COURSE INFORMATION: Fall 2014
MATH 454 Graph Theory and Applications
MATH 553 Discrete Applied Mathematics I

Time and Place: 1:50pm, Tuesday and Thursday, at 119, Engg. 1 Bldg.

Instructor: Hemanshu Kaul

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Office Hours: 3:15-4:15pm Tuesday and Thursday, and by appointment.
Emailed questions are also encouraged.

Problem-Solving Session: 4:45pm-5:45pm Tuesday, location E1 bldg.

Graduate Teaching Assistant: Chris Mitillos; cmitillo@hawk.iit.edu.

TA Office Hours: 1:30-4:30pm Monday, 129, E1 Building.

Course Communications: http://www.math.iit.edu/∼kaul/TeachingFall14/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).
I often send emails with comments regarding HW problems, Exams, etc. Make sure your IIT email account is active and working.

Prerequisites: Math 230 Introduction to Discrete Mathematics. In particular, familiarity with proofs using induction and with basic properties of discrete mathematical structures.

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

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 network design), matchings (with application to assignment problems), connectivity and network flow (with application to transshipment), coloring and intersection graphs (with application to scheduling), and planarity (important in facility location and VLSI design);
– Development of good habits of understanding, communicating, and writing proof-based mathematics.

Also see the separate document "My Aim for this Course".

An official description of the lecture topics and the course objectives is available at
"http://science.iit.edu/applied-mathematics/programs/course-descriptions"

Grade Break-down: Homework and participation is worth 20%; Three mid-term exams are worth 16.66% 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 and Participation: 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 reviewing the proofs done in class, and doing the examples not covered in class.

Multiple absences from class without permission from instructor will result in deductions from your 'HW and Participation' score at the discretion of the instructor.

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 once a week (typically on Thursday) which will be due one week later.
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.

The **graduate students registered for MATH 553** will have to solve FIVE out of SIX problems in the weekly homework assignment (Undergraduate students solve FOUR problems). In addition, the graduate students will also have to either solve 2-3 additional homeworks that will require independent reading of topics not covered in class; 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 5th. The final report submission and presentation would be completed before December 4th.

'Why and How' of Homework: Homework serves as an opportunity for students to practice communicating written mathematics with clarity of thought and language. In any course like this, learning good communication skills in mathematics is very important. As significant is the opportunity that a homework provides you to test your understanding of the material covered in class that week. Mathematics cannot be learned by listening or just reading a book - you have to **do** it. Considering the varying pace of learning of students in class and the lack of class time to explore every detail of every concept/Theorem, working through problems in the HW is an easy way for you to make sure that you are keeping up with the class. This is why homework is given a lot of importance in this course - dedicate enough time to it every week.

Some of the HW problems will be straightforward applications of the definitions or theorems studied in class, however every homework will also contain some challenging problems. Don't be disheartened if some problems take a while to solve. Such problems help develop your mathematical creativity. Discuss such problems with your classmates, and/ or ask me for help, but only after you have given them sufficient thought. Please remember that **homework is NOT meant to be an examination, it is meant to assist in your learning and development. If you need help with it, don't hesitate to ask.**

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. **Include enough detail in your solutions so that your explanation is convincing to someone who hasn't thought about the problem before**. The proofs/ arguments should be presented so that your classmates could read them and follow the logic (step-by-step).

Any incident of plagiarism/ cheating (from a person or from any online resource) will be strictly dealt with. Solutions **may not be sought** from solution manuals or any other pre-written solution (whether printed, web-based, or otherwise). You are allowed to discuss homework problems **only** with your classmates, the instructor, and the course TA. 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.

HELP: 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. The same goes for any concept/ proof you have difficulty understanding. Don't hesitate to ask for help! I cannot help you if you don't take the initiative. In the past, a lot of my students have regularly communicated with me over email. I encourage you to do the same, if that suits you better.
You are also encouraged to attend the weekly problem-solving session on Tuesday, where you can ask me or the TA questions about the difficulties you have faced while solving that week's assignment.

Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must obtain a letter of accommodation from the Center for Disability Resources and make an appointment to speak with me as soon as possible.