ISE429: Modelling and Optimization Techniques.

Dept. Industrial & Systems Eng. SU
Fall 1991 to 1993

Instructor: Jorge Luis Romeu, Ph.D.
http://myprofile.cos.com/romeu

Course Description:

Introduction to the major deterministic and stochastic techniques in Operations Research, including the theory and applications of linear programming and its extensions (transportation and assignment models), goal programming, integer and non-linear programming, Markov chains, queuing and inventory models and introduction to simulation. Computer applications of each of these models will be included.

Objectives:

This is a survey course. Its prime objective is to provide the student with knowledge of the most important models of Operations Research OR). At the end of the course, students will able to critically read and evaluate the current literature dealing with models and methodology and to undertake an in-depth study of them, at the Graduate level.

Course Structure:

1. Assignments: are individually done and submitted in three occasions, before the respective midterm tests. Randomly selected problems will be graded. The average of the randomly selected problems will be used for computing part of the final grade.

2. Tests: there will be three tests during the semester, given during a class meeting. Tests will be closed book, but the students may bring an information sheet 8 ½ x 11 inches with all the formulas.

Text: "Introduction to Operations Research"
Hillier, F.S. and G. J. Lieberman. McGraw-Hill, NY.

Grading Criteria:

Final grade will be calculated as follows: each of the three intra-semester tests will count 25%, for a total of 75%. The average of all graded assignment problems will count for the remaining 25%.

Tentative Outline:

1. Intro to LP: graphical approach.
2. Simplex I: model development in tabular form.
3. Simplex II: artificial and surplus variables.
4. Simplex III: Big M/Two Phase methods.
5. Fundamental Insight: theoretical simplex algorithm.
6. Duality Theory: applications and examples.
5. Sensitivity and Parametric Analysis: applications.
8. Test #1: Linear Programming.
9. Transportation Problems.
10. Assignment Problems.
11. Goal Programming.
12. Integer Programming I: Binary Integer Problem.
13. Integer Programming II: General Problem.
14. Non Linear Programming I: unconstrained optimization.
15. Non Linear Programming II: constrained optimization.
16. Test#2: Mathematical Programming.
16. Markov Chains I: introduction.
17. Markov Chains II: some closed forms/solutions.
18. Queueing Theory I: introduction.
19. Queueing Theory II: some models/solutions.
20. Applications of Queueing to Engineering.
21. Development of Stochastic Cost Models.
22. Introduction to Simulation Modelling and Analysis.
23. Simulation as an alternative to mathematical modelling.
24. Review.
25. Test #3: Probabilistic Models.