

DECISION MODELING AND APPLICATIONS – SPRING 2008

COURSE: MBAC6080 (800), 3 Credits.

MEETING TIMES: MW11:00-12:20pm, KOBL S125.

INSTRUCTOR: Thomas Vossen,
E-mail: Thomas.Vossen@Colorado.edu.
Phone: (303)735-2446

OFFICE HOURS: MW 4:30-6:00pm (KOBL S444) or by appointment.

RECITATION: TR 12:30-2:30pm (KOBL S129)
Review session and/or additional office hours by Teaching Assistants

TEXTBOOK: Cliff T. Ragsdale,
Spreadsheet Modeling & Decision Analysis, 5th Edition, 2007.
Thomson South-Western.

WEB SITE: <http://myleeds.colorado.edu/>

FINAL EXAM: Wednesday April 23, 9:30-12:15am

OVERVIEW: This course is designed as an introduction to Decision Science, which considers the application of mathematical modeling and analysis to managerial problems. Applications of Decision Science, which is also known as Management Science or Operations Research, have proven to be extremely useful in a variety of business settings, from operations, marketing, and accounting, to finance.

This course will focus on Decision Science from a modeling perspective, and emphasize a structured approach to problem-solving in management situations. The primary objective of this course is to help students become proficient in developing models and in executing model-based analyses. In other words, students will learn how to translate business situations into formal models, and to investigate those models in an organized fashion.

To achieve this objective, the course will introduce common analytic methods, discuss their strength and weaknesses, and show how they can be used to help managers make better decisions. Throughout the course, students will be exposed to a variety of applications in which these models can be applied effectively. Moreover, the course will show how to use Excel spreadsheets and other software packages effectively for business modeling analysis.

PREREQUISITES: It is assumed that each student has a basic familiarity with EXCEL.

EVALUATION: There are three principal requirements for the course: Exams, Homework, and Cases/Class Participation.

1. Exams

During the semester, there will be one midterm exam during regular class hours and one final exam. The final exam is comprehensive for the entire course. The midterm and final examination will be closed book and closed note exams.

The final exam will be optional for students who choose to perform a project assignment. The project assignments should be done by teams of up to four persons, and should consider the application of Decision Science in an actual company. Students who are interested in this option should submit a project proposal by February 20. See the Project Guidelines at the end of this syllabus for more detail.

2. Homework

There are ten homework assignments, but only eight will count toward your final grade -- the lowest two homework scores will be dropped. The reason for doing this is to accommodate interview trips, project deadlines, personal emergencies, and other unforeseen circumstances. Please note that you are still responsible for the material covered on dropped assignments at exam time. Assignments are due on **Wednesdays**.

Some of the homework exercises may require the use of Excel or other software tools. If you submit your assignment in a computer file, submit only one file and do not mix file types (e.g., some Word, some Excel). Format the file so that I can easily print it out without problem. In Excel, put problems on separate spreadsheets (tabs) and format spreadsheets so that they print properly using File|Print|Entire-Workbook. If you submit homework assignment by e-mail, use the following subject header:

MBAC6080 Day HW<xx> <student name>

Note: it often is easier to write up assignments by hand and include selected computer printouts than to format a computer file -- you decide.

Homework exercises may be discussed with other members of the class; however, each person must prepare his/her own work. Homework is due at the beginning of the designated class period. Late homework will not be accepted.

4. Class Participation and Cases

I expect each student to have prepared cases before they are discussed in class. On the day a case is discussed in class, a brief summary (approximately 1 page) of your thoughts, ideas, approach, and questions is due before the start of class. Late notes will not be accepted.

From time to time I will sample attendance; repeated absences (or late arrivals) may result in a reduced grade. Attendance is especially important because we may have frequent in-class case discussions, games or guest lecturers, and participation/attendance will form part of your grade.

