

Introduction to Operations Research

Economics 172A, Fall 2008

General Information

Homepage (with link to handouts for course):

<http://www.econ.ucsd.edu/%7Ejsobel/172f08/172f08home.htm>

Instructor and Teaching Assistants:

Name	Office	Office Hours
Joel Sobel	Econ 311	W 1:30-3:30
Soojin Jo	SH 207	F 2-4
Chulyoung Kim	SH 224	Tu 11-1
Charles Lin	Econ 124	Tu 2-4
Juanjuan Meng	SH 234	Th 1:30-3:30

My office phone: (858) 534-4367

Warning: I will not answer my phone if a student is in the office.

If you want to contact us via email, please use the class account: econ172a@gmail.com.

Description

Economics 172A is the first course in the two-quarter Operations Research sequence. It covers linear and integer programming. A linear and integer programs are types 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.

Course Material

I will follow the lecture notes that you can view and download from the class web page or at soft reserves. The notes concisely describe the main ideas of the class.¹ These notes 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 Operations Research, McGraw-Hill. Copies of the book are also on reserve at the SSSL Reserve Unit (Geisel Library). 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. The book is quite expensive, however, and not essential. Most of the material in the course is standard. You can find decent treatments in other sources. See me if you need advice.

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 a in-class midterm examinations on Thursday, October 23 and Thursday, November 20. There will also be an in-class final examination on Thursday, December 11 from 8:00-11:00 AM. I will determine your grade on the basis of your performance on the homework assignments (6%); the midterms (27% each); and the final examination (40%). The final will be cumulative. Homework assignments are an important way to prepare for the examinations. I have found that they are not a

¹The web page contains links to some material that will not be covered in the class or on examinations.

useful way to evaluate individual effort or understanding. They therefore receive only a small weight in the final grade.

I do not follow a rule that determines the fraction of the class that receives a particular letter grade. There is no strict percentage needed to attain a particular letter grade. Students frequently ask me to forecast their letter grade. I looked up my final distributions over the past few years and discovered that my highest distribution for this course (counting only students who took the final) was roughly 16% A, 41% B, 41% C, and 2% D and F while my lowest was: 12% A, 28% B, 44% C, 16% D and F. I will announce how these numbers correspond to actual examination grades. My goal is to give everyone an A (on the basis of excellent performance).

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. Old programs and homework assignments help you develop the skills needed to do well on exams. On examinations I usually want you to demonstrate that you understand how to solve problems and what the answers mean.

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. There is no need to use the computation lab if you have access to the software. The notes contain some information about using Excel to solve linear programming problems. I will not spend 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 am generally unsympathetic to requests for special timing of examinations.

You may use no electronic devices, notes, books, or your classmates’ exam papers during the midterm or the final. You may discuss your homework assignment with your classmates. You must write answers independently.

I take violations of academic honesty seriously. Any act of academic dishonesty will be reported to your academic dean, will lead to a failing grade in the course, and possibly dismissal from the university. If you have any doubts about what constitutes academic dishonesty, please consult me.

Outline and References

Below is a schedule of topics to be covered and associated readings in (HL). (The page references are from the edition that I ordered - earlier editions do not differ greatly. 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 has links to old problem sets and the last final examination of the course (and answers to these questions). These also contain relevant problems (especially to the last topics).

Date	Topic	Notes	Reading	Text Problems
9-25, 9-30	Introduction/Problem Formulation	I	32-68	92:3.1-7-10; 95:3.4-7-15
10-2	Graphing	II	28-31	92:3.1-11-13
10-7, 10-9	Duality	VI:1-6	209-217	277:6.1-4,5,10
10-14	Complementary Slackness	VI: 7-12	220-225	278:6.3-5,6
10-16, 10-21	Interpretation of Dual	VI: 12-17	217-220	
10-23	Midterm Examination			
10-28, 10-30	Sensitivity Analysis	VII	229-275	286:6.8-1-7, 289:6.1-4
11-4, 11-6	Integer Programming: Basics	X: 1-4	478-504	p. 535:11.1-1-7
11-11, 11-13	Branch and Bound	X: 4-8	505-527	540:11.6-1-8
11-18, 11-25	Network Algorithms	X: 8-21	374-404	428:9.3-1-5, 430:9.4-1-3, 431:9.5 3-5
11-20	Midterm Examination			
12-2, 12-4	Transportation Problem	VIII	320-363	366:8.2-1-3, 370:8.3-1-4
12-14	Final Examination 7-10 PM			