

# OR 541: Deterministic Models

Fall 2017

Innovation Hall Room 206

Wednesdays 4:30-7:10pm

**Professor:** Karla L. Hoffman

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**Office hours:** Wednesdays and Thursdays 2pm-3pm, and by appointment; via e-mail at other times

**I will not be on campus on Mondays.**

I should be on campus most Tuesdays and Fridays, but contact me in advance to confirm.

**Prerequisite:** Linear Algebra and graduate standing

All course materials will be posted at [mymason.gmu.edu](http://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:** Either MPL or python or Julia for Mathematical Programming (JUMP) coupled with GUROBI ) – more on web pages

**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, this course will concentrate on optimization models and their uses
- To learn about a broad range of contemporary optimization methods and their applications to the real world.
- To learn about the role of uncertainty when doing optimization and the role that data plays in the use of such models
- To learn to communicate effectively.

## Reverse Learning:

**This term I am trying to do both lectures and “reverse learning” where the class is broken into teams and works to solve problems during the class time. We will discuss in class but this method requires all students to come to class having read both the text and the lecture notes.**

## 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](http://mymason.gmu.edu) or via email announcements.)**

***Date Topic Chapters***

- 8/30 Introduction; Linear Programming Chapter 1; and Chapter 3.1-3.2
- 9/6 Modeling Linear Optimization Problems 3.3-3.9
- 9/13 More Modeling of Linear Optimization Problems and Modeling using Modeling Language or Python Tools to obtain Solutions via Computer Code.
- 9/20 The Simplex Method 4.1-4.5
- 9/27 The Simplex Method 4.6-4.8, 4.12-4.13 (Phase I and Phase II)
- 10/4 Sensitivity Analysis & Duality 6.1-6.3
- 10/11 Sensitivity Analysis & Duality 6.5-6.10
- 10/18 Intro to Networks (Class notes supplied. Will not be using textbook)
- 10/24 **Midterm Exam**
- 11/1 Network Simplex Method (Class notes supplied. Will not be using the textbook.)
- 11/8 Integer Programming 9.1-9.3, 9.5
- 11/15 Integer Programming (Rest of Chapter 9)
- 11/22 **Thanksgiving. No Class**
- 11/29 Introduction to Nonlinear Programming 11.1-11.4, 11.6
- 12/6 The Kuhn-Tucker Conditions 11.8-11.10 and review for Final Exam
- 12/13 *Final Exam (4:30-7:15pm)*

## **University Policies**

*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*

### **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](http://mymason.gmu.edu) (Blackboard).*