

# 88-223: Decision Analysis & Decision Support Systems

Spring 2014

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Instructor: John Gasper

*Office:* CMUQ 2160

*Email:* gasper@qatar.cmu.edu

*Course Time / Location:* Monday and Wednesday 3:00-4:20pm; Room 2147

*Office Hours:* Monday and Wednesday 1-2pm and 4:30-5:30pm

In general, I have an open door policy: if my door is open and I'm not meeting with someone, you are welcome to come in and meet with me. **If my door is closed, I am not available** (out of the office, working, etc). On non-teaching days, I'm often quite busy with research and not available. I highly encourage you to **set up an appointment** to make sure I will be available.

Assistants:

*Aniish Sridhar* email: aniishs@andrew; office hours: TBA

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*Required Materials:*

- *Practical Management Science* by Winston and Albright
- This course will stress the use of Microsoft Excel across a variety of applications
- A reasonable and basic calculator. Not a laptop. Not a phone.

## Course Description and Goals

This course is an introduction to the methods and practices of decision analysis. It is my goal that at the end of the semester you will have a mastery of several areas. You will learn ways to aid managerial decision making by applying a scientific approach to decisions problems that involve quantitative factors. These tasks involve

- Applying a scientific approach: defining the problem, gathering data, formulating a model of the problem (a selective abstraction of the reality).
- Given this abstraction, you will then be asked to use Microsoft Excel for evaluating potential solutions, analyze the model's alternatives and perform a sensitivity analysis.
- You will gain a basic understanding of a set of procedures including: project valuation analysis, Bayesian decision analysis, Monte Carlo simulation, and if time allows linear programming.

## Attendance and participation

It is easy to take the attitude that your job (and mine) is accomplished with your mastery of the material of the course, and consequently that I need not bother with whether you show up for class. Realistically, we know that in general the vast majority of students who feel they don't need to come to class are mistaken, but only find that out, to their shock, as they do poorly on exams. I will expect you in class and I expect you on time. This not an "easy" course and a large part of the lecture material will not come from the text. The exams will cover both sets of material.

I will occasionally take attendance in lecture as well as give unannounced quizzes. I will also make an effort to get to know you. It is also fair to say that those who sit near the front and participate in class will get the benefit of the doubt when their grades are below a borderline.

## Cell phones and laptops

I understand that many of you will use a laptop to take notes during the lecture. This is fine. I am also willing to bet that many of you will check your email, the news, etc. This is not fine.

I also ask that you turn off your cell phone during class. If there is an emergency and you might need to be contacted, please talk to me before class. Otherwise there should be no reason to hear a phone ring or see someone send a text.

## Course Logistics

This course has both a Blackboard and a Piazza site. Both sites should set up and functioning. Handouts, problem sets, updated syllabi and announcements will be posted and you are responsible for checking the site regularly. The TA and I will maintain the Piazza discussion board. If you have any questions about the techniques, problem sets, etc, ask them on the discussion board. It has been my experience that one of the best ways to learn something is to try to explain it to someone else. So I will expect you to try to answer the questions that other students ask; doing so will aid the participation element of your grade, and, while unofficial, will aid you if you're near a borderline at the end of the semester.

I welcome questions during class: if you have a question or a comment, please let me know. I will generally pause after each slide and ask if there are any questions – please feel encouraged to raise questions during class. In addition, please seek out help from the TA. We are here to help you learn the material.

I hope you will meet with me during the semester, especially if you have questions about the course material. I welcome questions during class: if you have a question or a comment, please let me know. I will generally pause after each slide and ask if there are any questions – please feel encouraged to raise questions during class. I hope you will feel free to raise questions if you are confused or want me to talk more about some topic. There is a lot of material in the course – please help me teach you what you want to know!

## Grades

Each student's grade for the course will be based on the following:

1. *Homework* 20%
  - Since this is a fundamental aspect of the course, you should treat every assignment as a project you are presenting to a business client or manager.
2. *Midterm Exam 1* 15%
3. *Midterm Exam 2* 15%
4. *Comprehensive Final Exam* 20%
  - You are allowed to the notes you take during the class on these exams. You will also be allowed the use of a basic calculator. **Laptops and calculators on phones (etc.) are not allowed.**
5. *Project* 20%
6. *Participation* 10%

Your homework is one of the primary ways the quality of your work will be judged in this class. It is designed to prepare you for solving the types of problems that you will likely encounter in an actual business decision-making environment. In such environments, the quality and appearance of your work take on a level of importance commensurate with your results. If your employers, co-workers, and clients cannot understand your work easily, it is of little use to them. **In some cases, you will find that you spend more effort on communicating your results than obtaining them.** Accordingly, in this class, we will place a significant emphasis on the total quality of your work. This includes not only content, but also appearance. You are responsible for making sure that your work is done, and any excuses for such work not being done are just that: excuses. We will make you aware of the deadlines and of the requirements for the assignments. Beyond that, the responsibility is yours to see that things get accomplished in a manner such that you would not be ashamed to sign your name to it. To this end, the following rules will govern your work in this class:

