COURSE INFORMATION:
MATH 454 Graph Theory and Applications
MATH 553 Discrete Applied Mathematics I
Fall 2007

Time and Place: 1:50pm, Monday-Wednesday-Friday at 122, Engineering 1 Bldg.

Instructor: Hemanshu Kaul

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Office Hours: 3:30pm-4:30pm Monday and Wednesday, and by appointment.
You are encouraged to request joint appointments so that more people can benefit from the discussion, or simply bring others with you. Emailed questions are also welcome.

Problem-Solving Session: 5pm-6:30pm Monday.

Course Webpage: http://www.math.iit.edu/∼kaul/TeachingFall07/Math454.html
Check the course webpage regularly for homework assignments, announcements, and a lecture log (useful when you miss a class and when reviewing for an exam).

Prerequisites: Math 230 Introduction to Discrete Mathematics, or its equivalent.

Course Description: This proof-based course has a two-fold aim (both equally important):
– Proficiency in concepts, theory, and applications of Graph Theory, including paths and trees (with application to building roads or telephone lines at minimum cost), matchings (with application to assigning tasks to workers), connectivity and network flow (with application to transshipment), coloring and intersection graphs (with application to scheduling), and planarity (important in facility location and VLSI/computer chip layout); and
– Development of good habits of understanding, communicating, and writing mathematics.

An official description of the lecture topics and the course objectives is available at "http://www.math.iit.edu/academics/syllabi.html"

Textbook: *Introduction to Graph Theory*, Douglas West, 2nd edition, Prentice Hall.
Minor corrections and typo fixes are available at "http://www.math.uiuc.edu/∼west/igt/igt2err.html".

Grade Break-down: Homework is worth 30%; Two exams are worth 20% each ; Final exam is worth 30%. The grading scale will be no more strict than A:85-100, B:75-84, C:65-74, D:55-64.

Class Attendance: Although the textbook is excellent, it is not intended to be used for self-study at the undergraduate level. Moreover, the importance of proofs in this course makes it critical to practice and be exposed to good proof techniques in lectures. Hence, you are expected to attend the lectures and participate in class discussions. You are also expected to read the text, including examples not covered in class.

Examinations: The exam dates and their precise topics will be announced in class and on the course webpage. The final exam will be on all the topics covered during the semester. Make-up exams will be given only in case of a documented emergency.

Homework Assignment: Homework problems will be assigned after each lecture. There will be one homework (typically, solving FOUR out of SIX problems) due each week, usually on Wednesday. It is your responsibility to check the webpage for assignments and their due

dates. Homework needs to be submitted at the beginning of class on the due date. It should be **typed or written legibly**. Be sure to staple the pages together and write your name, course number, assignment number, and the date of submission on the front. Late homework will not be accepted.
The **graduate students registered for MATH 553** will have to solve FIVE out of SIX problems in the weekly homework assignment. In addition, these students will also have to either solve two or three additional homeworks that will require outside reading, or complete a project involving an application of graph theory in their area of study, or study of an advanced topic in graph theory. If a student opts to do a project, a specific proposal (after consultation with the instructor) must be submitted by October 10th. The final report and presentation would be done before the last day of classes.

'Why and How' of Homework: Homework serves as an opportunity for students to practice communicating written mathematics with clarity of thought and language. In this course, learning good communication skills in mathematics is as important as learning new mathematics. This is why homework is given a lot of importance in this course - dedicate enough time to it every week.

To improve your mathematical writing quickly, start by writing draft solutions to homework early. A day or two later after you have had time to forget what you wrote, read it. If it doesn't make sense or convince you, rewrite it. Writing a solution requires saying what you mean and meaning what you say. Be intellectually honest. Intellectual dishonesty includes: 1) stating a "reason" without understanding its relevance. 2) Claiming a conclusion when you know you haven't proved it. 3) Giving an example and claiming you have proved the statement for all instances.

Examples can help you find the idea for a proof. But, you have to translate your understanding of why particular examples work into a proof that works for all possible examples. Include enough detail so that your explanation is convincing to someone who hasn't thought about the problem before. The proofs should be presented so that your classmates could read them and follow the logic.

You are allowed to discuss homework problems with your classmates. However, the solutions should be written by you alone. Solutions for homework and exams must be written clearly, legibly, and concisely, and will be graded for both mathematical correctness and presentation. Points will be deducted for sloppiness, incoherent or insufficient explanation, or for lack of supporting rationale.

Office hours and Problem-solving session: You are encouraged to ask questions during class, or in office hours, or through email. If you are having trouble solving a homework problem, I will be glad to direct you in the right direction. You are also encouraged to attend the weekly problem-solving session, where you can ask me questions about the difficulties you have faced while solving that week's assignment. I am here to help you learn, but I cannot help you if you don't take the initiative.