

Introduction to Deterministic Optimization Models in Operations Research

Dr. Martin Takáč

Mohler 481, 1 hours after the Friday's lecture

takac@lehigh.edu

Mohler TBA, office hours TBA

TBA@lehigh.edu

TA: TBA

1. Course Information

Meeting Times: MWFs, 1:10pm-2.00pm

Location: Mohler Lab 453

Prerequisites: Math 205

2. Scope of the Course

This course will introduce you to deterministic methods in operations research. You will learn to formulate, analyze, and solve mathematical models that represent real-world problems.

We will cover linear programming and the simplex algorithm, as well as related analytical topics. It will also introduce other types of mathematical models, including transportation, network, integer, and non-linear models. In the remaining part course we will learn to use software tools, such as AMPL, Cplex and Matlab to solve various optimization problem.

3. Course Logistics

3.1 Textbook

"Introduction to Operations Research" by F.S. Hiller and G.J. Lieberman; We will cover Chapters 1-6, 8-9 and 11-12.

3.2 Modeling Tools

In this class we will make use of modelling language AMPL and Matlab package. You should download the student version of AMPL from <http://www.ampl.com> (or use `http://neos.mcs.anl.gov/neos/`). Matlab is available on our lab computers.

3.3 Homework

There will be several homework, and **all must be completed to receive a grade for the course.**

Homework will be penalized for each day they are late. After solutions are released, they will not be accepted. No exceptions. Also, no exception to the no-exception rule.

3.4 Re-grade Requests

If you disagree with the grade you received on a homework or exam problem, you may submit a request for that problem to be re-examined. This request must be turned in no more

than 48 hours after you receive the graded assignment. Once we re-examine your work and decide whether to change your grade, our decision will be final.

3.5 Class Preparation and Participation

You are expected to come to class regularly and to be prepared for each class by reading the relevant sections of the textbook ahead of time. I will post slides on Coursesite in advance so that you may bring them to class if you wish. In addition, you are expected to participate in class discussions and ask questions when you are confused. A portion of your grade will be based on class participation.

3.6 Extended Absences

If you believe you will miss two or more consecutive lectures due to illness, family emergencies, etc., please contact me as early as possible so that we can develop a plan for you to make up the missed material. Under no circumstances will I give credit for missed homework or exams unless you have discussed your absence with me sufficiently in advance.

3.7 Evaluation

Homework	20%
Short quiz during lecture	10%
Quiz #1	15%
Project	20%
Final exam	25%
Class participation (discretion of the instructor)	10%

4. Plagiarism Policy

I strongly encourage you to consult with your colleagues when you're working on homework. However, you will not understand the material thoroughly or do well on the exams unless the work that you turn in is ultimately your own. Therefore, you must write up your answers alone, and without looking at anything you wrote down while working with your group. This means that if you solved the problem with a friend, you're going to have to go home and solve it all over again, by yourself. If you wrote AMPL code with a friend, you're going to have to re-write it by yourself. The work you turn in must be your own. In your write-up, you must cite everyone with

whom you worked or consulted about each problem, as well as any books or other references (other than Hillier and Lieberman and the lecture slides) that you used to solve the problem. Any breach of this policy will be considered an act of plagiarism, and no credit will be given for such assignments. Repeat offenses will be grounds for failure for the course.

5. Policies for the Course

- You are expected to arrive on time, turn your cell phone off, refrain from reading the newspaper, refrain from text-messaging the rest of the world, and stay in class for the duration of the lecture. Students who need to leave early should notify me ahead of time.
- Each homework in the course must be completed on its due date. Homework are due at the beginning of class.
- Any kind of cheating in any part of the course will be severely sanctioned and might result in disciplinary action.
- Regular attendance is required for the lectures. You should let me know in advance if you are going to be absent for a job interview, an athletic event, a religious holiday, a field trip, or any other good reason. Being sick is a good reason too, but you need to email me.
- If you plan to miss the lecture on a day where an assignment is due, you should make arrangements ahead of time so that your assignment is turned in on or before the due date. You are very strongly discouraged to miss a quiz.
- The lectures will be a lot more enjoyable if you participate.
- You are expected to check the course webpage regularly.
- Taping lectures, and specifically audio recording, is illegal in Pennsylvania without the prior consent of **all parties** in attendance.

6. Topics Covered in the Course

1. Introduction (1 week)
2. Linear Programming (2 weeks)
3. Simplex Method (2 weeks)
4. Introduction to AMPL (1 week)
5. Duality and Sensitivity Analysis (2 weeks)
6. Introduction to Matlab (1 week)
7. Transportation Problem and Other Network Models (1 week)
8. Network Models and Integer Programming (1 week)
9. Integer Programming (1 week)
10. Nonlinear Programming (1 week)
11. Review

7. Other

7.1 Accommodations for Students with Disabilities

If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of Academic Support Services, University Center C212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

7.2 The Principles of Our Equitable Community

Lehigh University endorses The Principles of Our Equitable Community (<http://www4.lehigh.edu/diversity/principles>). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.