MATH 332 | DISCRETE MODELS | Spring 2008
MWTh 10:30 - 11:45

Instructor:	Dr. Chris Black
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Office Hours:	M 12:00 - 1:00, Th 9:30 - 10:25 and by arrangement
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Text: *Introductory Graph Theory*, Gary Chartrand, Dover Publishing, 1977

GOALS FOR COURSE:

MATH 332 students will:

- ... improve their ability to think abstractly and critically;
- ... be able to communicate in precise written mathematical language, using correct logic and notation;
- ... be able to identify graphs with certain properties, and provide concrete examples;
- ... have a firm grasp on the basic concepts of graph theory, and the facility to apply them to particular graphs;
- ... use graph theory to model situations in social science settings, such as communication, connection, voting, traffic flow, and transactional analysis.
- ... actively participate in the classroom dialogue, both as an individual and as a member of a small group, and be an active partner during in-class exercises.

COURSE PHILOSOPHY:

Discrete mathematics, sometimes called *finite mathematics*, is the study of mathematical structures that are fundamentally discrete, in the sense of not supporting or requiring the notion of continuity. Most, if not all, of the objects studied in discrete mathematics are either finite sets, or countable sets such as the integers. Discrete mathematics has become popular in recent decades because of its applications to computer science.

Discrete mathematics is a very broad field, encompassing graph theory, number theory, logic & set theory, finite group theory, combinatorics, linear algebra, discrete probability & Markov chains, algorithmics, and the theory of computability. Rather than pursue a broad overview of this diverse field, we will instead focus on graph theory, and its uses to model discrete phenomena. Some of these applications are classics in the field of mathematics, such as the Königsberg Bridge problem and the Tower of Hanoi, and others are more recent.

Chartrand's text is very conversational, and presents an overview of graph theory. The text is adaptable for courses at all levels of the undergraduate curriculum: many of the exercises are very easy and can be answered by a simple drawing, while others demand rigorous proof. I will insist that we master both types of these exercises. At the end of the course, we will connect graph theory to both matrix algebra and group theory.

Probable Course Topics:

- ▷ Mathematical Models
- ▷ Elementary Graph Theory
- ▷ Transportation Problems
- ▷ Connection Problems
- ▷ Communication Problems
- ▷ Digraphs and Mathematical Models
- ▷ Games & Puzzles - classical puzzles solvable by graph theory
- ▷ Graphs and Social Psychology
- ▷ Planar Graphs and Coloring Problems
- ▷ Graphs in Matrix Theory and Group Theory

Grading:

Homework:	300-350 points, as needed
Final Assessment:	100 points
Participation:	15 points
Attendance/Citizenship:	15 points

Homework:

There are two types of homework problems in this course: computational problems and proofs. Proofs will be graded out of 10 points according to the *Proof Writing Guidelines*. Computational problems will have varying point values. The majority of collected problems will be proofs, and often the problems I have chosen to collect present an important part of the theory of the course. If necessary, graded problems may be re-written and re-graded within one week of receiving the work back from me. You may work in groups to discuss the homework problems, however the final version should be written individually. **It is considered plagiarism to find solutions to proofs assigned as homework in other texts or on the internet.** You are invited to come see me for hints on homework problems if you get stuck. You will find that reading the textbook will be critical to your success in this course.

Participation:

We will spend a portion of each class session working in small groups. Your participation will be graded based on your interactions with your peers, your ability to participate in class discussion, and how often you volunteer to present your solutions.

Attendance/Citizenship:

Discussion, interaction, and group problem solving will all be important aspects of this course, which necessitate your attendance. Citizenship addresses your behavior and comportment with class members and the instructor. We each need to be respectful of other students, other cultures, and differing ideas within our learning community.

Honor and Respect:

Each of us should consider our placement at this institution to be a privilege. We need to have respect for one another, and for ourselves. In light of these facts, cheating in any form will not be tolerated. You are encouraged to work together on homework problems, however anything you turn in with your name on it should have been written by you alone. In a course where much of your grade is determined by your proof writing and take-home exams, plagiarism is a concern. The word "plagiarize" is defined by Merriam-Webster as "to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source." This is a very serious offense.