

Math 150

Graphs and Complex Networks

Course Syllabus—Spring 2010

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DESCRIPTION:

In this course students will learn the basic principles and ideas of an area of mathematics called graph theory. A graph may represent an obvious construct such as a road network where the edges of the graph are the roads and the vertices of the graph are the street intersections or other points of interest. A graph may also represent less obvious constructs such as inter-relationships within a group of people.

We will then apply what we learn about graph theory to complex networks. The term complex networks arose in the late 1990s a number of researchers noticed that networks in biology, sociology, and telecommunications exhibited similar characteristics unlike standard random networks.

TOPIC OUTLINE:

My plan for the course is to cover the book LINKED and graph theory topics in parallel for the first half of the course. You will be given discussion questions for each chapter in LINKED and will be expected to actively participate in classroom discussion. The last half of the course will be focused on material from references 1, 3 and 5. There will be group research projects in lieu of a final exam.

REFERENCES:

1. Barabasi, Albert-Lszl, Bursts: The Hidden Pattern Behind Everything We Do, April 29, 2010. ISBN 0525951601
2. Barabasi, A-L., Linked: How Everything Is Connected to Everything Else and What it Means for Business, Science, and Everyday Life, Perseus Publishing, Cambridge, Massachusetts, 2002. ISBN 0-452-28439-2
3. Newman, M.E.J., “The Structure and Function of Complex Networks,” (2003) *SIAM Review*, Vol. 15, No. 2, pp. 167-256.
4. Chartrand, G., Introductory Graph Theory, Dover Publications Inc., New York, 1977.
5. Dorogovtsev, S. Lectures on Complex Networks, Oxford Master Series in Physics, Vol. 20, 2010. ISBN13: 978-0-19-954893-4, ISBN10: 0-19-954893-5

HOMEWORK:

Homework emphasizing and extending lecture material will be assigned and graded. Late homeworks are not accepted except in the case of an unanticipated absence (e.g. serious illness, death in the family, loss of your favorite DVD etc.).

GRADES.

Final grades will be based on five values: homework scores, participation in classroom discussions, exam 1, exam 2, and the final project. The five percent values will be weighted.

Homework	30%
Discussion	10%
Exam 1	20%
Exam 2	20%
Project	20%

Final grades may be “curved” (in your favor). If the final grades are not curved then the following scale will apply A 92% and above, B 80–91%, C 70–79%, D 60–69%, F 59% and below.