Management Problem Solving

This course teaches you to better analyze management problems using spreadsheet-based methods. You will learn specific methods for clarifying your objectives, developing alternatives, addressing tradeoffs, and conducting a defensible quantitative decision analysis.

Researchers in problem solving and decision making have learned that untrained decision makers make characteristic errors. You will learn skills and tools to overcome these mistakes which you can put to use immediately, and which will remain effective as you move to greater levels of responsibility. The methods are illustrated using successful applications to strategy, operations, and regulation problems.

Prerequisites are basic spreadsheet skills, including elementary charting, and rudimentary probability concepts.

Reading Assignments: From *Strategic Decision Making*

- Class 1: Ch. 1, Ch. 2, Ch. 3 (except Sec. 3.4), Ch. 4 (except Sec. 4.8)
- Class 2: Ch. 4 (except Sec. 4.8), Appendix A, *Optional:* Secs. 9.1-9.2
- Class 3: Appendix B
- Class 4: Secs. 3.4, 8.1-8.3, Ch. 5
- Class 5: Ch. 6, Appendix C
- Class 6: Secs. 7.1-7.5, *Optional:* Sec. 9.3
- Class 7: Secs. D.1-D.3, 7.6
- Class 8: *Optional:* Secs 4.8, 7.7, 8.4
- Class 9: None

Decision Making Project Assignments:

- Class 4: Informal preproposal presentation
- Class 5: Written proposal
- Class 8: Interim Presentation
- Class 10: Final Report/Presentation

Homework Assignments: From *Strategic Decision Making*.

- Assignment 1 (Due Class 3): Exercises 1.4, 1.5, 1.6, 1.7, 1.8, 2.2, 2.3, 1.3, 3.1 (Exercise 1.3 is placed in the exercises list where it logically fits while you are doing the exercises.)
- Assignment 2 (Due Class 5): A.3, A.5, A.6, 4.3, 4.5, 4.7
- Assignment 3 (Due Class 7): 8.1, 8.2, 8.3, 6.2, 6.4, 6.6
- Assignment 4 (Due Class 9): 5.1, 5.2, 6.8, 6.9, 6.13, 7.3

Project Assignment

This project applies the course methods to analyze a business decision problem. This analysis can be done individually or in teams of up to four people. Examples of appropriate business

decision areas include process improvement or re-engineering, facility siting, new ventures, new products/services, acquisitions, divestments, capital expenditures, lease-buy, make-buy, personnel planning, technology choice, and research/development planning.

The project must use the course decision analysis methods. The decision problem must have (1) at least three alternatives, (2) at least three evaluation measures, and (3) significant uncertainty about some important element of the decision. You must consult at least two outside expert data sources for information, which must include both written material and an expert.

Deliverables: 1) a written proposal, 2) an oral interim report, and 3) oral and written final reports. The deliverables are cumulative, and much of what you prepare for each assignment can be used in later assignments.

Proposal: Less than two double-spaced typewritten pages, excluding tables or figures, and includes: (1) a summary of the decision problem to be analyzed, (2) a preliminary list of evaluation considerations with evaluation measures, (3) a preliminary list of alternatives to be considered, and (4) proposed expert data sources to be consulted.

Interim Presentation: The oral interim presentation contains all the information needed to complete the analysis of the decision problem except that it does not have to include the final numerical calculations and conclusions. Address this presentation to someone who understands the material presented in this course.

Use the following outline:

1. *Problem Statement*: Overview of the decision problem and the major considerations in analyzing it.
2. *Evaluation Considerations and Evaluation Measures*: Describe the process used to determine evaluation considerations and evaluation measures, including a discussion of other evaluation considerations that seem relevant and the reasons that they were not included. Present a value hierarchy, and completely describe the final set of evaluation measures. Thus, completely present any constructed evaluation measure scales.
3. *Decision Alternatives*: Describe the process used to determine alternatives, including a discussion of other alternatives that seem relevant and the reasons these were not analyzed. Describe the final set of alternatives used in the decision analysis.
4. *Value Function Assessment*: Present the general procedure used for the assessment but not a blow-by-blow description. Show the parameters for the value function.
5. *Scenarios*: Present the scenarios used to analyze the impact of uncertainties. Describe the process used to develop the final set of scenarios, as well as other scenarios that seem relevant and the reasons these were not included.
6. *Data Collection and Evaluation Measure Scores*: Present the procedure used to determine the evaluation measure scores (levels) for each alternative under each scenario. Present the evaluation measure scores for each scenario, perhaps in one or more tables.
7. *Value Calculations and Sensitivity Analysis*: Briefly describe how you will carry out the value computations required to complete your evaluation.

