Decision Support Models
BA 502 (QMETH)—Spring 2015

Instructor
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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
Course Packet includes copies of class transparencies and problem sets. Available at the RAMS Copy Center, 4144 University Way.

Course Packet
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), TreePlan (available on Canvas), and Crystal Ball (trial version available for download). For Windows, Excel 2007, 2010, and 2013 will all work for this course (2010 and later preferred). For the Mac, Excel 2011 should be used, but please read the page on Canvas for Mac Users (Modules>Software). The Risk Solver Platform for Education (RSPE) available with the text is not required for this course.
**Canvas**
All spreadsheets (both the data files I start with in class and the completed spreadsheet models), all class slides (including versions with the notes I scribble in class scanned in), all problem sets, and more are available through Canvas at http://canvas.uw.edu/

**Laptop Policy**
You are welcome to bring a laptop to class to work the models we build in class. Completed spreadsheets as well as spreadsheets with just the data are available for download on Canvas. You are also welcome to just watch, take notes, and participate in discussion. I want to encourage your active involvement in this course. Thus, I subscribe to the School’s policy that expects you will not access email, surf the internet, or instant message others during class.

**Academic Integrity and the MBA Honor Code**
By being a student in this course you acknowledge that you are a part of a learning community at the Foster School of Business that is committed to the highest academic standards. As a part of this community, you pledge to uphold the fundamental standards of honesty, respect, and integrity, and accept the responsibility to encourage others to adhere to these standards. Furthermore, as part of the Foster MBA program, we have jointly agreed to conform to and uphold the MBA Honor Code.

**Grading Policy**
The course grade will be based on problem sets and a two-part final exam. The final grade will be based approximately on the following weights:

- Problem Sets (Individual): 15%
- Problem Sets (Team): 25%
- Final Exam (in-class portion): 35%
- Final Exam (take-home portion): 25%

**Problem Sets**
Four graded problem sets will be assigned in order to provide you the opportunity to develop and apply the concepts and tools discussed in class. Modeling with spreadsheets is best learned by doing. Therefore it is critical that every student first attempt to set up and solve each of the problems in the problem set on your own. Although it is fine to discuss and/or get help from classmates at this point, each problem should be set up and solved by the individual based on their understanding of the material (copying of files or portions of files is not permitted). This individual attempt should be submitted to Canvas. Then students should meet in their pre-assigned study groups to compare solutions, clarify issues that were encountered, and streamline the various analyses into a single submission from the team. Take this opportunity to make sure everyone on the team understands the material and everything in the team assignment that is being submitted. One member of each team should submit the team submission to Canvas. If possible, include all spreadsheets in a single workbook on separate tabs. The team submissions will be graded for accuracy and correctness, and thorough feedback provided. The individual submissions on Canvas will also be reviewed, but only graded for completion and effort with feedback given only if there was a deficiency in completion or effort.

**Final Exam**
The final exam will be in two parts—in-class and take-home. The in-class portion will be closed book, closed notes, with one single-sided, letter-sized page of notes allowed. Please bring a calculator, but no laptops are allowed. The take-home portion will be open book, open notes, but must be completed individually, without assistance from any other person.
Schedule

Tuesday, March 31: Session 1
Modeling with Spreadsheets
Skim: Text, Chapter 1
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.

Thursday, April 2: Session 2
Introduction to Linear Programming
Read: Text, Chapter 2 (you may skip Section 2.6)
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.

Problem Set 1 (Spreadsheet Modeling and Linear Programming)
Individual Submission due by Monday, April 6, 2pm
Team submission due by Tuesday, April 7, 8am

Tuesday, April 7: Session 3
Formulation of Linear Programming Models
Read: Text, Chapter 3
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.

Thursday, April 9: Session 4
Prudent Financial Services Case Study
Read: Text, Chapter 4
Read (but do NOT prepare): Case 4-1 “Prudent Provisions for Pensions” (at the end of Chapter 4 and also available in your packet and on Canvas).
The objective of this session is to improve your 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.
Problem Set 2 (Linear Programming Applications)
Individual Submission due by Monday, April 13, 2pm
Team submission due by Tuesday, April 14, 8am

Tuesday, April 14: Session 5
Sensitivity Analysis
Read: Text, Chapter 5 (you may skip Ch. 5 subsections covering Parameter Analysis Reports)
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.

Thursday, April 16: Session 6
Integer Models
Read: Text, Chapter 7
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.

Problem Set 3 (Sensitivity Analysis and Integer Models)
Individual Submission due by Wednesday, April 22, 2pm
Team submission due by Thursday, April 23, 8am

Thursday, April 23: Session 7
Introduction to Decision Analysis
Read: Text, Sections 9.1-9.3 (replacing the RSPE coverage in 9.3 with the Supplement to Chapter 9: TreePlan available on Canvas and also in your packet before the Session 7 class notes)
We discuss an approach to making decisions when there is uncertainty or risk present. We will discuss different criteria for making decisions and introduce decision trees as a tool for framing these problems. The TreePlan Excel add-in for developing decision trees is demonstrated.

Tuesday, April 28: Session 8
Value of Information, Risk Attitude, and Utility Functions
Read: Text, Sections 9.4-9.11
Here we will discuss methods for adapting decision trees to evaluate the value of information that might be gathered before a decision needs to be made. Then we introduce the concept of risk aversion and discuss the importance of incorporating risk attitudes in a decision analysis model. We will discuss the use of utility functions to model risk aversion.
Problem Set 4 (Decision Analysis)
Individual Submission due by Monday, May 4, 2pm
Team submission due by Tuesday, May 5, 8am

Tuesday, May 5: Session 9
Simulation and Crystal Ball
Read: Text, Chapter 20 (electronic chapter available on the textbook CD and on Canvas)
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.

Thursday, May 7: Session 10
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.

Monday, May 11: In-Class Final Exam

Monday, May 11 at 7:00pm: Take-Home Final Exam Available
Thursday, May 14 by 10:00pm: Take-Home Final Exam Due