GRADING:	Homework	30 %
	Midterm Exam	30 %
	Final Exam	30 %
	Class Participation and Cases	10 %

ACCOMODATIONS:

If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and www.Colorado.EDU/disabilityservices

Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at www.colorado.edu/disabilityservices.

Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, students who have conflicts should contact me as soon as possible (i.e. at least two weeks in advance) so that arrangements in accordance with the campus policy can be made. Policy details can be found at http://www.colorado.edu/policies/fac_relig.html

CLASSROOM POLICY:

It is expected that each student will have read the assigned material before he/she comes to class.

Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See polices at

<http://www.colorado.edu/policies/classbehavior.html> and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code

HONOR CODE:

All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; 303-725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>

SEXUAL HARASSMENT POLICY:

The University of Colorado at Boulder policy on Discrimination and Harassment (<http://www.colorado.edu/policies/discrimination.html>), the University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships applies to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>

TENTATIVE COURSE SCHEDULE:

Date	Topic	Text Reading	Assignment
1/14, 1/16	Introduction	Chapter 1	HW1 (due 1/23)
1/23	Introduction to Linear Programming Models	Chapter 2	HW2 (due 1/30)
1/28, 1/30	Formulating Linear Programming Models <i>Case: Al-Manakh Stockmarket</i>	Chapter 3	HW3 (due 2/6)
2/4, 2/6	Analysis of Linear Programming Models	Chapter 4	HW4 (due 2/13)
2/11, 2/13	Network Models and Integer Programming	Chapter 5,6	HW5 (due 2/20)
2/18 2/20	Network Models and Integer Programming	Chapter 6,7	
2/25, 2/27	<i>Exam Q&A</i> MIDTERM EXAM		
3/3, 3/5	Decision-Making under Uncertainty <i>Introductory Concepts</i>	Chapter 15	HW6 (due 3/12)
3/10, 3/12	Decision-Making under Uncertainty: <i>Inventory Management</i> <i>Case: Sport Obermeyer</i>	Handouts	HW7 (due 3/19)
3/17, 3/19	Decision-Making under Uncertainty: <i>Revenue Management</i> <i>Exercise: American Airlines</i>	Handouts	HW8 (due 4/2)
3/24, 3/26	CLASS CANCELED - Spring Break		
3/31, 4/2	Decision-Making under Uncertainty: <i>Risk Management</i> <i>Guest Lecturer: Vose Consulting</i>	Chapter 12	HW9 (due 4/9)
4/7, 4/9	Decision-Making under Uncertainty: <i>Simulation</i> <i>Case: Calambra Olive Oil</i>	Chapter 12	HW10 (due 4/16)
4/14 4/16	Project Presentations, Course Review		
4/23	FINAL EXAM		

PROJECT GUIDELINES:

Students may choose to complete a term project in lieu of the final exam. The project provides an opportunity to analyze the topics discussed in the course in a real-world setting. A project should consider the application of Decision Modeling in an actual company or non-profit organization. To give you an idea of suitable project topics, the following is a sample of student projects in the last few years:

- Transportation planning at Chlorox
- Mine processing at Newmont
- Course packet ordering at the CU Bookstore
- Ranking prospective students for MBA admissions at the Leeds School of Business
- Managing map inventory at National Geographic
- Assigning teachers within the Boulder Valley School District
- Workforce Scheduling at McGuckin Hardware

Projects may be done by teams of up to four persons. I will, however, consider larger groups when teams can make a solid case that additional manpower is needed to successfully complete the project.

For each project, the following elements should be addressed:

- What is the problem that is being addressed? Why is it relevant to the company, and how can a quantitative approach help.
- Has this (or a related) problem been studied already? If so, what were the main conclusions from these studies?
- What is the modeling approach/technique you have employed? Why did you choose this approach, and what were the data inputs you used?
- Which analyses did you perform with your model, and what conclusions can you draw from the results you obtained? How would your approach be used within a real-life setting?

