Instructor
Mark Hillier
Office: Paccar 465
Office Hours: Mondays and Fridays, 12:30-1:15 through May 4, and by appointment
e-mail: mhillier@uw.edu
Phone: 206-685-1912
Canvas Portal: http://canvas.uw.edu/

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.

Required Materials
Course Packet includes copies of the syllabus, class slides, problem sets, and case study.
Both are available at the UW Bookstore.

Course Packet
I have prepared extensive course notes that I use as slides 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 2010 and later will work for this course. For the Mac, Excel 2016’s Solver is somewhat unreliable—either Mac Excel 2011 or a Windows version of Excel should ideally be used—please read the page on Canvas for Mac Users (Modules>Software). The Analytic Solver 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, and without the use of the internet (other than the class Canvas site).
**Schedule**

**Monday, March 26: 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.

**Wednesday, March 28: 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 Sunday, April 1, 11:59pm**
Team submission **due by Monday, April 2, 11:59pm**

**Monday, April 2: 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.

**Wednesday, April 4: 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 at the end of 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 Sunday, April 8, 11:59pm**
Team submission **due by Monday, April 9, 11:59pm**

**Monday, April 9: Session 5**
**Sensitivity Analysis**
**Read:** Text, Sections 5.1–5.6 (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.

**Wednesday, April 11: 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 Sunday, April 15, 11:59pm**
Team submission **due by Monday, April 16, 11:59pm**

**Monday, April 16: Session 7**
**Introduction to Decision Analysis**
**Read:** Text, Sections 9.1–9.3 (replacing the Analytic Solver 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.

**Monday, April 23: 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.
Wednesday, April 25: Session 9
Simulation and Crystal Ball
Read: Text, Chapter 20 (electronic chapter available on the textbook website 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.

Friday, April 27 (10:30am-12:00pm in Paccar 390)
Review Session
The primary aim of this review session is to help you prepare for the in-class exam. I will use the sample questions available on Canvas as a basis for discussion (working through many of these problems and taking questions). For those that can't make it to the review session (or just want to view it again), I will have the session recorded and webcast, and also post my scanned notes.

Problem Set 4 (Decision Analysis and Simulation)
Individual Submission due by Sunday, April 29, 11:59pm
Team submission due by Monday, April 30, 11:59pm

Monday, April 30: 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.

Wednesday, May 2: In-Class Final Exam
Section A in Paccar 390 from 8:30am-10:20am
Section B in Paccar 392 from 8:35am-10:25am

Wednesday, May 2: Take-Home Final Exam Available at 5:00pm
Friday, May 4: Take-Home Final Exam Due by 11:59pm