

Math 777 Graph Theory (II)

Spring 2006 course syllabus

Course: Math 777

Credit: 3

Title: Graph Theory (II)

Instructor: Lincoln Lu, email: lu@math.sc.edu.

Lectures: TTh 2:00p.m.–3:15p.m., LC 310.

Office hours: TTh 1p.m.–2p.m., LC 418B

Reference books:

- Introduction to Graph Theory, second edition, by Douglas B. West, 2001.
- Complex graphs and networks, F. Chung and L. Lu, draft will be provided during the course.

Grading: This is a graduate level course. The grade is based on homework (30%), a midterm (35%), and a take-home final project (35%).

Course description:

First, we will cover topics on planar graphs like Euler's formula, Kuratowski's theorem, Five Color theorem, and crossing numbers.

Then, we will study latest results and methods on modeling real world graphs such as the WWW graph, the Collaboration graph, the Call graphs, biological graphs, social networks, etc. We shall cover the preferential attachment scheme, growth-deletion models, duplication models, and random graphs with given expected degrees. We will study various graph properties, such as connected components, average distance/diameter, and spectrum. Erős-Rényi model of classical random graphs will also be covered.

Some knowledge of probability theory is a plus, but not a prerequisite. We will study combinatorial probabilistic methods including first moment method, deletion method, Chernoff inequalities, Lovász local lemma, and martingale inequalities. All inequalities will come with applications in graph theory.