Course Description and Syllabus

This course is an advanced course in Management Science with a focus on both theory and the development of models and their use in the real world. Methodologies that are covered include: integer and nonlinear programming, basic network models and programming, inventory theory, decision theory, and queuing theory.

The course uses research papers which show direct application of management science tools in industrial, corporate, and public policy arenas, and which have resulted in major cost savings, profit increases, and/or direct benefit to welfare. The papers are accompanied with videos in which the tools are illustrated and the models. Applications of Management Science which are studied in the course include: Finance, Transportation and Logistics, Telecommunications, as well as Industrial Applications in the Steel and Forest Sectors. In addition, novel applications of Management Science to health care policy decision-making and treasure discovery are also discussed.

The prerequisite to the course is the satisfactory completion of FOMGT 353 or permission of the instructor.

Outline of Topics to be Covered

1. Review of linear programming

   Supplementary papers and videos, which illustrate applications to finance and telecommunications, respectively:

2. Fundamentals of integer programming

   Supplemental paper and video, which illustrates an application to operations in the steel industry:

3. Basic network models and algorithms

   Supplemental papers and videos, with applications to transportation and logistics:


4. Overview of dynamical systems

Supplemental paper and video, which illustrate an application to public policy associated with health:


5. Nonlinear programming: basic theory and applications

Supplemental paper and video, with application to transportation network design:


6. Inventory theory: basic models

7. Stochastic modeling: decision theory

Supplemental papers and videos, with application to treasure discovery and asset and liability modeling in insurance, respectively:


8. Fundamentals of queuing theory

Supplementary paper and video with application to optimization of telemarketing deployment:


9. Simulation

Supplemental paper and video with application to the use of operations research in the forest industries:

"Use of OR in the Chilean Forest Industries," by Epstein, et al., Interfaces 29 (1999), pp. 7-29.

The final paper and video will illustrate a combination of management science techniques:


Requirements: There will be regular homework assignments given out in class that will be graded and returned. No late homeworks are accepted. In addition, there will be exams and a class project, to be discussed further in class. The students are required to attend the classes and to participate in class discussions. The research papers will be distributed to the students in class. The videos will be shown in class.

Grading:

- Homework: 25%
- Midterm: 25%
- Class project and presentation: 20%
- Final exam: 30%