Course Syllabus

MISM 95.760: Decision Making Under Uncertainty, Fall 2023 mini 4 sections E4 and F4

Important Information:

- The midterm will be given on **Friday Mar 5 9:30am-10:50am, in HBH 1206 and HBH 1204.** Exams are **in-person only**. **You must attend on this day so that you can take the midterm.**

- The final exam schedule is determined by Heinz College. Exams are **in-person only. You must attend on the scheduled day so that you can take the final exam.**

- The review sessions are optional (and will be on zoom/recorded):
    - Mar 15: Review of linear programming
    - Mar 22: Review of network flow problems
    - Mar 29: Review of 2-stage (stochastic) LPs
    - Apr 19: Review of simulation

  NOTE: Officially, sections E4 and F4 meet at the same time for recitation, but in different rooms (HBH 1206 and HBH 1204). However, **we will only use room HBH 1206 for recitation**. It's big enough to seat all but 4 enrolled students. If somehow there are too many students for the classroom, the last 4 will have to attend via zoom (they can sit in room 1204 if they wish to do so).

Instructor: David Choi, davidch@andrew.cmu.edu,
Office hours: Wed 12:30pm-1pm in person, either in conference room 2118F or my office HBH 2118B (Note: I may arrive late to my office if students have many questions after the lecture).

For quick questions, by far the best time to ask will right after each class (or even better, during class if your question is about the lecture material)

Teaching Assistants

Yubo Li
yubol@andrew.cmu.edu
OH: Mon 4:30pm-5:40pm, HBH 3024 (PhD student lounge) and also accessible by zoom:
https://us05web.zoom.us/j/83124361861?pwd=Swpnm3KQT3i57WunjXUqVmGoDdFxbK.1
Meeting ID: 831 2436 1861 Passcode: 2vJ58r

Chenqi Wang
chenqiw@andrew.cmu.edu
OH: Tue 5-6pm, location TBD

Shayan Panjwani
shayanp@andrew.cmu.edu
OH: Wed 4-5pm, location TBD

Generally, the TAs are willing to schedule appointments for additional office hours – please contact them if interested

TA Office hours will begin in week 2.

If there are any changes to the office hours schedule, we will post an announcement on canvas, and also a corrected version of the syllabus on canvas as well.

Course objectives:

1. Become facile with Excel. This helps you get a job.
2. Survey many optimization and decision science methods. This helps you hire consultants intelligently, should you need to.
3. Learn some analytical methods. This helps you solve smaller problems yourself.
4. Learn how to make a mathematical model. This helps you think clearly and precisely, especially for industrial-sized problems.

All skills will be assessed by your performance on the homework sets and exams

Course Materials, Textbook: *Spreadsheet Modeling and Decision Analysis*, by Cliff T. Ragsdale, 6th edition or later

The numbering of the homework problems may change slightly (i.e., if we ask you to do problem #23 in the 6th edition, it may be #25 in the 7th), and we will include enough information in the homework handout for you to find the correct problem in either edition.

The text can be checked out digitally from the library, for a two hour loan period (it requires that you sign into the library page with your andrew ID).

Homework: There will be 4 homeworks.

Homeworks should be submitted electronically, via canvas. Submit a single PDF file. Many of the problems will require you to construct a spreadsheet. In these cases, you should copy a screenshot of the spreadsheet into the PDF that you submit, and also document the formulas that you used (there will be examples you can follow). If you need to draw a picture, you can draw it by hand, and then either scan or take a picture of it, and copy it into the PDF that you submit.

Homeworks can be done in groups of up to 4 students, if desired. The homeworks are too long to finish in a single group meeting. However, we strongly discourage you from dividing the homework between group members, so that each member does only 25% of the homework, as you probably will do much worse on the exams this way. A better strategy would be to attempt each problem on your own, asking group members for help whenever needed, and then compare answers to understand any differences that arise. **Groups should be formed on canvas** (go the "People" section and then click on the appropriate tab "HW 1 groups", "HW 2 groups", etc. (Note you will need to form your group on canvas for each HW assignment – this is done so that students can change groups if desired.)

Exams: Exams will be pencil and paper, in-person, closed notes/closed books/closed computer. We will give you a formula sheet to print out, and you can add your own handwritten formulas to the sheet as well. Seating may be randomized. Exams are done individually (not in groups).

