UW ❀ BUSINESS SCHOOL

TMMBA 514: Decision Support Models
Summer 2005

Instructor: Mark Hillier
Office Hours: Monday evenings 5:00-6:00pm in Kirkland
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Course Description
This course introduces you to the concepts and methods of management science, which applies mathematical modeling and analysis to management problems. Our principal interest is to help you develop the skills necessary to build and evaluate models and to understand the reasoning behind model-based analysis. Spreadsheet packages now have features that allow managers to perform sophisticated quantitative analysis in the comfortable and intuitive environment of the spreadsheet. This gives managers the power of quantitative analysis tools without forcing them to use unfamiliar mathematical notation.

Required Materials
Hillier and Hillier, *Introduction to Management Science*, 2nd Edition, Irwin/McGraw-Hill, 2003.

Course Binder includes copies of class transparencies.

Course Binder
I have prepared extensive course notes that I use as overheads during lecture. These course notes include examples that we will work together in class and other lecture material. The course notes are not intended as material that you use to prepare for class; my intent is for them to make it easier for you to listen, ask questions, and participate in class, rather than take lots of your own notes during the lectures.

Software
Microsoft Excel (including Solver), Solver Table, and Crystal Ball.

Problem Sets
There will be three problem sets to be prepared by each student. Working with others in your study group is encouraged, however it is expected that you will make every effort to complete each assignment relying primarily on your own understanding of the material. The study group should be used to resolve difficulties that you cannot manage on your own. Information sharing should be in the form of discussion and explanation, and should not include copying of computer files. Each student should turn in his/her own solution to each problem set on Blackboard no later than the start of class on the day it is due. Please title the file as your lastname. If possible, include all spreadsheets in a single workbook on separate tabs. The problem sets will be graded and feedback returned through Blackboard.

Exam
The exam will be open book and open notes, but must be completed without assistance from any other person. You will be given approximately one week to complete the exam. After the exam is available, please refrain from discussing any aspect of this course with anyone besides the instructor or TA.

Grading Policy
The course grade will be based upon scores on the three problem sets and the final exam, using the following weights:

Problem Set #1:   10%
Problem Set #2:   15%
Problem Set #3:   15%
Final Exam: 60%

Topics
- Linear Programming
- Sensitivity Analysis
- Integer Programming
- Simulation with Crystal Ball

Schedule

Monday, June 20: Session #1 and #2
Skim: Text, Chapter 1
Read: Text, Chapter 2

Session #1: Modeling with Spreadsheets. In this session we will discuss the role of models in managerial decision making, including the use of spreadsheets, and provide an overview of the models and techniques to be covered in this quarter. We will then "jump right in" and develop a spreadsheet model that addresses a managerial decision to be made.

Session #2: Introduction to Linear Programming. Through a hands-on example (using Lego building blocks), we introduce the linear programming model. We will then discuss the use of the Solver feature in Microsoft Excel for modeling and solving such problems. We discuss the benefits and pitfalls of modeling a problem as a linear model. Finally, we examine the process of solving linear programs and basic properties of their solutions.

Tuesday, July 5: Session #3 and #4
Read: Text, Chapters 3 and 4
Read (but do *not* prepare): Case 3-1 "Prudent Provisions for Pensions", p. 102-103.
DUE: PROBLEM SET #1 (SUBMIT TO BLACKBOARD BEFORE CLASS)

Session #3: Prudent Financial Services Case Study
The objective of this case study is to improve students' ability to develop models in spreadsheets. We discuss the process of modeling, some guidelines for building good spreadsheet models, and techniques for debugging spreadsheet models.

Session #4: Formulation of Linear Programming Models
In this session we learn to recognize the various kinds of managerial problems to which linear programming can be applied. We will formulate linear programs that address problems from a variety of different business areas.

Monday, July 25: Session #5 and #6
Read: Text, Chapters 5 and 9
DUE: PROBLEM SET #2 (SUBMIT TO BLACKBOARD BEFORE CLASS)

Session #5: Sensitivity Analysis
We discuss the use of Solver output for performing post-optimality or sensitivity analysis for linear programs. This analysis is useful in testing the robustness of the solutions to a particular model, and also in providing valuable economic information about the problem being analyzed.

Session #6: Integer Programming
In this session we address problems where some or all of the decision variables are required to assume integer values. We discuss when rounding is appropriate and when it is not. We also discuss the application of binary variables to making "yes-or-no" type decisions.

Monday, August 1: Session #7 and #8
Skim: Text, Chapter 15
Read: Text, Chapter 16
DUE: PROBLEM SET #3 (SUBMIT TO BLACKBOARD BEFORE CLASS)

Session #7: Simulation and Crystal Ball
In this session we discuss and demonstrate the role of simulation as a tool for analyzing systems involving uncertainty or risk. We discuss the use of the Crystal Ball Excel add-in for performing Monte-Carlo simulation.

Session #8: Applications of Simulation
In this session we continue discussion of Monte-Carlo simulation and the Crystal Ball Excel add-in and its application to various business problems.

Tuesday, August 9 (date tentative): Review Session
RECOMMENDED: PROBLEM SET #4 (SELF-GRADED)

Review Session
A review session will be held by the TA. The key concepts of the course will be reviewed. Problem Set #4 will be discussed. At the conclusion of the review session, the final exam will be made available at the review session and online for download via Blackboard.

Tuesday, August 16 (date tentative):

DUE: FINAL EXAM