.