Columbia Business School

B6015: Decision Models
Summer 2008

Instructor

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Course Description

This course provides an introduction to models for managerial decision-making. The emphasis of the course will be on models that are widely used in diverse industries and functional areas, including finance, accounting, marketing, and operations. Applications will include advertising planning, revenue management, asset-liability management, environmental policy modeling, portfolio optimization, and corporate risk management, among others.

The aim of the course is to help students become intelligent consumers of these methods. To this end, the course will cover the basic elements of modeling: how to formulate a model and how to use and interpret the information a model produces. The course will attempt to instill a critical viewpoint towards decision models, recognizing that they are powerful but limited tools.

The applicability and usage of computer-based models has increased dramatically in recent years, due to the extraordinary improvements in computer, information, and communication technologies. The rise of personal computers, intuitive interfaces (such as spreadsheets), and large databases has made modeling far more accessible to managers. Information has come to be recognized as a critical resource, and models play a key role in deploying this resource, and in organizing and structuring information so that it can be used productively.

Course Materials

There is no required textbook for the course. Lecture notes and reading materials will be distributed in class.

The web page for the course can be found on Angel at http://angel.gsb.columbia.edu/. We will use Angel extensively, and the page will be updated frequently as the course progresses, so please check it often. Lecture notes, Excel files, homework, solutions, announcements and supplementary materials will be posted online.

The following book is a good resource covering many of the modeling concepts and techniques we will discuss in the class. It is recommended, and copies are available in the library.

- Powell and Baker, *The Art of Modeling with Spreadsheets*, John Wiley & Sons, 2004.

- Powell and Baker, *Management Science: The Art of Modeling with Spreadsheets*, Wiley, 2007 [second edition]

Computer Software

We will use spreadsheets fairly extensively throughout the course. In particular, we will utilize the Microsoft Excel for Windows. This package has extensive optimization capabilities built-in. At the beginning of the course, you should make sure that you have the following add-ins for Excel installed on your computer:

1) *Solver*, an Excel add-in that allows you to solve different types of optimization problems. Solver is part of the standard Excel distribution.

2) *Crystal Ball*, an add-in for Excel created by Decisioneering, Inc. that makes it much easier to run simulations in a spreadsheet.

Computer Services should have installed these two pieces of software on your notebooks when you arrived at CBS. To check whether or not you have these add-ins, choose the Tools/Add-ins menu option in Excel. In the box that appears, you should have a line for each add-in, and the corresponding boxes should be checked. If you do not have a line for an add-in, please go to Computer Services to have it installed. **Do not install the software from the CD that comes with the Powell & Baker book**.

Review Sessions

I will hold review sessions every Friday between 10:45am and 12:15pm in Uris 142, with the following exceptions:

- There will be no review sessions on May 23 and May 30 due to class rescheduling.
- The review session on June 13 will be held in Uris 140.

The review sessions will be used to answer questions related to the material covered in class and to go over practice problems. The first review session will be devoted to covering basic Excel spreadsheet skills that are required throughout the course.

Course Work

There will be several homework assignments and one project assignment. Two short assignments (Shelby Shelving and Bond Return) are individual assignments. The remaining assignments (three homeworks and the project) are to be done in groups. In addition to these assignments, there will be a comprehensive final exam.

The dates and weighting of assignments/exams is as follows:

Assignment	Distributed	Due	Weight
Shelby Shelving Assignment (*Individual*)	Lecture 1	Lecture 2 (May 14)	5%
Optimization Homework I (*Group*)	Lecture 2	Lecture 4 (May 23)	6%
Optimization Homework II (*Group*)	Lecture 4	Lecture 6 (May 30)	7%
Project Proposal (*Group*)	Lecture 1	Lecture 7 (June 2)	N/A
Bond Return Assignment (*Individual*)	Lecture 7	Lecture 8 (June 4)	5%
Simulation Homework (*Group*)	Lecture 8	Lecture 10 (June 11)	7%
Project Presentation (*Group*) (See the project handout for details)	Lecture 1	Lecture 12 (June 18)	20%
Final Exam		June 24	45%

In addition, 5% of the final grade will be assigned on the basis of class participation and individual professional conduct. I expect all class participants to arrive to class on-time and prepared, and to stay involved during class sessions. Every conceivable effort should be made to avoid absences, late arrivals or early departures. In cases when these are unavoidable, they need to be communicated to me in advance.

Practice Problems

A set of practice problems, solutions and corresponding spreadsheets will be posted on ANGEL under Session 1. Many of these practice problems were based on past midterm and final examination questions. None of these practice problems will be collected, they are meant only for your personal enjoyment.

Exam

There will be a four-hour final exam. The exam will be open book and open notes. The *majority* of the points on the exam will be given for correct methods and analysis; correct numbers will only count for a small portion of the points.

Notebook Computers

Notebook computers will be used in this course, and students are strongly encouraged to bring them to class. The network connections in the classroom will be turned off during the class hours.

Course Schedule

Lecture #	Topic
Lecture 1	Introduction to Decision Models
Lecture 2	Modeling Examples: Advertising Spending and Cash-Flow Management
Lecture 3	Sensitivity Analysis and Cash-Flow Problems
Lecture 4	Non-Linear Models: Revenue Management in Retail
Lecture 5	Integer Models: Capital Budgeting and Plant Location
Lecture 6	Decentralized Optimization: Pollution Reduction
Lecture 7	Introduction to Decision Making under Uncertainty
Lecture 8	Simulation Examples: Pricing Asian Options; Flu Vaccine Supply
Lecture 9	Managing FX Risk: Comparing Alternatives in Simulation
Lecture 10	Portfolio Optimization and Hedging
Lecture 11	Introduction to Value-at-Risk
Lecture 12	Project Presentations