Final Presentation and Report: The final presentation and written report include (perhaps with corrections) the interim presentation material and extend this to complete a numerical evaluation of alternatives. The written report must be less than ten double-spaced typewritten pages, excluding tables or figures. Except for the Conclusions section, the audience is the same as for the interim presentation. Address the Conclusions section as discussed below.

Use the following table of contents for the written report:

1. *Problem Statement*: The same as the corresponding section in the interim presentation, except for any updates or changes.
2. *Evaluation Considerations and Evaluation Measures*: The same as the corresponding section in the interim presentation, except for any updates or changes.
3. *Decision Alternatives*: The same as the corresponding section in the interim presentation, except for any updates or changes.
4. *Value Function Assessment*: Similar to the corresponding section in the interim presentation, except for any updates or changes. Also include the assessed "raw data'" used to determine the value function, perhaps in a table. Show the math used to obtain the final value function from the assessed raw data (perhaps in a figure), as well as the parameters for the final value function.
5. *Scenarios*: The same as the corresponding section in the interim presentation, except for any updates or changes.
6. *Data Collection and Evaluation Measure Scores*: Similar to the corresponding section in the interim presentation, except for any updates or changes. Provide references for data sources, including interviews with experts, in standard bibliography style.
7. *Value Calculations and Sensitivity Analysis*: Present the value calculations for the alternatives for each scenario, as well as a sensitivity analysis. Briefly describe how these computations were done, but you do not have to present the actual computations, since you are using a computer to do the calculations. Include the spreadsheet equations for your analysis as an appendix to your report. Conduct and present a systematic sensitivity analysis to investigate how variations in assumptions impact the analysis results.
8. *Conclusions*: Present your conclusions based on the analysis in the preceding sections, but with a qualitative discussion of the reasons for the preferred alternative. The goal is that someone who does not understand the detailed analysis will find your Conclusions section to be a convincing argument for the preferred alternative. That is, the analysis should not be a mysterious procedure, but rather a way of developing *insight* about the key factors in the decision and how these lead to the preferred alternative.

The oral presentation also follows this outline, but adjusted to the available time. Thus, you will probably not present some details of computations and results that are in the written report.

Project Grading: The proposal is required but not graded. The project grade is based one-third on the interim and final presentations, which count equally, and two-thirds on the final report.

The written final report grade is based on the degree to which the presented work is complete, accurate, and defensible, and how well your results are explained in lay terms in the Conclusions section. Presentation clarity and accuracy are graded to the extent these make it hard to judge the

quality of the analysis. Common report presentation problems include 1) failure to include the required information listed above, 2) failure to follow the specified outline, 3) failure to reference figures, tables, or appendices in the text, and 4) failure to include references for data sources.

Oral presentations are graded on clarity, accuracy, completeness, appropriate use of visual aids, and ability to answer questions. Presentation should be sufficiently detailed for the listener to judge the quality of the analysis, but the level of detail should be adjusted to the available time so that the typical listener is not buried in too much detail to keep up with the presentation.

Oral presentations should be self-contained and directed at someone who understands the course material, except for the Conclusions section, which should present a convincing case for the preferred alternative to a lay audience. Common presentation issues include 1) failure to present key elements of the analysis, 2) lack of coordination between the spoken presentation and the visual aids, 3) inclusion of too much material in the visual aids so the listener cannot absorb this material in the available time, and 4) failure to direct the Conclusions section at a lay audience.

Each person can optionally provide a confidential written assessment of the contribution of each other team member as either "meeting" or "not meeting" expectations. A team member who receives a substantial number of "not meeting expectations" ratings will have his or her grade lowered for the project assignment. The intent is not to make fine distinctions about level of participation, but to identify freeloaders. It is hoped there will be no freeloaders.