University of Southern California

Daniel J. Epstein Department of Industrial and Systems Engineering

ISE 330: Fall 2013

Introduction to Operations Research: Deterministic Models

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Goal: The objective of the course is to introduce students to linear deterministic models and solution methodologies used in operations research.

Tentative Course plan:

Week #	Mondays		Wednesdays	
1	08/26	Operation Research Models	08/28	Optimization and Linear Programming
2	09/02	No classes (Labor day)	09/04	Blending Models
3	09/09	Production Planning Examples	09/11	Transportation and Distribution Examples
4	09/16	Introduction to AMPL	09/18	AMPL Examples
5	09/23	Graphical method for LP's	09/25	The Simplex Method
6	09/30	The Theory of the Simplex Method	10/02	The Theory of the Simplex Method
7	10/07	Review	10/09	Midterm-1
8	10/14	Duality and Economic Interpretation	10/16	Duality and the Simplex Method
9	10/21	Duality and Sensitivity Analysis	10/23	Sensitivity Analysis
10	10/28	Transportation Simplex Examples	10/30	Transportation Simplex concepts
11	11/04	Review	11/06	Midterm-2
12	11/11	Dynamic Programming Models	11/13	Dynamic Programming Examples
13	11/18	Dynamic Programming Concepts	11/20	Dynamic Programming Concepts
14	11/25	Modeling with Integer Programming	11/27	No classes (Thanksgiving)
15	12/02	Modeling with Integer Programming	12/04	AMPL for Integer Programming

Final Exam: Friday, December 13, 11 a.m.-1 p.m.

Textbook: Frederick S. Hillier and Gerald J. Lieberman, *Introduction to Operations Research*, McGraw-Hill, ninth edition, 2010.

References:

- Linear Programming - Dimitris Bertsimas and John N. Tsitsiklis, *Introduction to Linear Optimization*, Athena Scientific, 1997.
- Dynamic Programming - Dimitri P. Bertsekas, *Dynamic Programming and Optimal Control* – Vol.1, Athena Scientific, 2007.
- AMPL - Robert Fourer, David M. Gay, and Brian W. Kernighan, *AMPL: A Modeling Language for Mathematical Programming, Second edition,* ISBN 0-534-38809-4 (available online: http://www.ampl.com/)

Homework Exercises (40%): All exercises are weighted equally. Assignments are due before class one week after it is assigned (unless indicated otherwise). Late assignments will not be accepted for credit.

1. Linear Programming Models
2. Modeling with AMPL
3. The Simplex Method
4. Solving models with AMPL/CPLEX
5. Duality and Sensitivity Analysis
6. Transportation Problems
7. Dynamic Programming
8. Integer Programming formulation and AMPL

Examination (60%): All exams are weighted equally. All exams will be "in-class" and "closed book". However, each student is allowed to bring one 8½ "x 11" sheet of hand written notes for use during the exam. This sheet must be turned in with the exam. Each exam will draw upon the material presented up to the exam (and not covered in the previous exam):

- **Midterm-1:** Linear Programming models with examples, AMPL, Simplex method
- **Midterm-2:** Duality, Sensitivity analysis, transportation examples
- **Final:** Comprehensive (includes all the topics covered in the course)

University policies:

- **Statement for Student 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 your course instructor (or TA) as early in the semester as possible. DSP is located in STU 301 and is open from 8:30am to 5:00pm, Monday through Friday. Website and contact information for DSP: http://sait.usc.edu/academicsupport/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, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review should there be any suspicion of academic dishonesty. The Review process can be found at: http://usc.edu/student-affaris/SJACS/. Information on intellectual property at USC is available at: http://usc.edu/academe/acsen/issues/ipr/index.html.

- **Emergency Preparedness/Course Continuity in a Crisis**: In case of emergency, when travel to campus is difficult, if not impossible, USC executive leadership will announce a digital way for instructors to teach students in their residence halls or homes using a combination of the Blackboard LMS (Learning Management System), teleconferencing, and other technologies. Instructors should be prepared to assign students a "Plan B" project that can be completed 'at a distance.' For additional information about maintaining your classes in an emergency, please access: http://cst.usc.edu/services/emergencyprep.html.