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Overview

Many managerial decisions -- regardless of their functional orientation -- are increasingly based on analysis using *quantitative* models from the discipline of management science. Management science tools, techniques and concepts (e.g., data, models, and software systems) have dramatically changed the way business operates in manufacturing, service operations, marketing, and finance. This subject is designed to introduce students to the various ways of modeling, or thinking structurally about, decision problems in order to enhance decision-making skills.

It is impossible to teach you all there is to know about management science techniques in only part of a semester; rather, our goal is to enable you to become *intelligent users* of management science techniques. In that vein, emphasis will be placed on *how*, *what* and *why* certain techniques and tools are useful, and what their ramifications would be when used in practice, all in concert with the overarching goal for you to become excellent managers. This will necessitate some mechanical manipulations of formulas and data, but it is not our goal for you to become adept handlers of mathematical equations and computer software.

The objectives of the course are as follows:

- To enable the students to find some structured ways of dealing with complex managerial decision problems
- To introduce students to simple decision models and management science ideas that provide powerful and (often surprising) qualitative insights about a large spectrum of managerial problems
- To provide students with tools for deciding when and which decision models to use for the specific problems
- To give the students a feel for the kinds of problems that can be tackled using spreadsheet modeling and decision analysis
- To provide the students with more powerful ways of using spreadsheets which will be a ubiquitous tool in their managerial careers

Who Should Take the Course?

The course is particularly recommended to those interested in a career in management consulting, supply chain management, operations and logistics, electronic market design, and corporate finance. The main topics include optimization, decision making under uncertainty and simulation. The emphasis is on models that are widely used in diverse industries and functional areas, including operations, finance, accounting and marketing. *It is not advisable for students with a graduate level knowledge of operations research/management science to take this course.*

Prerequisites

There are no official pre-requisites for this course, but it is expected that students will have prior exposure to probability and statistics with be versatile with the use of Microsoft Excel spreadsheets. If you are not familiar with Microsoft Excel, consider taking classes from the campus office of information technology. More information is available at: http://www.inform.umd.edu/CompRes/Training/Peer_Training/

Textbook:

Practical Management Science by Winston, and Albright, 2nd Edition (Duxbury, 2000).

There will also be a Course Packet that can be purchased online, as well as handouts on cases, and other material needed to solve cases.

Class Procedure:

It is expected that each student will have read the assigned material before he/she comes to class for the given day. The class can be described as a mix of lectures, cases, and computer simulations. Students are encouraged to discuss their own work experience when relevant to the class material, even during lectures.

I highly recommend that you print out the day's lecture notes before coming to class. I will frequently make use of the whiteboards for developing equations, drawing figures, etc.

Academic Integrity

The University's *Code of Academic Integrity* is designed to ensure that the principles of academic honesty and integrity are upheld. All students are expected to adhere to this Code. The Smith School does not tolerate academic dishonesty. All acts of academic dishonesty will be dealt with in accordance with the provisions of this code. Please visit the following website for more information on the University's Code of Academic Integrity: <http://www.shc.umd.edu/code.html>

On each assignment you will be asked to write out and sign the following pledge. "*I pledge on my honor that I have not given or received any unauthorized assistance on this exam/assignment.*"

Special Needs:

Any student with special needs should bring this to the attention of the instructor as soon as possible, but not later than the second week of class.

Grading

Your course grade will be based on homework assignments, a term project, a final exam and class participation, as follows.

- Case Assignments: 30% (3 cases at 10% each).
- Term Project: 30%
- Final Exam : 30%
- Class Participation: 10%.

Cases – To be Handed In:

- Each case assignment should be done in groups of 3. Your partner for each homework have to be different.
- All written assignments must be handed in at the beginning of class on the day they are due, so you will probably want to make a copy of your assignment for reference during class. All written assignments will be graded and returned to you.
- You will be called upon to present your solution approach and managerial recommendations during the class. Please post a copy of your spreadsheet on BlackBoard via the Digital Dropbox in order to facilitate this discussion.

Term Project:

The motivation behind the term project is to find new and innovative applications, where decision-making techniques and technologies can be used to improve existing processes and/or create business opportunities. Some examples include marketing applications on the web, supply chain management, or telecommunications. Your term project is to be done in groups of 3 should include a description of the application, a detailed analysis of where the opportunity lies for using decision-making techniques to create value, the types of data available, and a proposal outlining the steps involved in implementation. In addition, each group must make a 20 minute in-class presentation during the last week of classes.

