OR/MATH 441: Deterministic Operations Research

Spring 2013
Innovation Hall, room 206
Tuesdays and Thursdays, 10:30-11:45am

Professor: **Karla L. Hoffman**
Office: **Nguyen Engineering Bldg., room 2207**
Phone: **703-993-1679**
E-mail: khoffman@gmu.edu
Webpage: seor.gmu.edu/~khoffman
Office hours: **Tuesdays 2-4pm, and by appointment; via e-mail at other times.**

Prerequisite: MATH 203
All course materials will be posted at http://mymason.gmu.edu

Textbook: *Operations Research Applications and Algorithms*, Wayne L. Winston (4th edition)
Software: *MPL*, available from www.maximal-usa.com

Overview: This course will introduce the basic mathematical ideas and methods of Deterministic Operations Research. We will discuss modeling real life problems, the basic concepts of Linear Programming (LP), and methods for solving LP problems. We are going to discuss briefly some concepts of nonlinear optimization and their applications. There will be a project, which requires modeling real life problems using MPL languages available for downloading from the Internet (www.maximal-usa.com).

Tentative Course Schedule

Date	*Topic*	*Chapters*
1/22	Introduction to Operations Research 1	
1/24	Linear Programming Modeling and Formulation (I)	3.1-3.2
1/29	Linear Programming Modeling and Formulation (II)	3.3-3.4
1/31	Linear Programming Modeling and Formulation (III)	3.5-3.9
2/5	Introduction to solving Linear Programs (Graphical Solutions)	
2/7	The Simplex Method (I)	4.1-4.2
2/12	The Simplex Method (II)	4.5
2/14	The Simplex Method (III)	4.6-4.8
2/19	The Simplex Method (IV)	4.12
2/21	Review for First Midterm	
2/26	*First Midterm Exam*	
2/28	Review of First Midterm	
3/5	Sensitivity Analysis & Duality (I)	6.1-6.2
3/7	Sensitivity Analysis & Duality (II)	6.3
3/12 and 3/14	Spring Break	
3/19	Sensitivity Analysis & Duality (III)	6.5-6.7
3/21	Sensitivity Analysis & Duality (IV)	6.8-6.9
3/26	Intro to Network Optimization.	8.1-8.2

3/28	The Network Simplex Method 8.3-8.6
4/2	Finish Networks
4/4	Review of MPL syntax for Network Problems and go over Project
4/9	Review for Second Midterm Exam
4/11	*Second Midterm Exam*
4/16	Go over second midterm exam and Intro to Integer Optimization
4/18	Integer Programming (I) - Formulation 9.1-9.2
4/23	Integer Programming (II) - Formulation 9.3-9.4
4/25	Integer Programming (III) – Solution Methods 9.5
4/30	Integer Programming (IV) 9.7
5/2	Go Over Project and Review for Midterm
5/7	Reading Period
5/14	*Final Exam (10:30am-1:15pm)*

Grading:

15% Homework (can be discussed with other classmates but must be handed in individually) and must be handed in at *beginning of class!* Can be handed in or provided in blackboard, but you will lose one point for each day late and late means after 10:30am.
20% First Midterm exam
20% Second Midterm exam
15% Computational project
30% Final exam

Main Goals:

This course covers fundamental methods of optimization with a focus on linear, network, and integer linear and nonlinear programming models.

Students are expected to be able to:

- Formulate basic optimization problems and solve them using a modeling language.
- Understand and be able to apply the simplex method to solve linear models.
- Understand how sensitivity analysis can be used to evaluate the effects of uncertainty in decision-making.
- Understand and be able to apply branch and bound methods to integer linear models.
- Understand and be able to apply network algorithms.

Fundamental Rules:

(1) Make-up exams will only be given for extreme situations. If at all possible, students must contact me before the exam. Full adherence to this policy is the responsibility of the student.
(2) The schedule and exam dates above are tentative, and it is the student's responsibility to keep abreast of changes.
(3) Homework will be assigned each class and collected each week on Tuesday. Homework can be handed in or provided in blackboard, but you will lose one point for each day late and late means after 10:30am.
Each homework assignment will be worth 10 points.
The lowest homework assignment will be dropped.
All work must be clearly written.

Illegible work will not be accepted.

Homework can be either provided by submitting before class begins or on blackboard. Regardless, timestamp will determine if homework is late.

(4) All assignments, solutions sets and lecture notes will be available on mymason.gmu.edu