1. Your lowest homework score will be dropped when calculating your final grade.
2. No late homework. Since the lowest scores will be dropped I will have a zero tolerance for late assignments. Printers jam, printers run out of paper, computer programs crash, assignments get lost, people get sick, holidays and trips come and go, all of these things happen to everyone. Work around them. If you are not allowing any room for contingencies, that is poor planning on your part. These excuses, and others, will not work in this class. You have the entire semester schedule in front of you. You can always plan ahead. See me in advance if you think there might be a conflict.
3. Homework is due within the first 5 minutes of class. After 5 minutes, it is considered late and will not be accepted.
4. If your homework is more than one page, it must be stapled.
5. Do not submit your homework assignments via e-mail or via Blackboard. They are due in hard copy, but I highly recommend keeping an electronic copy.
6. Presentation matters. Your homework must be typed. If you choose to include a excel spreadsheet, must be accompanied with a clear and full description of the answer to the question.
7. Random grading. For each homework set, a subset of the problems will be selected for grading. It could be one problem, or it could be every problem. Your grade for the homework will be based on those problems graded. Solutions will be provided for all the problems.
8. **Group work is fine, but you must include (1) your own write up (not a copy of your group members) and (2) list the members of your group.**
9. In general, try to figure things out on your own first. Visit Blackboard. I've set up a discussion board for the class on Piazza. Any question you might ask me, you should ask there first, unless it is of a personal nature. I am happy to help, but you'll learn the most by trying to solve problems on your own first. You will also learn a lot by trying to explain things to others. Therefore part of your participation grade will come from your **responses** to questions asked on the discussion board.

## Academic Integrity

You should feel encouraged to talk with your class mates about the problems on the problem sets, but do not copy even parts of someone else's work. The homework is graded on a check system to encourage you to attempt the homework yourself. While I highly encourage you to use the Piazza discussion site, if you speak with anyone else (including a TA/CA or the ARC) regarding the homework, I require that you list it.

The CMU-Q policy on cheating and plagiarism has been updated and I would like to point out the following text: *In all academic work to be graded, the citation of all sources is required. When collaboration or assistance is permitted by the course instructor(s) or when a*

*students the services provided by Academic Development, the Global Communication Center, and the Academic Resource Center (CMU-Q), the acknowledgement of any collaboration or assistance is likewise required. This citation and acknowledgement must be incorporated into the work submitted and not separately or at a later point in time. Failure to do so is dishonest and is subject to disciplinary action.*

I am very sensitive to cheating and plagiarism; my policy is that cheating of any kind will not be tolerated. If you have any doubt about your actions, please ask me. I strongly encourage you to review Carnegie Mellon's policies regarding academic integrity. A good online source for the academic integrity policy is:

[http://www.studentaffairs.cmu.edu/theword/acad\\_standards/integrity.html](http://www.studentaffairs.cmu.edu/theword/acad_standards/integrity.html)

## Weekly readings and course outline

Class	Date	Topic	Reading	Assignment
1	13-Jan	Introduction	WA 1, 2	
2	15-Jan	Engineering Economics: NPV	HO/WA 2	
3	20-Jan	Engineering Economics: Applications		HW 1 due
4	22-Jan	Engineering Economics: IRR	Handout	HW 2 due
5	27-Jan	Decision Analysis: Uncertainty	WA 10	
6	29-Jan	Decision Analysis: Risk	WA 10	HW 3 due
7	3-Feb	Decision Analysis: Sensitivity	WA 10	
8	5-Feb	Decision Analysis: Value of Information	WA 10	HW 4 due
9	10-Feb	Decision Analysis: Bayes Theorem	WA 10	
10	12-Feb	Decision Analysis: Subjective Probability	WA 11	Intro Proj.
11	17-Feb	Decision Analysis: Utility	WA 10	HW 5 due
12	19-Feb	Decision Analysis: Utility	WA 11	
13	24-Feb	<b>MIDTERM 1</b>		
14	26-Feb	Decision Analysis: Multiattribute Choice	WA 9	
X	3-Mar	<b>SPRING BREAK</b>		
X	5-Mar	<b>SPRING BREAK</b>		
15	10-Mar	Decision Analysis: Multiattribute Choice	WA 9	
16	12-Mar	Decision Analysis: Biases in Judgment	WA 9	HW 6 due
17	17-Mar	Simulation: Introduction	WA 10	
18	19-Mar	Simulation: Random Number Generation	WA 11	
19	24-Mar	Simulation: Excel	WA 11	HW 7 due
20	26-Mar	Simulation: @Risk	WA 11, 12	
21	31-Mar	Simulation: Applications	WA 11, 12	HW 8 due
22	2-Apr	Simulation: Applications	Handout	
24	7-Apr	<b>MIDTERM 2</b>		
25	9-Apr	Optimization: Linear Programming	WA 3, 4	
26	14-Apr	Optimization: Solver	WA 3, 4	
27	16-Apr	Optimization: Nonlinear Programming	Handout	HW 9 due
28	21-Apr	Optimization: Applications	WA 7	
29	23-Apr	Project Day	HO, WA 8	HW 10 due
	25-Apr	Project Reports are Due at Noon		
	TBA	<b>Final Exam</b>		