IE220: Introduction to Operations Research

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Description: In this course you will be introduced to the process of formulating, analyzing, and solving mathematical models of real-world problems. The models we discuss will fall into one of two categories: *deterministic* and *stochastic*. In the former case, the quantities defined in the model are assumed to be known and fixed. This section of the course covers linear, integer, and nonlinear programming problems and algorithms. In the latter case, the quantities defined in the model are assumed to be unknown (i.e., random), which in many situations is a more accurate way to model real systems. This section of the course covers Markov chains and queueing models.

Prerequisites and Corequisite: Everyone is required to have taken IE111 or Math231 and Math205 before this course and is required to take IE122 concurrently. Please see me about any requests for exceptions.

Lectures: Lectures will be held on Tuesdays and Thursdays at 9:20am-10:35am in Mohler 375.

Office Hours: I have reserved Wednesdays from 9:00am-12:00pm for office hours. This should work well for most people since homeworks will normally be due and quizzes/exams will normally be scheduled on Thursdays. However, I am also available through e-mail (always) and on Google Talk (often). If I do not respond to an e-mail within 24 hours, then please send a reminder/follow-up e-mail. If I do not respond on Google Talk, then I am either busy or you are contacting me too late in the day, in which case you can either try again the next day (during work hours) or send an e-mail instead. I am also willing to schedule other times to meet in my office, but please e-mail me in advance to set up a time.

Teaching Assistant: Yunfei Song, `yus210@lehigh.edu`

Materials: The required textbook for the course is:

- F. S. Hillier and G. J. Lieberman, *Introduction to Operations Research*, Ninth Edition, McGraw-Hill, New York, NY, USA, 2010.

However, I also recommended the following textbooks, if you have access to them:

- R. L. Rardin, *Optimization in Operations Research*, Prentice Hall, Upper Saddle River, NJ, USA, 1998.
- W. L. Winston, *Operations Research: Applications and Algorithms*, Third Edition, Wadsworth Publishing Company, Belmont, CA, USA, 1994.

Grading: Your grade will be calculated as follows:

Homeworks:	40%
Midterm Exams:	25%
Final Exam:	25%
Participation:	10%

Homeworks: There will be homeworks assigned regularly throughout the semester.

- *No credit* will be given for any late assignment.
- Each homework must be turned in *at the beginning of class* on the day that it is due.

- You are free to consult with other students when working on homework. However, *the work you turn in must be your own.* Please cite any references you use, including fellow students.
- You *can and will* lose credit for illegible work.

Midterm Exams: There will be two exams, approximately 1/3 and 2/3 of the way through the semester. Each will be cumulative, closed-book, and closed-notes, though formula sheets may be provided.

Final Exam: The final exam will be cumulative.

Participation: Everyone is expected to attend lecture, ask and respond to questions, and provide feedback about the lectures and assignments. My hope is that everyone will receive all of the possible credit for this part of the grade, but, if by the end of the semester I have no idea who you are, then your participation grade will suffer. In short, you are expected to communicate with me during the semester!

Regrade Requests: If you disagree with a grade you receive on a homework or exam, then you may submit a regrade request. This request must be *submitted no more than 48 hours after you receive the grade.*

Absences: Class attendance will not be recorded. However, everyone is expected to attend lecture and so everyone will be responsible for all material covered and announcements made in lecture. *It is your responsibility to contact me about any important information you might have missed in class if you were unable to attend.* If you believe you will miss numerous lectures due to illness, family emergencies, etc., then please contact me as early as possible. *Under no circumstances will I give credit for a missed homework, quiz, or exam unless you have discussed your absence with me in advance.*

Coursesite: Lecture slides will be posted on Coursesite prior to each lecture. Homework assignments, solutions, announcements, and other important material will also be posted on Coursesite. Important information, comments, corrections, and updates about the course may also be sent via e-mail (through Coursesite). Therefore, please let me know if you do not receive mass e-mails sent through Coursesite.

Software: In this course and in IE122, we will make use of the modeling language AMPL. You should download the student version of AMPL from `http://www.ampl.com/DOWNLOADS/index.html`.

Recording Devices: Voice and/or video recording devices may be used only with the approval of everyone in the classroom. Please let me know in advance if you wish to use these types of devices.

Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact me 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 Academic Support Services before accommodations can be granted.

Tentative Schedule:

Week	Tues.	Thurs.	Topics	Exams
1	Aug. 31	Sept. 2	Linear programming	
2	Sept. 7	Sept. 9	Linear programming	
3	Sept. 14	Sept. 16	Simplex method	
4	Sept. 21	Sept. 23	Simplex method	
5	Sept. 28	Sept. 30	Duality and sensitivity analysis	
6	Oct. 5	Oct. 7	Transportation and assignment problems	Midterm 1
7	Oct. 12	Oct. 14	Network models	
8	Oct. 19	Oct. 21	Network models	
9	Oct. 26	Oct. 28	Integer programming	
10	Nov. 2	Nov. 4	Nonlinear programming	
11	Nov. 9	Nov. 11	Markov chains	
12	Nov. 16	Nov. 18	Markov chains	Midterm 2
13	Nov. 23	Nov. 25	Queueing models	
14	Dec. 30	Dec. 2	Queueing models	
15	Dec. 7	Dec. 9	Review	