ECONOMICS 172B: Introduction to Operations Research (Part B)

Spring 2010 | Lectures: MWF 12:00 – 12:50pm | CENTR 115

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Office Hours: Tuesdays 1 – 2:30 pm | Office: Econ 108

Course webpage: https://webctweb.ucsd.edu/webct/logon/3358392343001

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This course primarily studies non-linear programming. We will examine optimization problems where the objective function, the constraint, or both are non-linear. We will use computational methods to find approximate solutions and calculus to find exact solutions. The course also studies dynamic programming, search models and inventory models. Dynamic programming is a method of analyzing optimization problems that exploits the sequential structure of the problem.

Prerequisites:

ECON 172A or Math 171A.

Lectures and Problem Sessions:

You are responsible for all the material in the lectures. Partial notes will be available on the class webpage before each lecture. I recommend that you print these out before hand and fill in the missing information. I'll do my best to avoid typos but you're responsible for the correct material. I want you to understand the material instead of simply memorizing it. If you miss a lecture, borrow someone's notes. Problem Sessions are optional but recommended.

Exams:

Your grade will be determined on the basis of two Midterm Exams (25% each) and the Final Exam (50%). Alternatively your lower midterm will count for 15%; your higher midterm will count for 25% and your final will count for 60%. If you miss a midterm for a documented, university approved reason (ie., illness, official university trip) the weight for that exam will be placed on the final. If you miss a midterm for another reason (ie., oversleep) you will receive a zero for that exam. No one will be allowed to start an exam after the first person leaves it.

Midterm 1 will be held in class on Monday, April 19th. Midterm 2 will be held in class on Monday, May 17th. The final exam will be held on Wednesday, June 9th from 11:30am – 2:30pm. If you know in advance that you cannot make an exam, please let me know as soon as possible.

You are only permitted to use pens and pencils, a calculator, a straight edge and one note card during each exam. The note card can be any size up to 8" by 5" for the midterms and up to 8.5" by 11" for the final. It may **only** have handwritten notes on both sides. Typed or mechanically reproduced notes are not permitted. Do **not** attach anything to your note card.

Academic dishonesty:

I take academic dishonesty seriously. Any student found guilty of academic dishonesty will earn a failing grade for the course. In addition to this sanction, the Council of Deans of Student Affairs will also impose a disciplinary penalty. For a review of UCSD policy, please see http://www-senate.ucsd.edu/manual/appendices/app2.htm.

Regrade requests:

Regrade requests must be made through a written statement **before** the start of class one week after the exam was first passed back. Extensions will only be permitted if you have a documented, university approved reason for missing the entire week after the exam was first passed back. If you request a regrade I may regrade your entire exam and your score could go up, down or stay the same.

Text:

Introduction to Operations Research, 9th Edition, Hillier and Lieberman, McGraw-Hill. I will give references for the 9th edition but other recent editions should also be fine. The material for this course is fairly standard; other Operations Research texts are also likely to be helpful.

Practice Questions:

Practice questions will be available online. We will go over these questions in office hours and in the problem sessions. Your best practice for the exams is to try these questions yourself first.

Preliminary Course Outline:

1. Introduction
    - Ch. 12: Intro.
    - 12.1: Sample Applications.
    - 12.2: Graphical Illustration of Nonlinear Programming Problems.
    - 12.3: Types of Nonlinear Programming Problems.

2. Concavity and Convexity
    - Appendix 2: Convexity.
    - Appendix 3: Classical Optimization Methods.

3. Unconstrained Optimization
    - 12.4: One-variable Unconstrained Optimization.
    - 12.5: Multivariable Unconstrained Optimization.

4. Equality Constrained Optimization
    - Briefly covered in readings for Introduction and Concavity and Convexity.

5. Inequality Constrained Optimization (KKT)
    - 12.6: The Karush-Kuhn-Tucker (KKT) Conditions for Constrained Optimization.
    - 12.7 Quadratic Programming.
    - 12.8 Separable Programming.
    - 12.9: Convex Programming.
    - 12.10: Nonconvex Programming (with Spreadsheets).

6. Dynamic Programming
    - 10.1: A Prototype Example for Dynamic Programming.
    - 10.2: Characteristics of Dynamic Programming Problems.
    - 10.3: Deterministic Dynamic Programming.
    - 10.4: Probabilistic Dynamic Programming.

7. Search Models

8. Inventory Models
    - Ch 18: Inventory Theory.