

Math 443/543
Theory of Graphs and Networks
MWF 2:00-2:50 PM, PSYCH 305
Fall 2012

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Office Hours: TBA

Textbook: *Introductory Graph Theory*, by Gary Chartrand, published by Dover.

Supplementary material: We will supplement the textbook by a number of other works, including:

- *Graph Theory* by Bondy and Murty. This is available as an ebook at the UA Library: <http://universityofarizona.worldcat.org/oclc/213099401>.
- The \$25,000,000,000 Eigenvector: The Linear Algebra Behind Google by K. Bryan and T. Leise.
- Notes on Small World Phenomena, by David Easley and Jon Kleinberg from Cornell.
- The Small World Phenomenon: An Algorithmic Perspective, by Jon Kleinberg.
- Collective dynamics of 'small-world' networks, by Duncan Watts and Steven Strogatz, published in Nature (you need UA access to get this paper).

We will also use additional materials which will be available on the course website.

Homework: Homework will be assigned on a regular basis. Only part of the homework will be turned in, but all should be done. **Since only a small number of problems will be turned in, it is expected that the homework assignments will be immaculate, typed or neatly handwritten, with explanations written in complete sentences when appropriate.** Sloppy work will not be accepted. In addition, exams will consist approximately 30-50% of problems taken directly out of the homework, mostly from problems not turned in for grading. Homework will be worth 100 points, or the equivalent of one exam.

Exams: There will be two in-class exams and a final. Approximately 30-50% of each exam will consist of problems taken directly from the homework, and the rest will consist of new problems. Each exam will be worth 100 points. **The midterm exams are tentatively scheduled for and October 8 and November 28 and the final exam is scheduled for Friday December 7 during 1:00 pm - 3:00 pm.**

Grades: A tentative grade will be determined by assigning 100 points to each of the exams and the homework and 200 points to the final (using the standard scale of 90-100% A, 80-89% B, 70-79% C, etc.). In addition, those enrolled in 543 will be required to complete a project by the end of the course. The project will probably involve a report on a theorem or programming an algorithm. The final course grade will be at least as high as the tentative grade. Small adjustments may be made on consideration of positive trends in the class.

Attendance: Students are expected to attend every scheduled class and to be familiar with the University Class Attendance policy as it appears in the General Catalog. **Any student who does not attend the first two classes and does not contact the instructor may be automatically dropped from the course** (but if you want to drop the course, be sure YOU drop it). Students are expected to behave in accordance with the Student Code of Conduct and the Code of Academic Integrity. The guiding principle of academic integrity is that a student's submitted work must be the student's own. **It is the student's responsibility to keep informed of any announcements, syllabus adjustments or policy changes made during scheduled classes.**

Disabilities: If you anticipate issues related to the format or requirements of this course, please meet with me to discuss ways to ensure your full participation in the course. If you determine that formal, disability-related accommodations are necessary, it is very important that you be registered with Disability Resources

(621-3268; drc.arizona.edu). You should notify me of your eligibility for reasonable accommodations by September 9.

Withdrawing: If you drop a class by September 16, the course will be not appear on your transcript (note, there are earlier deadlines to drop without penalty and for a refund). If you withdraw from the course by October 12, you will receive a grade of W. The University allows withdraws after October 12, but only with the Dean's signature. Late withdraws will be dealt with on a case by case basis, and requests for late withdraw with a W without a valid reason may or may not be honored.

Incomplete: The grade of I will be awarded if the student has completed all but a small portion of the required work, has scored at least 50% on the work completed, has a valid reason for not completing the course on time, agrees to make up the material in a short period of time, and asks for the incomplete before grades are due, 48 hours after the scheduled final exam.

Tentative approximate schedule

We will try to follow the ordering listed below, however it is possible we will not cover all of the topics listed. C# refers to chapters from Chartrand, BM# refers to chapters from Bondy and Murty, BL refers to Bryan and Leise, EK refers to Easley and Kleinberg, K refers to Kleinberg. We will generally follow Chartrand as our primary text when the topic is covered. The later topics are advanced, and we may not cover all of them.

Text Chapter	Topic
C1,C2, BM1	Introduction to graph theory, isomorphism
C3, BM3.3, BM18.1	Transportation problems, Eulerian, Hamiltonian graphs
C9, BM10, BM11, BM14, C10.2	Coloring problems and planarity
C4, BM6	Shortest paths, trees, Connector problem
C7, BM10	Digraphs, traffic
C10.1, BL, BM20	Graphs and matrices, Pagerank, Laplacians
BM7	Networks and feasible flows
EK, K	Small World Phenomena
BM10	Graph Minor Theorem and Proof of Kuratowski
	Matchings and Stable Marriage