MATH 247: Graph Theory
Course Description

Instructor: John Schmitt
Office: Warner 311, Ext. 5952
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Office Hours: Tuesday, Wednesday and Friday 1:30pm-3pm or by arrangement

Meeting Times:
Section A, MWF, 11:15am—12:05pm, Warner Hall 507

Textbook: *Introduction to Graph Theory, Second Edition* by Doug West, Prentice Hall, NJ, 2001.

Supplemental Texts available in the library

- *Graphs and Digraphs*, by G. Chartrand (my mathematical grandpa), L. Lesniak
- *Graph Theory*, by R. Diestel (he also has an on-line text available for free download)
- *Pearls in Graph Theory*, by N. Hartsfield, G. Ringel
- *Graph Theory*, by C. Berge
- There are many others.

Homework: Homework will be assigned on a weekly basis. The content of this course is best learned by *solving problems*. I **encourage you to work together**. However, the write-up of homework solutions *should be done on your own.*

Quizzes: I reserve the right to give quizzes. If given, they will be short in length and cover recent homework problems, assigned reading, or class discussion.

Special Needs: If you require special arrangements for class or during tests/exams, please talk to me as soon as possible to make such arrangements. If you are color-blind, please let me know as I like to use colored chalk.

Grading Percentages:

Homework/Quizzes	25
Midterm 1	25
Midterm 2	25
Midterm 3 (Final)	25

Assignment of Grades:

The assignment of grades will follow the scheme below.

90 and above	A
80 - 89	B
70 - 79	C
60 -69	D
below 60	F

Plus and minus will be assigned at my discretion.

Midterm Exams:

Schedule:
Midterm on Chapters 1 and 2: Thursday, October 13th at 7pm
Midterm on Chapters 3 and 4: Thursday, November 10th at 7pm

Final Exam:

Wednesday, December 14th 7:00pm-10:00pm.
The final exam will be administered **at this time only**, please make plans accordingly.

Absences: Please see me as far in advance as possible for absences that will occur on the day of an exam. Any such absences, or unforeseen ones, must be documented in writing by the appropriate person.

Honor Code: The Honor Code will be observed throughout this class and for all examinations. If you have a question about how the Honor Code applies to this class please ask.

Solve an open problem and earn an A: Anyone solving an open problem in graph theory given in the text, from a published peer-reviewed journal article or from the following webpages will automatically earn an A for the course as long as he or she is current with all work at the time of submission.

- http://garden.irmacs.sfu.ca/?q=category/graph_theory
- http://www.emba.uvm.edu/∼archdeac/problems/problems.html

Outline of Topics

1. Fundamental Concepts
   Basic definitions, paths, cycles, trails, degree, directed graphs

2. Trees and Distance
   Basic properties, spanning trees and enumeration, optimization

3. Matchings and Factors
   Matchings, covers, algorithms

4. Connectivity and Paths
   Cuts, connectivity, k-connected graphs, network flow

5. Coloring of Graphs
   Vertex colorings, structure of k-chromatic graphs, enumerative aspects

6. Planar Graphs
   Embeddings and Euler's formula, characterizations and parameters of planarity

7. Graph Pebbling: A mathematical model for the transportation of consumable resources
   History, pebbling number, Class 0 graphs

Goals of the Course:

- gain an understanding of the fundamental concepts of graph theory,
- gain an understanding of when a graph is a useful mathematical tool to solve problems in mathematics, the sciences and the environment,
- develop the ability to write a logical and coherent proof, including proof by contradiction and induction,
- introduce topics suitable for a senior thesis (and see ones that have been),
- develop a desire for further study in related areas, including combinatorics and computer science.