Course Syllabus

MISM 95.760: Decision Making Under Uncertainty
Fall 2018 Mini 1
6 units

Important:

• On Friday of week 4 (Sep 21) we will use the review session to hold the midterm. You must attend the midterm.
• On Friday of week 7 (Oct 12) we will use the review session to hold the final exam. You must attend the final exam.
• In the other weeks, the TAs will lead an optional review session during the review session time.

Important Dates:

Midterm: 1:30-2:50PM, Fri Sep 21
Final Exam: 1:30-2:50PM, Fri Oct 12
No class on Mon Sep 3. (Tue class will end early on this week to synchronize)

Instructor: David Choi, davidch@andrew.cmu.edu,
Office hours: Tue 4:30-5:45pm, HBH 2118F (conference room)

How to contact the instructor:
Best way: ask me after class (or even better, during class it pertains to the course material!) or office hours
Medium: email. The more effort you put into explaining your question, the more likely I’ll understand enough to help without giving away any answers. I will not “check your spreadsheet” for you over email.
Worst way: interrupt me when I’m working on something else. I’ll probably decline to help.

Teaching Assistants:

(TBD)

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.

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


New copies of this book include a license card for the Risk Solver Platform software. We will only use this software in the last two weeks of the course. Instead of acquiring a license, you can use the Heinz Virtual Labs instead if you wish (http://www.heinz.cmu.edu/computing-services/virtual-labs/index.aspx).

The 7th edition of the textbook is also fine for the course. 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.

There are 2 copies of the 7th edition textbook on reserve at the Sorrells library circulation desk.
There are also 2 copies of the 6th edition textbook on reserve at the Hunt library circulation desk. Call number: T57.62.R34 2012. (The Hunt library copies are actually there for another class, but you are free to use them as well.)

**Homework:** There will be 4 homeworks:

- HW 1: due 6 PM, Wed Nov 1 (submit electronically on Blackboard)
- HW 2: due 6 PM, Wed Nov 8 (submit electronically on Blackboard)
- HW 3: due 6 PM, Wed Nov 22 (submit electronically on Blackboard)
- HW 4: due 6 PM, Wed Dec 6 (submit electronically on Blackboard)

**Late homeworks will be subject to “horrible and unspeakable” penalties. If you have a potential conflict, submit your HW a day or two early instead.**

Homeworks should be submitted electronically, via blackboard. 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.

The homeworks are already available on canvas. I have annotated each homework question with the lecture that covers the relevant material, so that you can attempt the question right after that lecture if you want. I recommend this as a good way to stay on top of the course and to identify weak spots in your understanding.

Homeworks must be done alone.

**Exams:** There will be 1 midterm and 1 final exam.

**The midterm and final will be held during the same time slot as the review session, Fri 1:30-2:50pm.** This means you should not schedule another class during this time!

The exams will be closed book, closed note, and closed computer. We will provide a formula sheet ahead of time, and you can add handwritten notes to this sheet if you like before the exam. You can also bring a simple calculator that cannot connect to the internet (no smartphones or tablets). A ruler may also be helpful for drawing graphs.

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 the lecture. Instead, you will need to think about why the question is a little different from what you have seen before, and decide how to adapt what you have learned. Also, 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.

The exam questions tend to have a “whiteboard technical interview” feel to them. They will definitely be based on the course material, but we are looking to determine your technical/critical thinking ability, not whether you can short-term memorize things. Being comfortable in such an environment may be important for your future job search.

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

- HW: 30%
- midterm: 30%
- final exam: 40%
Grades will be curved to conform to Heinz college standards. Typically, the curve usually 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!

**Attendance:** Lecture attendance is not required, nor part of your final grade. However, the course moves quickly and if you should fall behind, it may be extremely difficult to catch up. Laptop usage will be permitted during lectures.

**Email Policy:** You should cc all 5 TAs on any email that you send to me, especially for questions regarding how the HW was/will be graded. The TAs (who are grading the HWs) will be more knowledgeable than I will be on this issue.

**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 is not permitted in this class. Cheating will be treated very seriously.

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:
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 produce an Excel spreadsheet for you
5. Having anyone else 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

A student who shares code with another student will be treated the same as the person who does the copying. Keep your own work safe.

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.

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
Week 2:
No class Monday (labor day)
Lec 2: Linear optimization
Friday: Review session

Week 3:
Lec 1: Network Flow Problems
Lec 2: Network Flow Problems
Reminder: HW 1 due 6pm Tue on Blackboard.
Friday: Review session

Week 4:
Lec 1: 2-stage linear programs
Lec 2: Review for midterm
Reminder: HW 2 due 6pm Tue on Blackboard
Friday: **midterm: covers Linear Optimization and Network flow models**

Week 5:
Lec 1: Integer Programs
Lec 2: Integer Programs

Week 6:
Lec 1 and 2: Simulation
Reminder: HW 3 due 6pm Tue on Blackboard
Friday: Review session

Week 7:
Lec 1: Time series forecasting (optional material)
Lec 2: Review for Final Exam
Reminder: HW 4 due 6pm Tue on Blackboard
Friday: **Final exam: covers 2-stage LPs, Integer Programs, and Simulation**