Syllabus and Policy Statement

ISE 5900: Engineering Operations Research: Deterministic Models
Winter Semester, 2018

Instructor: Michael P. Polis
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Office Hours: MW 2:15-3:15pm. Also, almost anytime by email appointment.

Course (Catalog) Description: Introduction to operations research models used in decision making and system performance evaluation. Topics include linear programming including simplex method and duality theory, integer linear programming, the assignment and transportation problems, network flows, and dynamic programming.

Class Times and Location: 7:30-9:17pm MW; Rm. 136B Dodge Hall

Course Purpose: To provide you with an introduction to the methods and techniques of Operations Research, and their role in decision making and in the analysis and design of man-made systems. In particular, the course covers deterministic mathematical programming techniques such as linear programming, the Simplex Method, the concepts of duality and sensitivity analysis, network analysis, and the transportation and assignment problems, integer linear programming, and dynamic programming.

Text: *Introduction to Operations Research, Tenth Edition*, by F.S.Hillier and G.J.Lieberman, McGraw-Hill, 2015, ISBN: 978-0-07-352345-3.

Course grade. A weighted average grade will be calculated as follows: **Mid-term 30%, Final Exam 40%, and Homework: 30%**. Only a sample of the homework problems will be graded, and the homework portion of the grade will be based on these grades. **Note, however:** *You will not receive a passing grade in the course without receiving a passing grade on the final examination.* Note also that I reserve the right to add or subtract 10% of the final grade based on individual observation. Grades will be based upon a curve.

Course Objectives: By the end of the course, you should:
1. Be able to formulate a real-world problem as a linear programming model.
2. Be able to explain the theory of the simplex method for linear programming.
3. Be able to explain the relationship between a linear program and its dual.
4. Be able to perform a sensitivity analysis to calculate the magnitude and direction of change of a model's optimal solution to a change in the data.
5. Be able to solve network optimization problems such as shortest path, minimum spanning tree, and maximum flow.
6. Be able to use linear programming to solve the transportation and assignment problems..
7. Be able to formulate and solve dynamic programming problems.
8. Be able to explain the basic methods for solving integer programming problems.
9. Be able to *use software such as* spreadsheets and LINGO to implement and solve sample programming problems.

Policies and Procedures

Homework. Completed assignments should be turned in to me in class on the due date.

Homework format. Use plain or lined paper, one side of each page. Staple the pages, putting **your name**, **the homework number,** and **date** at the top. ***Make a copy of all homework solutions before you turn them in*** so that **i**f a homework is lost, you will have a copy. I will return homework with selected problems graded. The graded homework problems will form the basis for your homework grade in the course.

Late homework. No late assignments (any that come in after the end of the period on the due date) will be accepted without my written consent.

Mid-term, & Final Exam. *If you leave the room at any time during a test or the final examination, you must obtain permission.* There will be a mid-term exam that will last one entire class period (approximately 110 minutes), and a Final Exam which will last 3 hours. The final exam will be comprehensive. On the mid-term you will be allowed to bring and use one 8 ½ × 11" sheet of paper with writing on both sides, as well as a calculator. On the final exam you will be allowed to bring and use two 8 ½ × 11" sheets of paper with writing on both sides, as well as a calculator. No textbook or other notes will be allowed.

Academic Conduct: Students are expected to read, understand and comply with the Academic Conduct Policy of Oakland University, found at http://www2.oakland.edu/secs/undergrad/ughndbk.htm. Violations will be taken before the Academic Conduct Committee. Students found guilty of academic misconduct in this course will receive a grade of 0.0 in addition to any penalties imposed by the Academic Conduct Committee. *Note that I take violations of the Academic Conduct Policy extremely seriously!* If you cheat, you are not only hurting yourself, but you are also taking unfair advantage of the other students in the class. As such, *I take active steps to monitor for cheating.*

Michael P. Polis (12/4/17)

ISE 5900 Winter 2015 TENTITATIVE SCHEDULE

Week #	Date	Reading Assignment	HW # (Assigned)	HW# (Due)	Textbook Chapters/Sections
1	Jan. 3	Class intro, Models	1		1 & 2, 3.1 – 3.3
2	Jan. 8	Linear Programming			3.4 – 3.5, App. 3.1
	Jan.10	Linear Programming	2	1	3.6-3.8
3	Jan. 15	MLK – **No Class**			
	Jan. 17	The Simplex Method	3	2	4.1-4.4
4	Jan. 22	The Simplex Method			4.5
	Jan. 24	The Simplex Method	4	3	4.6
5	Jan. 29	The Simplex Method			4.6
	Jan. 31	No Class			
6	Feb. 5	The Simplex Method, Shadow Prices	5	4	4.6-4.8, 4.10
	Feb. 7	The Theory of the Simplex Method			5.1-5.5
7	Feb. 12	Review for Midterm		5	
	Feb. 14	**MIDTERM**	6		Do Midterm as Homework
8	Feb. 19	WINTER BREAK			
	Feb. 21	WINTER BREAK			
9	Feb. 26	Duality Theory & Sensitivity Analysis	7	6	6.1-6.3
	Feb. 28	Duality Theory & Sensitivity Analysis			6.4-6.5
10	March 5	Duality Theory & Sensitivity Analysis	8	7	6.6
	March 7	Duality Theory & Sensitivity Analysis			6.7-6.9
11	March 12	The Transportation Problem	9	8	8.1-8.2
	March 14	The Assignment Problem			8.3-8.5
12	March 19	Network Optimization	10	9	9.1-9.3
	March 21	Network Optimization			9.4-9.6
13	March 26	Network Optimization			9.6-9.9
	March 28	Dynamic Programming	11	10	10.1-10.2
14	April 2	Dynamic Programming			10.3-10.4
	April 4	Dynamic Programming	12	11	10.5
15	April 9	Integer Programming			11.1-11.6
	April 11	Integer Programming			11.7-11.8
16	April 16	Integer Programming		12	11.9-11.10
	April 18	Review for Final Exam			
	April ??	**Final Exam**			