

GEORGE MASON UNIVERSITY
DEPARTMENT OF SYSTEMS ENGINEERING AND OPERATIONS RESEARCH

DETERMINISTIC OPERATIONS RESEARCH
OR/MATH 541

Class time: **Thursdays 4:30pm-7:10pm**
Classroom: **Nguyen Engineering Building 2608**
Final exam date: **Thursday May 10th, 4:30pm-7:10pm**

INSTRUCTOR: **Dr. Karla Hoffman (khoffman@gmu.edu)**

The best way to contact me is via email.

Office: **Engineering Building 2207**

Office hours: **Mondays and Thursdays 2:00pm-3:00pm and by appointment**
With notice, I can be available after class on Thursdays

I will not be on campus on Wednesdays.

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

Office phone: **703-395-4080**

Prerequisites for the course: Linear algebra and graduate standing.

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: 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 methods 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 Goals:

- 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 such models
- 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.

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 before class.*

For those using the distance-learning option, this is a *synchronous* class and you need to be online during the entire class. Please make sure that your microphone is working and that you can share your desktop. Instructions for collaborate on at mymason.gmu.edu

Grades will be computed as follows:

- In class participation will count as 10% of grade
- The midterm will count as 20% of grade,
- The project will count for 20% of grade,
- Homework will count 15% of grade
- The final will be worth the remaining 35%.

CLASS RULES

- Please turn off your cell phone before class and never use it during a lecture. Feel free to walk out without distracting the class when needed.
- Attendance in class is very important. Some material, not necessarily from the book, will be covered in class and will show up on the midterm and final.
- In order to help you learn the course material, weekly homework exercises (each worth 10 points) will be assigned throughout the semester. **You will lose one point for each day late and late means after 4:30pm; but you only have until Sunday to hand it in! That way, I can post solution sets before the next homework is due.**
- Of the graded assignments, I will drop the lowest grade and then average the rest of the grades. This is in acknowledgement of the fact that we all have bad days, other pressures etc. Use this wisely!
- Exams will only be given at the predetermined dates. Early or late exam taking will not be allowed, except for **very special** cases.

- Make sure you check Blackboard regularly for class announcements, grades, notes, and homework related material. I will send alerts via email when there is an important announcement on Blackboard.

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 or via email announcements.)

Date Topic Chapters

- 1/25 Introduction; Linear Programming Chapter 1; and Chapter 3.1-3.2
- 2/1 Modeling Linear Optimization Problems 3.3-3.9
- 2/8 More Modeling of Linear Optimization Problems and Modeling using Modeling Language or Python Tools to obtain Solutions via Computer Code.
- 2/15 The Simplex Method 4.1-4.5
- 2/22 The Simplex Method 4.6-4.8, 4.12-4.13 (Phase I and Phase II)
- 3/1 Sensitivity Analysis & Duality 6.1-6.3
- 3/8 Sensitivity Analysis & Duality 6.5-6.10
- 3/15 **SPRING BREAK – No Class**
- 3/22 Intro to Networks (Class notes supplied. Will not be using textbook)
- 3/29 In class exam – covers through sensitivity analysis
- 4/5 Network Simplex Method (Class notes supplied. Will not be using the textbook.)
- 4/12 Integer Programming 9.1-9.3, 9.5
- 4/19 Integer Programming 9.7
- 4/26 Nonlinear Programming 11.1-11.4, 11.6
- 5/3 Nonlinear Programming 11.8-10 and review for Final Exam
- 5/10 *Final Exam (4:30-7:10pm)*

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).