OR 541: Deterministic Models

Fall 2013
Planetary Hall, Room 124
Aug 27-Dec18, 2013
Tuesdays 4:30-7:10pm

Professor: **Karla L. Hoffman**
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Office hours: Tuesday and Thursdays 2pm-3pm, and by appointment; via e-mail at other times
Prerequisite: Linear Algebra

All course materials will be posted at mymason.gmu.edu You must have a George Mason University email account to access these materials.

Textbook: *Operations Research Applications and Algorithms*, Wayne L. Winston (4th edition)

Software: *MPL*, available from www.maximal-usa.com

Objectives: The course introduces the basic mathematical ideas and method of Deterministic Operations Research. We will discuss modeling real life problems, and show how to develop, solve, and interpret a variety of deterministic optimization models. Students will gain experience in converting a variety of applied problems to optimization models, representing these models in a sophisticated modeling language, solving these models with a variety of algorithms and software, and interpreting the results using sensitivity analysis and other approaches.

Main Goal:

- To improve decision-making with operations principles and methods, specifically:
- To learn about a broad range of contemporary operations research methods and their applications to the real world.
- To learn about the role of uncertainty and use of data in decision-making.
- To learn to communicate effectively.

Homework and Grading:

- Homework problems will be assigned at each session. Some or all of the assignments will be collected and graded.
- There will also be one project that will require the formulation and solution to an optimization problem.

Grades will be computed as follows:

- The midterm will count as 30%,
- The project will count for 20%,
- Homework will count 15%, and
- The final will be worth the remaining 35%.

Tentative Course Schedule (This schedule may change as course progresses. It is the responsibility of the student to know the schedule – posted on mymason.gmu.edu)

Date Topic Chapters

8/27 Introduction; Linear Programming 1, 3.1-3.2
9/3 Linear Programming 3.3-3.9
9/10 The Simplex Method 4.1-4.5
9/17 The Simplex Method 4.6-4.8, 4.12-4.13
9/24 Sensitivity Analysis & Duality 6.1-6.3
10/1 **CLASS IS CANCELLED – PROFESSOR IS TRAVELING**
10/8 In class exam - Note Teaching assistant will proctor exam; INFORMS Meeting
10/15 This is the Fall Break and Class would normally be cancelled. However, I want to make up the 10/1 class we will discuss how to do this the first night of class.

NOTE: Schedule of topics may change based on discussion first night and how we make up class.

10/22 Sensitivity Analysis & Duality 6.5-6.10
10/29 MPL Formulations and Use of Indices, Loops, etc.
11/5 Intro to Networks 8.1-8.3
11/12 Network Simplex Method 8.6-8.7
Integer Programming 9.1-9.3, 9.5
11/19 Integer Programming 9.7
11/26 Nonlinear Programming 11.1-11.4, 11.6
12/3 Nonlinear Programming 11.8-10
Review for Final Exam
12/10 *Final Exam (4:30-7:15pm)*

Academic Integrity

Include a statement about academic integrity within the context of your class, including consequences for violating the standards. The University Honor Code is upheld and supported by the Office for Academic Integrity. The following are three sample statements about Academic Integrity shared by faculty from their syllabi. Please feel free to use these statements in your syllabi or adapt them as needed for your course.

- *The integrity of the University community is affected by the individual choices made by each of us. GMU has an Honor Code with clear guidelines regarding academic integrity. Three fundamental and rather simple principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct. Plagiarism means using the exact words, opinions, or factual information from another person without giving the person credit. Writers give credit through accepted documentation styles, such as parenthetical citation, footnotes, or endnotes. Paraphrased material must also be cited, using MLA or APA format. A simple listing of books or articles is not sufficient. Plagiarism is the equivalent of intellectual robbery and cannot be tolerated in the academic setting. If you have any doubts about what constitutes plagiarism, please see me.*

- *As in many classes, a number of projects in this class are designed to be completed within your study group. With collaborative work, names of all the participants should appear on the work. Collaborative projects may be divided up so that individual group members complete portions of the whole, provided that group members take sufficient steps to ensure that the pieces conceptually fit together in the end product. Other projects are designed to be undertaken independently. In the latter case, you may discuss your ideas with others and conference with peers on drafts of the work; however, it is not appropriate to give your paper to someone else to revise. You are responsible for making certain that there is no question that the work you hand in is your own. If only your name appears on an assignment, your professor has the right to expect that you have done the work yourself, fully and independently.*

- *GMU is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.*

Disability Accommodations

All syllabi should include a statement about accommodations for disabilities. For more information about accommodations and other information related to students with disabilities, please contact Mason's Office of Disability Services. The following are three sample statements about disability accommodations. Please feel free to use these statements in your syllabi or adapt them as needed for your course.

- *If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 4205; 993-2474;http://ods.gmu.edu) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.*

- *If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at 993-2474, http://ods.gmu.edu. All academic accommodations must be arranged through the ODS.*

- *If you have a learning or physical difference that may affect your academic work, you will need to furnish appropriate documentation to the Office of Disability Services. If you qualify for accommodation, the ODS staff will give you a form detailing appropriate accommodations for your instructor. In addition to providing your professors with the appropriate form, please take the initiative to discuss accommodation with them at the beginning of the semester and as needed during the term. Because of the range of learning differences, faculty members need to learn from you the most effective ways to assist you. If you have contacted the Office of Disability Services and are waiting to hear from a counselor, please tell me.*

Diversity

As a Mason faculty member, you are asked to keep diversity, one of the university's core values, in mind throughout the semester and are encouraged to include Mason's Diversity Statement on your syllabus.

Privacy

Student privacy is governed by the Family Educational Rights and Privacy Act (FERPA) and is an essential aspect of any course. Instructor responsibilities with respect to student privacy are an important consideration when designing your syllabus, especially–though certainly not exclusively–when it comes to faculty and student digital communication. For that reason, please require students to use their Mason email. As an employee of the state of Virginia, it is also required that you use your Mason email when communicating with students. Sample syllabus language for email usage:

- *Students must use their MasonLive email account to receive important University information, including messages related to this class. See http://masonlive.gmu.edu for more information.*