SA305 – Linear Programming
Asst. Prof. Nelson Uhan

Spring 2013

Syllabus

Last updated: January 7, 2013

Course description Operations Research (OR) is a broad field which, loosely, seeks to investigate how mathematical techniques can be used to aid in solving "real-life" problems. This course provides an introduction to linear programming, which is a fundamental technique used in OR. The foci of the course are formulating mathematical optimization models (also called *mathematical programs*), and understanding the mathematical underpinnings of linear optimization algorithms.

Textbook D. Rader, *Deterministic Operations Research: Models and Methods in Linear Optimization*, Wiley, 2010.

Schedule

This schedule is subject to change.

Date	Lesson	Topic	Readings
Overview			
1/8	1	The cycle of operations research	1.1
1/9	2	An illustrative example	1.2
1/11	3	Sensitivity analysis, classification of optimization models	1.3
Modeling			
1/14	4	Resource allocation models, MathProg and GUSEK	2.1
1/16	5	Work scheduling models	2.2
1/18	6	Blending models	2.3
1/21		Holiday: Martin Luther King Jr. Day	
1/23	7	Production process models	2.5
1/25	8	Multiperiod models	2.6
1/28	9	Multiperiod models	2.6
1/30	10	Sets, indices, and summations, oh my	2.3
2/1	11	Resource allocation models redux	2.1
2/4	12	Work scheduling models redux	2.2
2/6	13	Blending models redux	2.3
2/8	14	Production process models redux	2.5
2/11	15	Multiperiod models redux	2.6
2/13	R1	Review	
2/15	**E1**	**Exam 1**	
2/18		Holiday: Washington's Birthday	

Date	Lesson	Topic	Readings
Algorithms			
2/20	16	Optimization algorithms – local search	5.1-5.3
2/22	17	Improving search, optimality, gradients	6.1-6.2
2/25	18	Convexity, global optimality	6.3
2/27	19	Geometry and algebra of extreme points	7.1
3/1	20	Geometry and algebra of extreme points, cont.	7.1
3/4	21	Fundamental theorem of LP	7.2
3/6	22	Basic solutions in canonical form	2.8, 7.3
3/8	23	Basic solutions, cont.	7.3
3/11		Holiday: Spring Break	
3/13		Holiday: Spring Break	
3/15		Holiday: Spring Break	
3/18	24	Simplex method	8.1
3/20	25	Simplex method, cont.	8.1
3/22	26	Degeneracy, convergence	8.3
3/25	27	Two-phase simplex method	8.4
3/27	R2	Review	
3/29	**E2**	**Exam 2**	
Duality			
4/1	28	Bounds	9.1
4/3	29	The dual LP	9.2
4/5	30	Duality theorems	9.3
4/8	31	Minimax objectives	2.7
4/10	32	Zero-sum games	
4/12	33	Modeling with Excel	2.9
4/15	34	Introduction to network optimization	12.2
4/17	35	The shortest path problem	
4/19	36	Shortest path interdiction	
4/22	37	Review / Open	
4/24	38	Review / Open	
4/26	39	Review / Open	
4/29	40	Wrap-up	