

IE 1081: Operations Research

Fall 2010 Syllabus

Basic information

Instructor: Oleg Prokopyev, prokopyev@engr.pitt.edu

Lectures: TTh 8:00-9:15, Benedum 1021

Office: Benedum 1037

Office hours: We will set up formal office hours during the first week of class. You may also contact me to set up an appointment.

Grader: Julie Solar, jls176@pitt.edu

Course website: <https://courseweb.pitt.edu>

Textbook: *Introduction to Mathematical Programming* by Winston and Venkataramanan, 4th Edition. Available at the Book Center. I do not expect to require use of the software included with the text.

Prerequisites

1. Knowledge of (a) linear algebra, (b) differential calculus, and (c) basic mathematical concepts such as sets, functions, vectors, matrices etc.
2. An interest in mathematical methods.

Course Description

This is an introductory course in operations research (OR). The primary emphasis will be on Linear Programming (LP) and its applications (covering formulation of a number of different types of linear models, the simplex algorithm, duality and sensitivity analysis, and the transportation and assignment problems). Other areas such as integer programming, network flows, nonlinear and dynamic programming will also be covered, with the amount of emphasis depending on the time available.

The tentative order of topics is as follows:

- modeling with linear programs and solving with a computer
- simplex algorithm(s) to solve linear programs
- duality
- sensitivity analysis
- transportation, assignment and transshipment problems
- integer programming
- network models
- dynamic and nonlinear programming (if time permits)

Objectives

We will develop modeling and analysis skills in deterministic optimization, focusing primarily on linear programming. At the end of the course, students will be able to

- Identify opportunities for the use of optimization.

- Given a problem to optimize, identify an objective and constraints and model these correctly as a mathematical program. In particular, decide on an appropriate type of model as well as appropriate decision variables. Also, recognize problems that can be more appropriately addressed with approaches other than math programming.
- Use a computer to solve a mathematical program by correctly expressing the problem as valid input for a solver and interpret the results, including sensitivity analysis.
- Communicate intelligently with a coworker or boss about the limits of the model, the solution to the problem, and any corresponding analysis.

Applicable ABET Outcomes

- (a) An ability to apply knowledge of mathematics, science and engineering
- (b) An ability to analyze and interpret data
- (e) An ability to identify, formulate and solve engineering problems
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Grading

Exams: There will be a midterm (week of October 18-22) and a final exam (week of December 13-18). If you must miss an exam, you should make alternative arrangements with the instructor before the exam is given. If you miss an exam without prior notification, you will receive a score of “zero” for that exam except under very unusual circumstances.

Homeworks: Homeworks are always due at the beginning of class on the specified date. 20% of the possible points will be deducted for homework handed in up to one week late. Homework will not be accepted more than one week past the due date. Do not wait until the middle or end of the semester (when you realize you are failing or doing much worse than anticipated) and ask to hand in all the homework that you haven't been doing it will not be accepted. Note that some homework problems will require the use of Microsoft Excel. The lowest homework grade will be dropped.

Grading: Midterm Exam 35%, Final Exam 35%, Homework 30%.

Course Policies

Attendance: No attendance will be taken, but the students are responsible for the announcements made in the class.

Homework collaboration: You can learn a lot from working with other people. I have no objections if you wish to study with your friends or work together on homework in fact, you should feel free to do so! However, you must write up your homework solutions on your own without assistance from other people. This is to help you and me ensure that you understand the solutions that the group came up with.

Exam collaboration: No collaboration is allowed on exams.

If you are ever unsure about the collaboration policy, please contact me for clarification.

Disability

If you have a disability that requires special testing accommodations or other classroom modifications, you need to notify both the instructor and Disability Resources and Services no later than the 2nd week of the term. You may be asked to provide documentation of your disability to determine the appropriateness of accommodations. To notify Disability Resources and Services, call 412-648-7890 (Voice or TTD) to schedule an appointment. The Office is located in 216 William Pitt Union.