**DISCRETE MATHEMATICS SEMINAR**
CENTER FOR APPLIED MATHEMATICS AND SCIENCE
DEPARTMENT OF MATHEMATICS
UNIVERSITY OF WEST GEORGIA

**9:20 – 9:40 PM, Monday, October 24, 2016**

**BOYD 306**

Speaker: **Dr. Jeong-Hyun Kang** (UWG)
Title: **A new approach to the chromatic number of the square of Kneser graph** $K(2k+1,k)$


**Abstract**:
The vertices of Kneser graph $K(n,k)$ are the subsets of $\{1,2,\ldots,n\}$ of cardinality $k$, two vertices are adjacent if and only if they are disjoint. The square $G^2$ of a graph $G$ is defined on the vertex set of $G$ with two vertices adjacent if their distance in $G$ is at most 2. Z. Füredi, in 2002, proposed the problem of determining the chromatic number of the square of the Kneser graph. The first non-trivial problem arises when $n = 2k+1$. It is believed that $\chi(K^2(2k+1,k)) = 2k+c$ where $c$ is a constant, and yet the problem remains open. The best known upper bound is $8k/3 + 20/3$ by Kim and Park (2014). In this paper, we prove $\chi(K^2(2k+1,k)) \leq 5k/2 + c$, where $c$ is a constant in $\{5/2, 9/2, 5, 6\}$, depending on $k \geq 2$. We develop a new approach to this coloring problem by employing graph homomorphisms, Cartesian products of graphs, and linear congruences integrated with combinatorial arguments.