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Fall 2002

ECONOMICS 172A: Linear Programming

GENERAL:
Economics 172A, Linear Programming, is the first course in the three-quarter Operations Research sequence. A linear program is a type of mathematical optimization problem. The class will introduce you to the problem, teach you how to formulate economic problems as linear programming problems, teach you how to solve these problems, and teach you how to interpret the solutions to these problems.

TEXTS:
I will follow the lecture notes that you can view and download from the class web page or at soft reserves. The course webpage is:

http://www.econ.ucsd.edu/%7Ejsobel/172af02/172f02home.htm.

The notes concisely describe the main ideas of the class. They do not cover everything, nor do they give all of the details, but they will make lectures easier to follow. Tests cover only material discussed in lectures, lecture notes, and in problems.

The Bookstore also has copies of (HL) Hillier and Lieberman: Introduction to Mathematical Programming, McGraw-Hill, second edition, 1995. This book is a useful supplement. You should buy the book if you have trouble following the lectures or my notes. You should buy the book if you have more money than you can spend. Most of the material in the course is standard. You can find decent treatments in other sources. See me if you need advice. Hillier and Lieberman is also on reserve at the Social Science and Humanities Circulation Desk at Geisel Library.

PREPARATION:
You should be comfortable with linear algebra, basic microeconomics, and the operation of a spreadsheet computer program. In order to enroll in the class you must have the requirements listed in the UCSD catalog.

GRADING:
There will be in class midterm examinations on October 24 and November 14. There will also be an in-class final examination on Tuesday December 10 from 8-11 a.m.

I will determine your grade on the basis of your performance on the homework assignments (10%); two midterms (40%); and the final examination (50%).

I do not grade on a strict curve: I follow no rule that determines the fraction of the class that receives a particular letter grade. On the other hand, there is no strict percentage needed to attain a particular letter grade.

OUTLINE AND REFERENCES:

Below is a schedule of topics to be covered and associated readings in (HL). (The page references are from the most recent editions - earlier editions do not differ greatly. The book "Introduction to Operations Research" by Hillier and Liebermann contains "Introduction to Mathematical Programming." If you have access to an earlier edition, you should have little trouble finding the relevant reading.) In the column labeled "problems" the first line gives page and problem numbers in Hillier and Liebermann's book.

The class web page will also have links to the last two final examinations of the course.

Week	Topic	Notes	Reading	Problems	Answers
0	Introduction	I, 1-6			
1	Geometry and Problem Transforms	II V	28-31	68:3.1-1,2,8-10 02Exam I:1,2ab,5 01Exam I:2 01Exam II:2a	Exam I, W02 Exam I, F01 Exam II, F01
2	Simplex	III	81-122	139:4-3-4,5,6 02Exam I: 3,4 01Exam II:1	Exam I, W02 Exam I, F01 Exam II, F01
3	Duality	VI: 1-6, 17-19	196-204	240: 6.1-5,6,7,8 02Exam I: 2c,6 01Exam II: 2b	Exam I, W02 Exam II, F01
4	Complementary Slackness	VI: 7-12	206-214	244:6.4-2 02Exam II: 3 01Exam III: 1	Exam II, W02 Exam II, F01 Exam III, F01
5	Formulation Interpret Dual	I, 6-11 VI, 12-17	32-68 204-6	Supplementary 02Exam II: 2 01Exam I: 1 01Exam III: 2	Supplementary Exam II, W02 Exam I, F01 Exam III, F01
6-7	Sensitivity	VII Examples	122-9 215-239	246: 6.6-1,2 02Exam II: 1 Data	Exam II, W02
8	Transportation	VIII Examples	304-329		
9-10	Games	IX	514-530	532:11.1-3;.2-2-6	

HOW TO STUDY:
This course introduces a few ideas and mathematical techniques. You will need to learn the ideas and how to apply the techniques. Doing so requires practice. The web page (or the soft reserve package) has many old problems and exam questions (with solutions). The text also contains many good practice problems. Working these problems is the best way to prepare for the examinations. The exam will mimic old programs and homework assignments. Concepts and methods are important features of the class. On examinations I usually want you to demonstrate that you understand how to solve problems and what the answers mean. Getting correct numerical answers alone is not sufficient.

I will also assign homework problems that must be turned in. Most of these will involve using the computer. Standard spreadsheet programs now have the ability to solve linear programming problems. You will need Microsoft Excel ("solver" option must be installed) to do these assignments. The program is available on computers in the computation lab in Econ 100. I will distribute account information in class. The notes contain some information about using Excel to solve linear programming problems. I will spend next to no time in lecture talking about the computer program.

ADMINISTRATIVE MATTERS:
Homework is due at the announced time. I will accept no late papers.

I will give no late examinations without compelling (and fully documented) medical excuses.

I take violations of academic honesty seriously. You may use calculators (but not other electronic devices) during examinations. You may not consult notes, books, or your classmates' exam papers during the final or the midterms. Any act of academic dishonesty will be grounds for failure in the course.

You may discuss your homework assignment with your classmates. You should write answers independently.

COMPUTER ACCOUNTS:
If you do not have access to Excel, you will need a computer account to do some homework. I will distribute account information in class.

OFFICE HOURS:
My office hours are Tuesdays and Thursdays, 9:30-10:45 in 311 Economics. My phone number is (858) 534-4367, my e-mail address is jsobel@ucsd.edu. I will announce the name and office hour of the teaching assistant in class.

Warnings: I will not answer my office phone during office hours if a student is in the office. A TA will be responsible for answering email questions.