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**MATHEMATICS COLLOQUIUM SERIES**  
**UNIVERSITY OF CENTRAL FLORIDA**

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**Dr. Peter D. Johnson, Jr.**  
**Department of Mathematics**  
**Auburn University**

Will speak on

**"Two families of analytic inequalities associated  
with edge-weighted uniform hypergraphs"**

**Abstract:**

A  $k$ -uniform hypergraph is a set  $V$  (of vertices) together with a set  $E$  of multisubsets of  $V$  (called hyperedges, or just edges), each with multiset cardinality  $k$ . Thus, an ordinary graph with no isolated vertices nor multiple edges, but possibly with loops, is a 2-uniform hypergraph. If the edges of the hypergraph are weighted (usually with non-negative real numbers, but not necessarily), the weighted degree of a vertex is the sum of the weights of the edges it belongs to, with multiplicity accounted for. The two families of inequalities referred to in the title relate functions of the weighted degrees on the various edges to the arithmetic mean, over the vertices, of the weighted degrees. These families contain some old favorites, such as  $x^2 + y^2 \geq 2xy$ , for real numbers  $x$  and  $y$ , and some nice surprises, such as: for any  $k$ -uniform hypergraph, for any  $k$ , and for any weighting of its edges with real numbers such that every weighted degree is positive and the sum of all the weights is positive, the weighted geometric mean, over the edges, of the geometric means of the weighted degrees of the  $k$  vertices on the edge, is no less than the average weighted degree, and equality implies that all the weighted degrees are equal.

(It is a joint work with Ram N. Mohapatra)

Date: Thursday, March 5, 2009

Time: 11:30 AM

Place: MAP 318

Everyone is cordially requested to attend.