

MATH 3330: Applied Graph Theory

Winter 2007

Description:

The development of the Internet and the World Wide Web has changed our outlook on the world. Science has followed suit with an increased emphasis on the study of networks. However, mathematicians have studied networks for over one hundred years. A network, to a mathematician, is a *graph*, and graph theory is a fertile research area on the cross-section of mathematics and computer science.

This course gives an introduction to graph theory, with an emphasis on applications and modelling.

Topics:

- Paths, cycles and the concept of diameter: are all humans really connected by at most "six degrees of separation"?
- Shortest paths: What is the shortest way of routing packets through the Internet?
- Connectivity, strong connectivity, connected components: communities in social networks
- Connectivity and spanning trees: what is the minimum cost, or maximum reliability network needed to connect a set of servers?
- Minimum flow and maximum cut: how scheduling problems can be solved efficiently using graph theory
- Graph colouring: assigning radio frequencies in cellular networks
- Graph models: how graphs are used to model real-life networks such as ecological networks, the World Wide Web, the Internet, biological networks, and social networks.

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Office hours: M 14:00–15:00, TR 11:30–12:30

Lectures: LSC 214, TR 10:05–11:25

Web page: <http://www.mathstat.dal.ca/~janssen/3330>

Text: *Graph Theory and its Applications*, J.L. Gross and J. Yellen, Chapman & Hall/CRC, Second Edition, ISBN 1-58488-505-X (available from the Dalhousie bookstore)

Evaluation Scheme:

The assessment of your performance in the course will be based on assignments, presentations, a midterm test, and a final exam.

Assignments may be done individually, or in teams of two. If the assignment is handed in by a team, it is understood that both members have contributed equally to *all* questions on the assignment. Both members will receive the same mark. Assignments should be handed in before or on the due date; late work will be penalized. Plagiarism will be prosecuted.

During the term, there will be short presentations prepared by individual students. Attendance is mandatory for the classes where presentations are scheduled. If a student is absent, his or her presentation mark will be affected.

A 90 minute written midterm test will be scheduled during class, around the 7th week of class; the precise date will be given before January 23.

The final exam, duration 3hrs, will be scheduled by the registrar, and held during the exam period.

Assignments	20%
In-class presentations	20%
Midterm test	25% (date to be set)
Final Exam	35%

Note: Students with disabilities are encouraged to register as quickly as possible at the Student Accessibility Services if they want to receive academic accomodations. To do so, please phone 494-2836, email access@dal.ca, drop in at the Killam, G28, or visit the Web site at www.studentaccessibility.dal.ca.