OR/MATH 441 – Deterministic Operations Research (Spring 2023)

Instructor: Dr. Ran Ji
Office: Nguyen Engineering Building, Room 2210
Email: rji2@gmu.edu
Phone: (703) 993-5993
Office Hours: Tuesday & Thursday 1:00 – 2:00 PM or by appointment

**Class Place
and Time:**   Engineering Building 1107
                   Tuesday & Thursday 3:00 – 4:15 PM

Prerequisites: MATH 203

**Course
Description:**   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.

Software: Microsoft Excel with Solver.

                   AMPL algebraic/mathematical modeling language with academic/commercial optimization solvers, including Cplex, Gurobi, etc. AMPL software with academic license will be provided (see Blackboard).

Textbooks: *The course materials will be adapted from several textbooks and case studies. Lecture notes will be provided that can be augmented with the books listed below.*
   - **Wayne L. Winston. "*Operations Research Applications and Algorithms*". 4th Edition. Cengage Learning, 2003.**
   - Hamdy A. Taha. *"Operations Research: An Introduction"*. 11th Edition. Pearson, 2022.
   - Ronald L. Rardin. "*Optimization in Operations Research*". 2nd Edition. Pearson, 2016.

   Note: The assigned reading for each lecture is with Winston's book.

**Assignments
Exams and
Grading:**   The course grade will be based on individual homework assignments, midterm exam, computational project, and final exam. Each grading component is described below.

Assignments:	30%
Midterm Exam:	30%
Project	10%
Final Exam:	30%

   The +/- letter grades will be used.

   The instructor reserves the rights to make minor modifications in the percentages related to the number and difficulty of the assignments/projects/exams given.

Attendance Policy, Class Expectations, Late Submission, and Make-up Policy

- Attendance in class is very important. Some material, not necessarily from the book or lecture slides, will be covered and discussed in class, and will show up on the midterm and final exams. Students are expected to attend the class and to notify the instructor when they are not able to. Repeated unexcused absences might result in a penalty of up to 5% of the class grade.

- Weekly (or Biweekly) homework will be assigned throughout the semester. The due date is basically Thursday 3 PM, beginning of class. No late submission will be accepted. Electronic (typed) files can be submitted via Blackboard. If submitting in hand-writing format, it is the student's responsibility to write and show all work clearly. Homework assignments are all individual. Homework with the lowest score will be dropped.

- Exams will be given at predetermined dates. In the event a student is unable to attend the exam with a valid reason (e.g., jury duty, family/medical emergency), a make-up exam will be organized as soon as feasible for both instructor and the student. Students who miss the exams without advanced notices to the instructor (or without a valid reason) will receive 0 points for the exam and will not be given a make-up exam.

- Midterm exam is expected to be scheduled to the week before Spring break, and final exam is in the last week. Final exam will not be cumulative.

- Cheating and plagiarism will be taken very seriously in this course. Any academic misconduct will be dealt with in accordance with university policy.

Topics and Schedule

Note: The list of topics and schedule is tentative and may be subject to update.

Date	Topics and Contents	Readings (Winston)
01/24	Introduction;	Chapter 1
01/26	Review of Linear Algebra	Chapter 2
01/31	Linear Programming and Graphic	Chapter 3.1-3.2
02/02	Method	Chapter 3.3-3.9
02/07	The Simplex Method	Chapter 4.1-4.2, 4.5
02/09		
02/14		Chapter 4.6-4.8, 4.12
02/16		
02/21	Sensitivity Analysis	Chapter 6.1-6.3
02/23		
02/28	Duality	Chapter 6.5-6.9
03/02		
03/07	Review and Introduction to AMPL	AMPL handouts
03/09	**Midterm Exam**	
03/13-03/19	**Spring Break (No Classes)**	
03/21	Transportation Problems	Chapter 7.1-7.2
03/23		
03/28		
03/30	Network Problems	Chapter 8.1-8.2 Chapter 8.3, 8.6
04/04		
04/06		

04/11	Integer Programming	Chapter 9.1-9.3
04/13		
04/18		Chapter 9.5, 9.7
04/20		
04/25	Nonlinear Programming	Chapter 11.1-11.3
04/27		
05/02		
05/04	Review for Final Exam	
05/09	**University Reading Day**	
05/11	**Final Exam**	

Class Website: **Blackboard**: http://mymson.gmu.edu
Click on the Courses tab in the green area and then on the Spring 2023 Deterministic Operations Research (OR/MATH-441) link when the course list column appears.
The left column menus include the following:

Syllabus: Class syllabus, schedule, course overview information.

Content: Links to weekly modules with lectures, data files, and suggested readings.

Assignments: Homework information, data, and guidelines. Solutions to the Assignments. Links to submit assignments.

Projects: Project information. Links to submit the proposals and final reports.

Software: Some resources for optimization software are available here.

My Grades: This is the place to check on your grades.

Discussion Board: At least one discussion board will be open to support communication among students.

General Material

Academic Integrity

Mason is an Honor Code university; please see University Catalog (http://oai.gmu.edu/the-mason-honor-code-2/) 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.

Mason Email Accounts

Students must use their MasonLive email account to receive important University information, including the messages related to this class. See Mason Live (http://masonlive.com) for more information.

Office of Disability Services

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 (703) 993-2474. All academic accommodations must be arranged through the ODS (http://ods.gmu.edu).

Writing Center: Robinson Hall A114. Phone: (703) 993-1200. Webpage: http://writingcenter.gmu.edu

University Libraries: "Ask a Librarian". Webpage: http://library.gmu.edu/mudge/IM/IMRef.html

University Policies: The University Catalog (http://catalog.gmu.edu) is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at University Policy (http://universitypolicy.gmu.edu). All members of the university community are responsible for knowing and following established policies.