Deterministic Methods in Operations Research
ESI 6314 Section 1OEM
Academic Term: Fall 2025

Instructor:
Jorge A. Sefair (jorge.sefair@ise.ufl.edu)

Grader:
Please contact through the Canvas website (preferred)
- Teaching Assistant: Dong Han (donghan@ufl.edu)

Class Schedule:
- [Lectures 1 and 2] August 23 (1pm-5pm), 24 (12:30pm-2:30pm), Gainesville
- [Lectures 3 and 4] September 13 (8am-noon), 14 (1-5pm), Orlando
- [Lectures 5 and 6] October 18 (1-5pm), 19 (8am-noon), Orlando
- [Lectures 7 and 8] November 15 (8am-noon), 16 (1-5pm), Orlando
- [Lecture 9] December 6 (1-5pm), Orlando

Office hours:
- Mondays & Wednesdays, 6-8:00pm, Zoom
- Fridays, 12-2:00pm, Zoom
- Alternative office hours available by appointment

Course Description
Introduction to basic models and their solution with modern computer packages. Emphasis on modeling, computer solution, and sensitivity analysis with minimal reference to model theory and development of algorithmic methods. (4 credits).

Course Pre-Requisites / Co-Requisites
There are no formal prerequisites for this class. However, students are expected to have basic knowledge of programming (any software), linear algebra (matrix operations, solving systems of equations), and differential calculus.

Course Objectives
This introductory course in Operations Research (OR) focuses on the formulation of deterministic mathematical models and algorithms for decision making. The course covers applications in a variety of domains, including transportation, health care, supply chain, and logistics. The theoretical foundation will include the Simplex algorithm, sensitivity analysis, network flows, and integer programming. The hands-on activities will focus on modeling and software use, with emphasis on their managerial insights for decision making. At the end of this course, students are expected to be able to: (1) identify situations where deterministic OR tools can improve the decision-making process, (2) mathematically formulate optimization problems, (3) implement and solve optimization problems using commercial software, and (4) analyze, interpret, and communicate the output of an optimization problem to professionals in other disciplines.

Materials and Supply Fees
N/A

Required Textbooks and Software
- Lecture notes and reading materials will be provided during the semester.
- AMPL and Excel will be used intensively.

Recommended Materials
- Rardin, R.L. 2016. Optimization in operations research. 2nd Edition. Pearson. ISBN-13: 978-0134384559.
- AMPL: A Modeling Language for Mathematical Programming, 2nd ed. 2002. R. Fourer, D.M. Gay, and B.W. Kernighan. Cengage Learning. URL: http://ampl.com/resources/the-ampl-book/

Required Computer
Any computer capable of running AMPL (Mac or PC) is suitable. Ideally, students should have a laptop available for in-class exercises.

Course Schedule
The course Schedule is offered as a guide and it is subject to change, depending on the pace of the class. Each lecture includes hands-on activities. Please bring your laptop for every session.

Lecture	Topic	Activity
1 (8/23)	Motivation. Introduction to OR. Formulation of optimization models.	
2 (8/24)	Solution of optimization problems using Excel.	Excel practice. Homework 1.
3 (9/13)	Classes of optimization models and tractability. Global and local optima. Linear programming (Part 1): Introduction to linear programing models. Graphical solution. Applications.	AMPL practice
4 (9/14)	Linear programming (Part 2): Solution methods. Sensitivity analysis. Applications.	AMPL and Excel practice. Homework 2.
10/3 – 10/10	Exam 1 (take home, online)	
5 (10/18)	Network optimization (Part 1). Network flow models and applications. Assignment problem. Shortest-path problem. Maximum flow problem. Minimum-cost flow problem.	AMPL practice.
6 (10/19)	Network optimization (Part 2). Specialized algorithms (Dijkstra's algorithm, Ford–Fulkerson algorithm). Applications.	Modeling practice. Homework 3.
7 (11/15)	Integer programming (Part 1). Modeling. Logical constraints. Piecewise linear objective functions. Reformulations.	Modeling practice.
8 (11/16)	Integer programming (Part 2). Solution techniques. Applications.	AMPL practice. Homework 4.
9 (12/6)	Case studies: applied problems and solution techniques.	Modeling practice. Final Exam

Important Dates
October 3-10 Exam 1 Take home, online.
December 6 Final exam In class.

Homework Assignments
Four homework assignments (15% each) will be given during the semester. You are expected to answer and turn in all problems. The assignments will consist of three components: modeling, solution, and analysis. They will test your ability to apply the concepts learned in class, use of the optimization solvers and solution algorithms, and interpret the model solutions in the problem context. Homework assignments must be submitted through Canvas by the due date in groups of no more than 3 (three) students.

Exam Policy
Exam 1 will be online, and Exam 2 will be at the end of the last class of the semester (1.5 hours). Details will be communicated during the semester. Reasonable flexibility will be provided for due dates in case of extraordinary circumstances. Excused absences must be consistent with university policies in the graduate catalog (https://gradcatalog.ufl.edu/graduate/regulations/) and require appropriate documentation.

Evaluation of Grades

Item	**Total Points**	**Percentage of Final Grade**
Homework Assignments (4)	100 each	60%
Exam 1	100	20%
Final exam	100	20%
		100%

Academic Policies & Resources
For information about academic policies and campus resources please visit https://go.ufl.edu/syllabuspolicies.

Attendance Policy
In-person attendance is strongly encouraged. You are responsible for the announcements made in class. Students are expected to know the material in the prerequisite courses and activities. Excused absences must be consistent with university policies in the Graduate Catalog (https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/) and require appropriate documentation. Additional information can be found here: https://catalog.ufl.edu/UGRD/academic-regulations/

This is not a course where success on exams comes from simply memorizing and applying formulas. To get the most out of the course, it's important to stay ahead by reviewing lecture material in advance. Beyond the required readings, working through additional practice problems on your own will deepen your understanding. With consistent and focused practice, you can reach a level of preparation where solving exam problems feels intuitive and straightforward.

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00

Percent	Grade	Grade Points
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67

Percent	Grade	Grade Points
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at: https://gradcatalog.ufl.edu/graduate/regulations/

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

In-Class Recording
Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without the permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third-party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (https://sccr.dso.ufl.edu/process/student-conduct-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu