Introduction to Operations Research

Economics 172A, Fall 2012

General Information

Homepage (with link to handouts for course):
`http://weber.ucsd.edu/ jsobel/172f12/172f12home.htm`
Instructor and Teaching Assistants:

Name	Office	Office Hours
Joel Sobel	Econ 311	2:30-3:20, TuTh
Leland Farmer	Econ 128	2:30-3:30, M
Erin Giffin	Econ 117	5:00-6:00, Tu

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: econ172af12@gmail.com.

Description

Economics 172A is the first course in the two-quarter Operations Research sequence. It covers linear and integer programming. Linear and integer programs are types of mathematical optimization problem. The class will introduce you to the problems, teach you how to formulate economic problems as 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 available at Geisel Reserves. Page references below are to the ninth edition. Earlier editions are fine, but pagination may differ. 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.

It would be useful to have access to software that solvers linear programming problems. There are several options. The Hillier and Lieberman comes with software. Google documents has a free "cloud based" solver. There are also free solvers than are compatible with Microsoft Excel. (Some versions of Excel already have the solver. In some cases you must download a free add on.) The notes describe how to use Excel's solver.

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.

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

Wait List

I have no authority to add people to the class. Direct all questions to the departmental undergraduate office, Sequoyah Hall 245.

Grading

There will be an in-class midterm examination on Thursday, November 1. There will also be an in-class final examination on Monday, December 10 from 3:00 PM-6:000 PM. There will be four short quizzes, to be held on October 11, October 25, November 15, and November 29. I will determine your grade on the basis of your three best quiz performances (15% total); the midterms (35%); and the final examination (50%). The final will be cumulative.

Homework assignments are an important way to prepare for the examinations. For a variety of reasons, I find that they are not a good way to evaluate effort or understanding. I urge you to work problems (available on the class web page).

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. I will give vague feedback after assessments, but I will not provide letter grade information until the end of the class.

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 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.

There will be sections on Tuesdays in York Hall 2262 from 8-9 PM and from 9-10 PM.

Administrative Matters

I will give no late examinations without compelling (and fully documented) medical excuses. I am generally unsympathetic to requests for special timing of examinations. Under no circumstances will I change the time of a quiz. If you are unable to come to class for one quiz, the other three quizzes will determine your grade.

You may use no electronic devices, notes, books, or your classmates' exam papers during the midterm or the final.

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.

Date	Topic	Notes	Reading	Text Problems
9-27, 10-2	Introduction/Problem Formulation	I	30-60	77:3.1-7–10; 81:3.4-9–17
10-4	Graphing	II	27–29	79:3.1-12–14: 80: 3.4-5–8
10-9, 10-11	Duality	VI:1-6	195-206	261:6.1-4–10
10-11	Quiz I			
10-16, 10-18	Complementary Slackness	VI: 7-12	206–215	262: 6.5,6
10-23, 10-25	Interpretation of Dual	VI: 12–17		
10-25	Quiz II			
10-30	Sensitivity Analysis	VII	217–259	271:6.8-1–8
11-1	Midterm Examination			
11-6	Sensitivity Analysis Continued			
11-8, 11-13	Integer Programming: Basics	X: 1-4	464–491	p. 524:11.1-1–7
11-15	Branch and Bound	X: 4-8	491–515	529:11.6-1–6; 530: 11.7-2–3
11-15	Quiz III			
11-20, 11-27	Network Algorithms	X: 8-21	358–389	412:9.3-2–5, 414:9.4-1-3; 9.5 3–5
11-22	No Class – Thanksgiving			
11-29, 12-4	Transportation Problem	VIII	304–318, 334–347	350:8.2-1–3, 355:8.4-4–6
11-29	Quiz IV			
12-4, 12-6				
12-10	Final Examination 3:00 - 6:00			