1106-15-1246 **Cheryl Grood**, **Johannes Harmse**, **Leslie Hogben**, **Thomas J. Hunter**, **Bonnie Jacob**, **Andrew Klimas** and **Sharon McCathern*** (smccathern@apu.edu). *The minimum rank of symmetric zero-diagonal matrices associated with a graph.*

Associated with any simple graph G is a family of symmetric matrices with the same zero-nonzero pattern as the adjacency matrix of G. The minimum rank of the matrices in this family is known as the minimum zero-diagonal rank of G and denoted $\mathrm{mr}_0(G)$.

In this talk, we characterize all connected graphs G with low ($\mathrm{mr}_0(G) \leq 3$) and high ($\mathrm{mr}_0(G) = |V(G)|$) minimum zero-diagonal ranks, and we describe the connection between the ranks of matrices associated with G and the generalized cycles that are subgraphs of G. The existence of a unique spanning generalized cycle (also known as a unique perfect $[1,2]$-factor) of G is equivalent to $\mathrm{mr}_0(G) = |V(G)|$, and we give an algorithm for determining whether a given graph has a unique spanning generalized cycle. We also discuss the maximum zero-diagonal rank of a graph, as well as the realizable zero-diagonal ranks between minimum and maximum for a given graph. (Received September 11, 2014)