Department of Industrial Engineering & Operations Research

IEOR 162: Linear Programming and Network Flows (Fall 2017)

Class time & location
Lecture: MW 10-11A, 150 GSPP
Discussion: F 9-10A, 3111 Etcheverry or F 10-11A, 150D MOFFITT

Instructor
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Graduate student instructors
Rebecca Sarto Basso
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Required text: Introduction to Mathematical Programming, 4th Edition, Winston and Venkataramanan, Duxbury Press, 2003. (ISBN 0-534-35964-7)

Recommended reference: AMPL: A Modeling Language for Mathematical Programming. 2nd Edition, Fourer, et. al., Duxbury Press, 2002. (ISBN 0-534-38809-4)

Course description:
This course introduces the students to quantitative modeling and formulation of optimization problems. The technique of solving linear programming problems using the simplex algorithm will be described in detail. The extent and usability of that technique and of linear programming modeling will be discussed along with alternative quantitative approaches. The second part of the course covers network flow problems, solution techniques and the relationship of these problems to Linear Programs.

Throughout the course we will develop and analyze mathematical optimization models for various production/inventory planning and scheduling, project management, transportation problems. These models will then be solved using the methods introduced during the course. The emphasis will be on modeling optimization problems as linear programming (LP) and network flow models.

Homeworks:
Homework will be assigned on a weekly basis on Wednesdays and are due on Friday of the following week at the beginning of discussion (so you have 10 days per assignment). Working in groups is encouraged, but each student must submit their solutions independently. The two lowest homework grades will be dropped. **Late homework will not be accepted**.

Project:
There will be a project consisting of modeling and computational solution to problems (groups of 3 or 4). Details of the project will be given out mid-way through the semester. The due date of the project is **Dec 1st**.

Exams:
The midterm exam is a two hours exam scheduled for the evening of **October 18th**. The exact time and location will be announced at a later time. Class will be cancelled on that day. The final exam will take place on **Dec 12th** from 3 to 6 pm. There will be one in-class quiz at a date to be decided (in september). All exams are closed book and closed notes. You will be allowed one single two-sided cheat sheet. No calculators allowed.

Grading:

Homework	14%
Quiz	1%
Project	10%
Midterm	30%
Final	45%

Tentative course schedule:

Lecture	**Topic**	**Reading**	**Date**
1	Introduction	Ch. 1	Aug 23
2-4	Formulation and applications of linear programming	Ch. 3.1, 3.3-3.12	Aug 28, 30, Sep 6
5-6	Graphical solutions and sensitivity in two-dimensions	Ch. 3.2, 5.1, 6.1	Sep 11, 13
7	Interpreting the output of optimization software	Ch. 5.2	Sep 18
8-10	The simplex algorithm	Ch. 4	Sep 20, 25, 27
11-13	Sensitivity analysis	Ch. 5, 6.1-6.4	Oct 2, 4, 9
14-15	Duality	Ch 6.5 - 6.10	Oct 11, 16
16	**Midterm**		**Oct 18**
17-18	Minimum cost network flow: modeling and applications	Ch. 8.5	Oct 23, 25
19-21	Special cases of min cost network flow	Ch. 7.1, 7.5-7.6, 8.1-8.3	Oct 30, Nov 1, 6
22-24	Shortest path and dynamic programming	Ch. 8.2	Nov 8, 13, 15
25-27	Project management	Ch. 8.4	Nov 20, 27, 29
	Project deadline		**Dec 1**
	RRR-week		Dec 4 - Dec 8
	Final exam		**Dec 12 (8-11A)**