Discrete Mathematics Seminar

<mark>Please note</mark> the time change for this talk.

Time: Friday, March 25, 2022, <mark>2:00-3:00 PM</mark> (Central Time)
Title: Signed Pathing Matrices and Characteristic Polynomials
Speaker: Dr. Joni J. Lindsey, School of Mathematics and Computer Science, Lake Superior State University
Room: 330 Derrick Hall

Abstract:

A graph consists of a set of vertices, *V,* that are connected by a set of edges, *E.* Whereas a signed graph is a graph that consists of a set of vertices, *V,* that are connected by edges, *E,* however, there is an edge signing function σ from $E \rightarrow \{-1,+1\}$. In this presentation, we describe walks and paths on examples of signed graphs as well as define a *q*-path matrix along with some new found results. We strengthen and extend the classical pathing matrix formulas for regular graphs to any signed graph. We also prove a relationship among the characteristic polynomials of oriented hypergraphs of each matrix that unifies their presentation as polynomial products, or linear/quadratic variable transformations. We also address future research that includes adjusting the definition of "girth" for oriented hypergraphs to extend the pathing matrix formulas, and allow multiple variables in the characteristic polynomials to remove the regularity and uniformity criteria.