

## **Decision Modeling and Data Analysis**

MBA for Executives  
Cohort MBAE 2011-2  
Course Outline (Syllabus)  
May–June 2010

## **“Decisions and Data”**

MBAE 6912-01  
University of San Francisco  
School of Business and Professional Studies  
Masagung Graduate School of Management

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### **Learning Objectives**

Main learning objective:

To be able to make effective operational and strategic decisions using concepts, methods, and quantitative tools from the fields of decision modeling and data analysis.

Secondary learning objectives:

1. Develop quantitative models for unstructured decision problems by identifying controllable factors, uncontrollable factors, performance measures, and relationships.
2. Develop and analyze financial planning models and perform sensitivity analysis to identify critical factors.
3. Measure uncertainty using probability, and perform Monte Carlo simulation to gain insight into practical business problems.
4. Develop and analyze decision tree models for sequential decision problems and determine value of information.
5. Use descriptive statistics and charts to summarize cross-sectional and time series data.
6. Develop regression models to explain variation, measure relationships, and make predictions.
7. Identify patterns in time series data, develop appropriate models, and make forecasts.

### **Grading**

Homework	60%	(3 @ 20% each; late: max half credit)
Project	30%	(proposal 5%, presentation 10%, and short paper 15%)
Final Quiz	10%	(one hour, in-class, books, notes, calculator)

Course letter grades are assigned to total course score based on rank relative to other students.

## Materials

Hammond, Keeney, Raiffa, Smart Choices: A Practical Guide To Making Better Life Decisions, 1999. Read this entire paperback for the first several class meetings.

Middleton, Decision Analysis Using Microsoft Excel: March 2010, bound 277-page course reader. Bring this duplicated material to each class.

Middleton, Data Analysis Using Microsoft Excel: August 2009, bound 145-page course reader. Bring this duplicated material to each class.

Savage, The Flaw of Averages: Why We Underestimate Risk in the Face of Uncertainty, 2009.

## Schedule

Chapter titles from the Decision Analysis and Data Analysis course readers are shown below in quotes, for skimming, reading, or studying, usually during class or after the topics are discussed in class.

The course may not cover all sections of the chapters listed below.

Each homework assignment is handed out in the previous class.

All duplicated materials (PDF), Excel add-ins (XLA), and Excel files (XLS) are available on Blackboard.

### May 1, Saturday morning, Session 1 of 6

Before Class: No Readings

Deliverable: None

Session Topics: Decision Models, Sensitivity Analysis, Descriptive Statistics

Decision Analysis: Ch. 1, "Introduction to Decision Modeling"  
Ch. 2, "Sensitivity Analysis Using Excel"  
Ch. 3, "Installing SensIt, RiskSim, and TreePlan"  
Ch. 4, "Sensitivity Analysis Using SensIt"

Data Analysis: Ch. 1, "Introduction to Data Analysis"  
Ch. 2, "Univariate Numerical Data"

### **May 14, Friday afternoon, Session 2 of 6**

- Before Class: Read Smart Choices, Introduction, Preface, Chapters 1 through 5 (Making Smart Choices, Problem, Objectives, Alternatives, Consequences, 86 pages)  
Read The Flaw of Averages, pp. 1–90
- Deliverable: Homework #1 (sensitivity analysis, SensIt tornado chart, histogram)
- Session Topics: Uncertain Quantities, Monte Carlo Simulation, Simple Regression
- Decision Analysis: Ch. 7, “Introduction to Monte Carlo Simulation”  
Ch. 8, “Uncertain Quantities”  
Ch. 9, “Simulation Without Add-Ins”  
Ch. 10, “Monte Carlo Simulation Using RiskSim”
- Data Analysis: Ch. 3, “Bivariate Numerical Data”  
Ch. 4, “One-Sample Inference for the Mean”  
Ch. 5, “Simple Linear Regression”  
Ch. 6, “Simple Nonlinear Regression”

### **May 15, Saturday afternoon, Session 3 of 6**

- Before Class: Read Smart Choices, Chapters 6 through 9 (Tradeoffs, Uncertainty, Risk Tolerance, Linked Decisions, 106 pages)  
Read The Flaw of Averages, pp. 91–180
- Deliverable: None
- Session Topics: Decision Trees, Multiple Regression
- Decision Analysis: Ch. 15, “Introduction to Decision Trees”  
Ch. 16, “Decision Trees Using TreePlan”  
Ch. 17, “Strategies in Decision Trees”  
Ch. 18, “Sensitivity Analysis for Decision Trees”
- Data Analysis: Ch. 7, “Multiple Regression”  
Ch. 8, “Regression Using Categorical Variables”  
Ch. 9, “Regression Models for Cross-Sectional Data”

### **May 22, Saturday afternoon, Session 4 of 6**

Before Class: Read Smart Choices, Chapters 10 and 11, Roadmap (Psychological Traps, The Wise Decision Maker, 56 pages)  
Read The Flaw of Averages, pp. 181–271

Deliverable: Homework #2 (RiskSim Monte Carlo simulation, simple regression)

Session Topics: Multiattribute Utility, Value of Information, Risk Attitude Utility, Time Series

Decision Analysis: Ch. 6, “Multiattribute Utility”  
Ch. 19, “Decision Trees with Multiattribute Outcomes”  
Ch. 20, “Value of Information in Decision Trees”

Data Analysis: Ch. 10, “Time Series Data and Forecasts”  
Ch. 11, “Autocorrelation and Autoregression”  
Ch. 12, “Time Series Smoothing”  
Ch. 13, “Time Series Seasonality”  
Ch. 14, “Regression Models for Time Series Data”

### **June 5, Saturday morning, Session 5 of 6**

Before Class: Read The Flaw of Averages, pp. 272–366

Deliverables: Homework #3 (TreePlan decision tree, multiple regression)  
Project Proposal

Session Topics: Multiperiod Models, Revision of Probability, Risk Attitude Utility, Pivot Tables

Decision Analysis: Ch. 5, “Multiperiod What-If Modeling”  
Ch. 11, “Modeling Uncertain Relationships”  
Ch. 12, “Multiperiod Simulation Modeling”  
Ch. 13, “Modeling Inventory Decisions”  
Ch. 14, “Modeling Waiting Lines”  
Ch. 21, “Value of Imperfect Information”  
Ch. 22, “Modeling Attitude Toward Risk”  
Ch. 23, “Risk Attitude Using TreePlan”  
Ch. 24, “Making Choices Under Uncertainty”

**June 12, Saturday afternoon, Session 6 of 6**

Before Class: No Readings

Deliverable: Course Project

Session Topics: Quiz (first hour), Project Presentations