Final Exam:

A take-home comprehensive final exam will be given out on the last day of class and will be due at 5pm one week later. The exam is to be done individually, without the assistance of any of your classmates or friends.

Class Participation

Relative differences in technical background will not be a criterion. I will rely heavily upon interactive discussion within the class. Students will be expected to be familiar with the readings, even though they might not understand all of the material in advance. In general, questions and comments are encouraged. Comments should be limited to the important aspects of earlier points made, and reflect knowledge of the readings.

Class Participation includes coming to class prepared to discuss assigned problems.

At the end of some class, I will assign you some homework problems. These assignments are not to be turned in, but will be discussed in class. They are designed to help you learn the mechanics of the methods discussed in class and to give you an opportunity to apply these concepts in a straightforward manner. Fully analyze the problem before class. Be ready to discuss it in class, with model equations formulated, the numbers computed, etc. I will cold-call on people, so please be ready. We will discuss the formulation of these problems in class. You may find it useful to discuss broad conceptual issues and general solution procedures with others. If this is the case, then I enthusiastically recommend that you do so. The objective here is to learn.

Class participation includes punctuality in attendance. It is expected that you arrive, be seated, and be ready for class on time, and to stay in class for the entire session. Arriving late is inconsiderate to fellow students as well as to the instructor. Late-comers also miss announcements, handouts, and miss the initial thrust of the class. I ask that you use a name card for the first few weeks until I learn your names.

Class participation also includes maintaining a professional atmosphere in class. This means utilizing computers and technology suitably (silencing wireless devices, no web-browsing or emailing), and refraining from distracting activities during class (side conversations or games).

I will evaluate your classroom participation on the basis of the extent to which you contribute to the learning environment. (Demonstration of mastery of advanced topics at inappropriate times does not help create a positive learning environment, neither does asking questions about things that have nothing to do with what is being covered in class at that time.) However, correcting the professor when he/she makes a mistake and asking what appear to be “dumb questions” about what is being covered both do help! In the case of so-called “dumb questions”, very often half of the class will have the same questions in mind and are relieved to have them asked.

Software Laboratory

The software packages used in this class are provided in as an accompanying CD to this textbook; you will need to install the course software on your own personal computers. It is also highly advisable that you bring your computer with you to class (not for surfing the web or writing emails – but for in case exercises). While using Microsoft Excel, if a function you wish to use is not available, try going to Tools→Addins and check the addin you are trying to use.

Tentative Course Outline

Week	Topic	Required Reading	Cases
1	<i>Introduction to Spreadsheet Modeling</i> <i>Introduction to Optimization Modeling</i> Use of Excel-Solver Sensitivity Analysis SolverTable	Chapter 3	
2	<i>Linear Programming Models</i> Production Planning Financial Planning Currency Trading	Chapter 4	
3	<i>Linear Programming</i> Multi-Objective Decision Making/Goal Programming LP under Uncertainty	Chapter 9.1 – 9.3	MacPherson Case Hand-In*
4	<i>Network Models</i> Assignment Models Shortest Path Minimum Spanning Tree	Chapter 5	
5	<i>Network Models Continued</i> Critical Path Method & Crashing <i>Integer Programming</i>	Chapter 6	
6	<i>Integer Programming Continued.</i>		AT&T:Telemarketing Site Selection Case
7	<i>Nonlinear Optimization</i> Financial Portfolio Optimization Product Pricing	Chapter 7	Wharton Optim Management Hand-In*
8	<i>Decision Making Under Uncertainty</i> Introduction to Risk Analysis Introduction to Decision Trees (Use of Precision Tree)	Chapter 10 Pete Sampras Summer Job Handout	
9	<i>Decision Trees</i> Bayesian Updating of Beliefs Value of Information	Chapter 10	Merck Case
10	<i>Introduction to Simulation Modeling</i> (Use of @Risk)	Chapter 11	
11	<i>Simulation</i> Applications in Operations Applications in Marketing	Chapter 12	Casterbridge Bank
12	<i>Simulation</i>	To Hedge or Not to Hedge Case	
13	<i>Simulation</i> Applications in Finance		Offshore Drilling Inc. Hand-In*
14 & 15	<i>Term Project Presentations</i>	Just Modeling Through	

		Spreadsheet Errors: What we know – what we think we can do.	
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