

Course Outline — Spring 2014

MATH 412

INTRODUCTION TO GRAPH THEORY

Sections X13,X14: noon MWF, 243 Altgeld Hall.

Instructor: Theo Molla, 226 Illini Hall, molla@illinois.edu.

Office hours: tentatively MWF 1:30–2:30 and by appointment.

Web page: <http://www.math.uiuc.edu/~molla/math412>

Final Exam: 7:00-10:00PM, Tuesday, May 13.

TEXT: **Introduction to Graph Theory**, D. B. West (Prentice Hall), Second Edition, Chapters 1–7.

This is a serious introductory course about properties and applications of graphs. We study graph-theoretic concepts such as paths, Eulerian circuits, trees, distance, matchings, connectivity, network flows, colorings, planarity, and spanning cycles. A primary goal is to improve students' clarity of thought and language when writing proofs in discrete mathematics.

Famous applications include the *Minimum Connector Problem* (building roads at minimum cost), the *Assignment Problem* (filling n jobs in the best way), the *Committee Scheduling Problem* (using the fewest time slots), the *Four Color Problem* (coloring maps with four colors so that adjacent regions have different colors), and the *Traveling Salesman Problem* (visiting n cities with minimum cost).

REQUIREMENTS: There will be at least 11 homework assignments. Each of these assignments will be worth 20 points each. Homework is not accepted late for any reason. To account for illnesses and unexpected absences, only the ten highest homework grades count. There are 5 short quizzes. There are three tests plus a final examination. There will be one make-up test for all three tests in the semester, and no other make-ups.

WEIGHTING: homework 200 points, quizzes 25 points, tests 100+100+100 points, final exam 200 points, total 725 points. The homework provides practice in both finding and writing proofs; writing up the solutions is among the most effective ways of keeping up with the material in the course. The grading scale is: $A \geq 640$ points, $A^- \geq 600$ points, $B^+ \geq 550$ points, $B \geq 500$ points, $B^- \geq 450$ points, $C^+ \geq 400$ points, $C \geq 350$ points, $C^- \geq 300$ points, $D^+ \geq 266$ points, $D \geq 233$ points, $D^- \geq 200$ points. The scale for graduate students registered for 1 unit (4 hours) is different.

RESOURCES: Electronic mail is a medium for announcements and questions. Collaborative study sessions are offered to aid students in understanding the material and solving problems. The course webpage also can help.

PREREQUISITES: There are no official prerequisites, but students will be best prepared if they have encountered logical reasoning, induction, and equivalence relations.