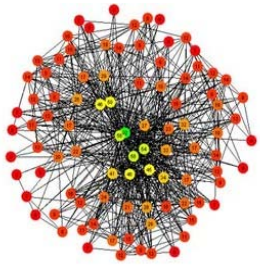
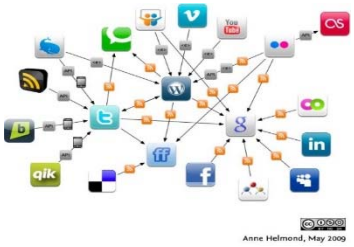
COMP SCI 6204: Applied Graph Theory for Computer Science



Spring 2019 Semester

Class Hours: Tuesday, 4:00-6:30 PM
Computer Science Bldg., Room 209
Instructor: Prof. Sajal K. Das
(sdas@mst.edu)



"... pleasure has probably been the main goal all along. But I hesitate to admit it, because computer scientists want to maintain their image as hard-working individuals who deserve high salaries. Sooner or later society will realize that certain kinds of hard work are in fact admirable even though they are more fun than just about anything else."– Donald E. Knuth (Turing Awardee)

Course Description:

Graphs offer excellent modeling and analysis tools for solving a wide range of real-life problems in computer science and engineering that include the Internet, wireless and sensor networks, mobile computing, social networks, distributed computing architectures, VLSI, bioinformatics, scheduling, image processing, databases, machine learning, data mining, big data, IoT, and so on.

This foundational course (a **"must"** for graduate students, particularly PhD students) deals with fundamental and advanced concepts in graph theory. Emphasis will be given on understanding the basic theory of graphs, proof techniques, and how to apply them to develop "cool and elegant" solutions for real-life applications.

Topics include, but are not limited to:

- Fundamentals of combinatorial principles
- Undirected and directed graphs
- Connected and disconnected graphs
- Enumeration of trees
- Graph planarity
- Network topology design
- Hamiltonian cycles and Euler tours
- Node and edge coloring
- Graph matching
- Network flow problems
- Random graphs
- Real-life Applications of Graphs

Textbook: Douglas B. West, *Introduction to Graph Theory*, Prentice Hall, 2nd edition, 2002. (Supplemented by additional materials and papers.)

Prerequisites: CS 5200 or MATH 5107; or consent of the instructor. More importantly a problem solving, creative mind is helpful!

[If qualified, *senior undergraduate students are encouraged to take this course.*]