

COURSE INFORMATION:
MATH 435 Linear Optimization
MATH 553 Optimization I
Spring 2008

Time and Place: 1:50pm, Tuesday-Thursday at 225, Stuart Bldg.

Instructor: Hemanshu Kaul

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Office Hours: 3:30-4:30pm Tuesday, 2:30-3:30pm Wednesday, and by appointment.
Emailed questions are also encouraged.

Course Communications: <http://www.math.iit.edu/~kaul/TeachingSpr08/Math435.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 regularly send emails with comments regarding HW problems, Exams, etc. Make sure your IIT email account is active and working.

Prerequisites: Math 332 Matrices, or its equivalent course in Elementary Linear Algebra.

Course Description: The primary aim of this course is to develop a deep and comprehensive understanding of various algorithms used for solving Linear Optimization problems. This course will lay the foundation for you to do non-trivial applications of these optimization problems and their algorithms.

This aim cannot be achieved without studying and understanding the numerous mathematical structures and concepts that underly such problems and algorithms. Consequently, mathematical arguments a.k.a. proofs will be an integral part of this course. This leads to our second, and equally important, aim: 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: D. Bertsimas and J. Tsitsiklis, *Introduction to Linear Optimization*, Athena Scientific, 1997.

Grade Break-down:

Math 435: Homework is worth 30%; Two mid-term 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.

Math 535: Homework is worth 25%; Project is worth 10%; Two mid-term exams are worth 20% each ; Final exam is worth 25%. 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 multitude of concepts introduced and developed in each class, as well as the importance of proofs in this course makes it critical to attend 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 once a week (typically on Thursday) which will be due one week later. In addition, I will assign reading homework during lectures. It is in your best interest to do this reading before the next lecture.

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.

Project for MATH 535: Students will do a project on a topic approved by the instructor. Project topics can include (computational) applications of the course material to student's own research area; development of a MATLAB based implementation of one of the algorithms covered in class; and expository talks (with proofs) on material (from the book or elsewhere) not covered in class. A specific proposal after consultation with the instructor must be submitted by February 29th. Each project can be done by teams of 1-2 students. The final report and presentation would be done before the last day of classes.

Students registered for MATH 435 can replace two of their HW scores by doing a similar project.

'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 (both written and reading HWs) 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.

Every homework will contain some straightforward exercises and 1 or 2 slightly more 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).

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.

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 reading assignment given during class, or any concept you have difficulty understanding. Don't hesitate to ask for help! I cannot help you if you don't take the initiative.