MATH 332 | DISCRETE MODELS
MWTh 9:00 - 10:10 | Spring 2011

Professor:	Dr. Chris Black
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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 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:	Scaled to 300 points
Quizzes:	150 points (2 @ 75 points each)
Final Exam:	150 points
Participation/Attendance/Citizenship:	50 points

Structure of this Course:

I will not lecture in this course. It is the responsibility of the student to come to class having already read the assigned section, done the assigned problems to the best of his/her ability, and read the upcoming section. After the first week of the quarter, the first portion of class time will be spent with students presenting their work from the section(s) of the day, and the remainder will be spent working on the next section(s) of material. For example, if the schedule says "Section 3.2" then:

(i) Homework for Section 3.2 is due at the start of class.
(ii) The first part of class will be spent with students presenting solutions to some or all of the problems in Section 3.2.
(iii) The students should have already read Section 3.3.
(iv) The remainder of class will be spent working on problems in Section 3.3 to be presented the next class day.

You must be actively engaged in the material to succeed in this course.

Homework:

We will have two types of homework in this course.

Exercises: Exercises are computational or short-answer questions. These will not be presented at the board, but *all exercises will be collected daily* and selected exercises will be graded. Exercises have varying point values and cannot be revised and resubmitted.

Problems: Problems are generally proofs, or questions whose answers involve an in-depth argument. Problems will be graded out of 10 points according to the *Proof Writing Guidelines*. Problem solutions will be presented each day of class. You are responsible for submitting at least three problem solutions per week, at least two of which you have presented at the board. Problem solutions may be revised and resubmitted one time within one week of receiving the graded problem back from the professor.

We will spend class time working 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.

Quizzes:

There will be two in-class quizzes that cover the basic concepts of the course, computational exercises and basic proofs. These quizzes are scheduled for Wednesday 4/20 and Thursday 5/19 Each quiz is worth 75 points.

Final Exam:

The final exam is scheduled for Wednesday 6/8/2011 from 12:00 - 2:00 pm. This will be a 100-point comprehensive exam covering the basic concepts of the course. The score on the final will be scaled to 150 points for the final grade calculation.

Participation/Attendance/Citizenship:

You are expected to present a solution to at least two of the homework problems each week and to participate actively in group work. Participation is a large portion of your class grade, so plan accordingly.

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 professor. 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, 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.

Disability Services:

Students with disabilities may arrange for academic adjustments by providing the professor with a copy of the "Confirmation of Eligibility for Academic Adjustments" from the Disability Support Services Office as soon as possible. To obtain this form contact Bree Callahan, director of Disability Support Services for the Westside University Centers at (206) 439-3800 ext. 3866 or by email at bcallaha@cwu.edu.