

Daniel J Epstein Department of Industrial and Systems Engineering

ISE 530 Introduction to Operations Research

Syllabus

Summer 2014

Mon/Wed—9:00-10:50 am

Location: GFS 202

Instructor : S. Ayça Erdoğan

Office : OHE 310N

Office Hours : Wed 3:00-4:00pm or ask appointment time via email

Contact Info : serdogan@usc.edu

Course Description: This course will provide an introduction to the basic deterministic and stochastic models in operations research. The students will learn to formulate, analyze, and solve mathematical models motivated by real-world problems. Most of the topics that will be discussed are deterministic models in which no uncertainty exists. These topics include linear programming and the simplex algorithm, integer programming, transportation and network models. The remaining time will be spent on introducing stochastic models that involve uncertainty.

Learning Objectives:

- Formulate a real-world problem as a mathematical programming model
- Understand simplex method for solving linear programming(LP) models and also learn to use computer programs for solving LPs
- Understand the relationship between a linear program and its dual
- Perform sensitivity analysis to determine the change of a model's optimal solution when the model parameters change
- Formulate and solve special linear programming problems like the transportation, assignment and network models
- Formulate integer programming models and gain a basic understanding of a solution method
- Formulate models with uncertainty as a Markov chain and find its steady-state probabilities

Prerequisite(s): ISE 220, Math 225

Textbook: Winston, *Operations Research: Application and Algorithms*, 4th edition, 2004, Thompson, ISBN 0534380581.

Supplemental: Frederick S. Hillier and Gerald J. Lieberman, *Introduction to Operations Research*, McGrawHill, 9th edition, 2010, ISBN: 0073376299

Blackboard: Lecture slides, homework assignments and solutions, and other important materials will be posted on Blackboard (<https://blackboard.usc.edu/>). Please check regularly.

Computing Resources: Students will be required to use one of the software programs introduced in class to solve the homework assignments. The textbook comes with its own software (LINDO). AMPL and CPLEX are available in the ISE GER-309 laboratory. Student versions of LINDO, LINGO and AMPL software are free for downloading:

<http://ampl.com/products/ampl/ampl-for-teaching/>

http://www.lindo.com/index.php?option=com_content&view=article&id=34&Itemid=14

Attendance: Students are expected to attend each class. In class participation and in-class exercises will contribute to the grade.

Homework Assignments:

- There will be homework assignments almost every week which will be due in a week unless otherwise stated.
- Late submissions will not be accepted for grading.
- Discussions related to assignments are strongly encouraged but the homework to be turned in must be each student’s own work. If another resource is used, it must be clearly mentioned in the submitted document.

Important Note: Given that the summer term is shorter than regular semester, we will move at a really fast pace. The rate of introduction of new concepts is quite high in this course. Do not delay understanding of material. Put my office hours to good use. The homework is very important for understanding.

Exams:

- There will be one midterm and one final exam.
- All exams will be “in-class” and “closed book”.
- Midterm exam will be around the middle of the semester. Exact date will be announced.
- Final exam will be comprehensive and will take place on the last day of classes (June 30).

Grading Breakdown: The grading breakdown is as follows:

Homework assignments:	20 %
In-class assignments :	10 %
Midterm Exam :	30 %
Final Exam :	40 %

Scheduling Conflicts: Students are required to inform the instructor about any scheduling conflicts during the first two weeks of the semester.

Tentative Plan:

Topics		Readings
Brief Introduction to Operations Research Modeling Linear Programs Simplex Method Sensitivity Analysis and Duality	~ 4 classes	Chapters 1,3-6
Transportation & Assignment Problems Network Models	~ 2 classes	Chapters 7 & 8
Integer Programming Dynamic Programming	~ 2 classes	Chapters 9 & 18
Markov Chains Queuing	~ 2 classes	Chapters 17 & 20
Final Exam	June 30	

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website and contact information for DSP:

http://sait.usc.edu/academicssupport/centerprograms/dsp/home_index.html, (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, (www.usc.edu/scampus or <http://scampus.usc.edu>) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

Emergency Preparedness/Course Continuity in a Crisis

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.