You should expect the exams to test your mathematical knowledge using pencil and paper, while the homeworks will test your ability to implement solutions on a computer. These are complementary skills and both are important. Expect at least one of the questions on each exam to be conceptually challenging in that you won't be able to simply follow recipes from lecture. Instead, you will need to think about why the question is a little different and decide how to adapt what you have learned.

Final Grades: HW, quizzes, and exam scores will be combined with the following weights:

HW: 35%
Midterm: 25%
Final exam: 40%

Grades will be curved to conform to Heinz college standards. Typically, the curve results in most of the grades being roughly evenly divided between A, A-, B+, and B, with a few exceptions (both high and low). However, performance of past classes may not be predictive of future ones! Note: undergrads in 94-433 will be curved separately from graduate students if obvious discrepancies in prior experience emerge.

Academic Integrity:

The rules and the academic integrity standards outlined in your student handbook will be strictly enforced. Violations of these rules or standards are considered a fundamental breach of trust and will result in failure of the course.

Collaboration on homework (outside of your group) is not permitted in this class. Cheating will be treated very seriously. **You should only take credit for work which you have done yourself – always cite your sources (including webpages) and give credit where credit is due.** In the working world, managers who steal credit for the work of others or the ideas of others are a serious problem to the morale and health of a company, and the pressure to do so will be much higher than it is here.

The following are OK:

1. Discussing the requirements of a homework problem as long as no specific solution is discussed
2. Discussing general approaches to solving a problem as long as no specific solution is discussed
3. Using Excel samples from the textbook and class handouts.

The following are considered cheating (except with people in your own group on group assignments)

1. Discussing specific math or Excel formulations
2. Showing anyone your Excel spreadsheet
3. Looking at anyone else's Excel spreadsheet
4. Having anyone else (including chatGPT) produce an Excel spreadsheet for you
5. Having anyone else (including chatGPT) correct your Excel spreadsheet for you
6. Copying any Excel spreadsheet you find on the web
7. Using solutions from past courses or the solutions manual

To best support your own learning, you should complete all graded assignments in this course yourself, without any use of generative artificial intelligence (AI). Please refrain from using AI tools to generate any content (text, video, audio, images, code, etc.) for an assignment or classroom exercise. Passing off any AI generated content as your own (e.g., cutting and pasting content into written assignments, or paraphrasing AI content) constitutes a violation of CMU's academic integrity policy. If you have any questions about using generative AI in this course please email or talk to me.

You are not permitted to be in possession of any assignments, quizzes or exercises from another student either from the current semester or from past semesters whether they are electronic or paper. Possession of or sharing such files constitutes an infraction of the academic integrity policies of this course.

The midterm and final exams must be done alone, with no help from others.

There are unscrupulous book sellers on the Internet who will sell you a copy of the Solutions Manual for our text book. This is illegal in the U.S., and our book publisher actively seeks out, and sues, such vendors and sometimes those who buy these illegal books. I cannot prevent you from buying an illegal book. However, using such a book usually results in great homework scores and really bad exam scores. Since the exam scores are much more heavily weighted in this course, your best plan for a good final grade is to work all of the homework problems yourself. Also, there are often errors in the solutions manual, some of them placed there on purpose by the author, "designed" to let us discover who is cheating in this way.

Schedule of topics:

Week 1:
Lec 1: Linear optimization
Lec 2: Linear optimization
Friday: Review session on linear optimization

Week 2:
Reminder: HW 1 (linear optimization) due 8pm EST Wed on canvas
Lec 1: Network Flow Problems
Lec 2: Network Flow Problems
Friday: Review session on network flow problems

Week 3:
Reminder: HW 2 (network flow problems) due 8pm EST Wed on canvas
Lec 1: case study and 2-stage (or stochastic) LPs
Lec 2: Review for midterm
Friday: Review session on 2-stage LPs

Week 4:
Lec 1: Integer Programs
Lec 2: Integer Programs
Friday: **midterm: covers weeks 1-3 (Linear Optimization, Network flow models, and 2-stage LPs)**

Week 5: **No review session Friday (university holiday)**
Lec 1: Integer Programs
Lec 2: Simulation
No review session

Week 6:
Reminder: HW 4 (integer programs) due 8 EST Wed on canvas
Lec 1: Simulation
Lec 2: Simulation
Friday: Review session on simulation

Week 7:
Reminder: HW 4 (simulation) due 8 EST Wed on canvas
Lec 1: Review for final exam
Lec 2: Time series forecasting (bonus lecture)
No review session

Final exam week: (exam date is TBD)
final exam covers weeks 4-6 (Integer programs and simulation)