The main deliverables for the course are an oral presentation and a written report, which are both due on the final day of classes

- Presentations are expected to be about 10 to 15 minutes in length with a 5 minute discussion period. You will be evaluated on how well you relate your experience to the course material as well as your presentation's effectiveness, organization, professionalism, and originality.
- The written report should be neatly formatted and aside from a title page, it should contain three parts. The first part should be an executive summary, which should be no more than 2 pages in length (double spaced). The second part will be the main body of the report. The main body of the report should contain a table of contents, and be appropriately divided into sections. While there is no page limit, I would expect that typical reports have a body length of 10 to 15 pages. Additional supporting material and/or exhibits could be included in an appendix.

The relevant project deadlines are as follows:

February 20, 2008:

- Project Proposals Due
Project proposal should include:
Team members
Company name
Problem description/overview
Project plan

March 19, 2008:

- Project Meeting with Instructor
Discuss: Project progress, Problems encountered, opportunities, etc.

April 18, 2008:

- Final Presentations

April 23, 2008:

- Final Project Reports Due

Week 2



Lecture Notes

[Lecture 2](#) (322.5 Kb)

Date Posted: 1/21/08



Suggested Reading

Chapter 2, Textbook



Assignments

[Homework 2](#) (43 Kb)

[Homework 2 \(updated, includes problem statement for Question 1\)](#) (44.5 Kb)

Carefully read the *Al-Manakh Stock Market* case handed out in class.

We will go over the case as an in-class exercise; issues you might want to think about are:

- How would you determine a method of allocating payments between traders using the example given in the case, while ignoring the asset breakdown?
- What is the most appropriate and fair rationale to guide disentangling payments?
- What constraints must be taken into account?
- How should different assets be treated?



[Suggested Reading: Wal-Mart gets back to basics](#)



[Suggested Reading: Math Will Rock Your World](#)



[Suggested Reading: Math That Helps Nearly Everyone Make Decisions](#)



[Suggested Reading: Michael Trick's OR Blog](#)

OK

Week 5



Lecture Notes

[Lecture 8](#) (640 Kb)

[Lecture 9](#) (650.5 Kb)

[Network Examples \(xls\)](#) (58.5 Kb)

Date Posted: 2/09/09



Suggested Reading

Chapters 5, 6 of textbook



Assignments

[Homework 5](#) (32.5 Kb)

[Pioneer Case](#) (255.48 Kb)

[Case Data \(Optional\)](#) (55 Kb)

[Case Questions](#) (31 Kb)

[Pioneer Supplement](#) (15.695 Kb)

Note: The case write-up has been canceled

Prepare a brief (1 or 2 pages, double-spaced) case report for the *Pioneer Hi-Bred* case handed out in class.

Notes:

- I do **not** expect you to answer all the assignment questions that are listed, but select 2 or 3 that you think are particularly relevant;
- I should also emphasize that I do **not** expect you to come up with an actual LP formulation; the idea is to give some thought about what an LP formulation would look like (what decisions, etc.), and how you would go about structuring the problem.



[An Example of Optimization in Sustainability](#)

The Wind Deployment System (WinDS) model developed at NREL. Make sure to take a look at the actual LP formulation!



[greenOR](#)

A blog on the intersection of operations research and sustainability



Carbon Neutral Initiative

A Message from Matt:

Greetings!

Wednesday in Decision Modeling we'll devote the first 20 minutes to calculating our individual "baseline" carbon footprints. Prior to, we encourage you to join our Group at:

<http://calc.zerofootprint.net/calculators/boulder>

- 1: create an account
- 2: click the "My Community" option on the top of the page
- 3: click on the "MBA Class of 09" (you'll see a picture of Koebel hall)
- 4: click "Group Gtats", then "Join this group"

As you'll see, the calculator is Boulder-specific. Feel free to calculate your footprint before Wed. and please be as accurate as possible. We'll answer questions and fine tune our calculations in class.

Note: To support this initiative, I will apply 8 points of extra credit to Homework 5 if you complete and submit these calculations

OK