DISCRETE MATHEMATICS SEMINAR

CENTER FOR APPLIED MATHEMATICS AND SCIENCE

DEPARTMENT OF MATHEMATICS

UNIVERSITY OF WEST GEORGIA

2:00 - 2:50 PM, FRIDAY, OCTOBER 23, 2015

BOYD 306

Speaker: **Dr. Guantao Chen**

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Title: **On Goldberg's Conjecture**

Abstract:

Given a graph G possibly with multiple edges but no loops, denote by Δ the *maximum degree*, μ the *multiplicity*, χ' the *chromatic index* and χ'_f the *fractional chromatic index* of G, respectively. It is known that $\Delta \leq \chi'_f \leq \chi' \leq \Delta + \mu$, where the upper bound is a classic result of Vizing. While deciding the exact value of χ' is a classic NP-complete problem, the computing of χ'_f is in polynomial time. In fact, it is shown that if $\chi'_f > \Delta$ then $\chi'_f = \max \frac{|E(H)|}{\lfloor |V(H)|/2 \rfloor}$, where the maximality is over all induced subgraphs H of G. Goldberg (1973), Andersen (1977), and Seymour (1979) conjectured that $\chi' = \lceil \chi'_f \rceil$ if $\chi' \geq \Delta + 2$. Chen, Gao and Shan showed that if $\chi' > \Delta + \sqrt[3]{\Delta/2}$ then $\chi' = \lceil \chi'_f \rceil$. The previous best known result was for graphs with $\chi' > \Delta + \sqrt{\Delta/2}$ obtained by Scheide and by Chen, Yu and Zang, independently. It has been shown that Goldberg's Conjecture is equivalent to the following conjecture of Jakobsen: *For any positive integer m with $m \geq 3$, every graph G with $\chi' > \frac{m}{m-1}\Delta + \frac{m-3}{m-1}$ satisfies $\chi' = \lceil \chi'_f \rceil$.* Jakobsen's conjecture has been verified for m up to 15 by various researchers in the last four decades. Chen, Gao and Shan showed that it is true for $m \leq 23$. Moreover, They showed that Goldberg's Conjecture holds for graphs G with $\Delta \leq 23$ or $|V(G)| \leq 23$.