

OR 541: Deterministic Models

Fall 2016

Planetary Hall 224

Aug 29, 2016-Dec 20, 2016

Tuesdays 4:30-7:10pm

Professor: Dr. Ronald F. A. Woodaman, Adjunct Professor

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Office hours: available after class, location to be determined

Prerequisite: Linear Algebra

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

Software: MPL, available from <http://www.maximal-usa.com>

Course Materials: All course materials will be posted at mymason.gmu.edu

Philosophy: I spent 20 years in the Marine Corps: half in the infantry, the other half doing operations research. Since retiring in 2007, I have attacked some of the hardest problems in DoD, from counter-IED to suicide prevention, gaining practical experience in the breadth of OR methods. Thus, my approach is to cover the requisite material and make it *interesting, practical, and holistic*. Good OR engages not just your technical skills but your creative and communicative skills.

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 deterministic optimization 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 are assigned at each session to be turned in at the start of the next class.
- There will be one group optimization project that will require oral presentation.
- Late work will only be accepted where prior arrangement has been made with the instructor.
- All tests are open book, open notes.

Grades will be computed as follows:

- Class participation: 10% (subjective assessment of your level of involvement in class)
- Homework: 20% (collaboration is thoroughly encouraged – but copying teaches you nothing)
- Midterm: 20%
- Project: 20%
- Final: 30%

Tentative Course Schedule: Subject to change. It is the responsibility of the student to know the schedule – posted on mymason.gmu.edu or via email announcements.

Date Topic: Chapters

8/30 Introduction: 1, Linear Programming: 3.1 – 3.2
9/6 Linear Programming 3.3 – 3.9
9/13 The Simplex Method 4.1 – 4.5
9/20 The Simplex Method 4.6 – 4.8, 4.12 – 4.13
9/27 Sensitivity Analysis & Duality 6.1 – 6.3
10/4 Sensitivity Analysis & Duality 6.5 – 6.10
10/11 **NO CLASS DUE TO COLUMBUS DAY**
10/18 MPL Formulations and Use of Indices, Loops, etc.
10/25 In class exam – covers through sensitivity analysis/duality
11/1 Intro to Networks 8.1 – 8.3, Network Simplex Method 8.6 – 8.7
11/8 Integer Programming 9.1 – 9.3, 9.5
11/15 Integer Programming 9.7
11/22 Nonlinear Programming 11.1 – 11.4, 11.6
11/29 Nonlinear Programming 11.8 – 10
12/6 Project Presentations and review for Final Exam
12/13 Final Exam (4:30-7:15pm)

University Policies

Honor Code:

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:

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.

Email:

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. You will need an email account to get all notices that are posted on mymason.gmu.edu (Blackboard).