

Syllabus for course variant based on

DECISION ANALYSIS AND RATIONAL JUDGMENT: STRUCTURING UNCERTAINTY, VALUES AND CHOICE

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Courses can be (and have been) adapted to the needs of different programs: e.g. public policy, business, psychology, general education. The following was a required course for a Master's in Public Policy.

This course teaches basic models of decision analysis, applied especially to public policy issues, such as whether to close down a nuclear plant or abolish the death penalty, or if the Clean Air Act is worth its cost. There are no course prerequisites, but some background in quantitative methods is valuable. There is one required text.

The tools are intended to help policy makers to structure their thinking on substantive policy, to improve their own judgments on perplexing and controversial issues, or to validate these judgments to others. Judgments may address choices themselves or the facts and values that underlie them. They may address conflicting objectives and/or uncertain outcomes, direct and indirect assessment of uncertainty, or combining different ways of looking at a given problem.

Technically, tools are simple variants of decision theory models (including multi-attribute utility, decision trees, influence diagrams, expected utility, and plural evaluation), but no explicit mathematics is used. Models address a decider's knowledge, either as it exists or as enriched by new data and analysis. However, the most challenging and critical skill developed, is application: integrating models into how the decider *really* thinks about a live choice (not a hypothetical one). This involves understanding how people currently make decisions and their human context, as well as substantial logical aptitude.

Teaching strategy alternates technique with illustrative application, involving real personal, professional and public dilemmas. Policy cases are drawn from the instructor's consulting. As a term project, students model their own judgment of a current public policy decision, singly or in groups. Grading is based on project, class participation, homework and tests.

The course was developed by the author, based on thirty years consulting to senior policy makers, interleaved with research on applied decision methodology. He was trained as a statistician and social scientist, and taught in a variety of professional and academic programs.

COURSE OUTLINE

14 sessions @ 2.5 hours.

Texts: Required : Textbook “Decision Analysis and Rational Judgment”

Papers: “Should a reactor install a costly safety measure?”; “How decision aids can mislead deciders”

Enrichment material: Smart Choices (Hammond et al); Value-Focused Thinking (Keeney); Buede and Watson; Clemen.

1a. Course Substance

End Product

Illustrative public choice

Tools and their use

Personal (inc. public policy) vs. professional choices

Current decision aiding practice

1b. Teaching

Alternating technique and practice, hand-in exercises

Outline

Term projects, personal and group

Materials, Glossary

Syllabus

Grading: holistic, including mid-term and final

*Post-class homework*¹

Read: Text through Chapter 1.

Brief example where tools might help

2a. Applied Term Projects

Group public policy issue, for oral and/or written presentation at end of term.

OR

Personal choice term project: for written paper end term.

Pre HW: Read Ch. 2 (Applied projects). Consider personal problems, opportunities.

Post HW: explore group project possibilities, Choose up groups

OR identify personal choice with two options

2a. Exploring considerations in a choice

Principles of informal reasoning; facts vs. values

Going through the GOO--Goals, Options, and Outcomes.

Examples

Pre-class HW: Read T3 (Exploring issues)

Post HW: GOO for Public policy choice (running through course)

¹ Pre HW means homework to be done before class, i.e. assigned along with readings. Post HW means to be done after material has been covered in class.

3. Decision Aids

Quantifying the GOO

When to bother

Schematic tree

The practice of decision analysis: extent and impact

Applications (consulting cases)

Philosophy of statistical decision theory

Concept of equivalent substitution

Quantitative models

Preview of importance-weighted impact model

Pre HW: Ch 4 (Decision Aids and Models of Rational Judgment)

Post HW: hand-in exercises; public policy case revisited

Group/Personal project: Hand-in informal evaluation of options.

4a. Term projects

Review status.

4b. Option consequences

Principles, technique

Natural measures; Rating scales

Pre HW: Ch. 5 (Characterizing Consequences of Options)

Post HW: Exercises

5a. Consequences (cont.)

5b. Conflicting values

Partitioned evaluation

Tradeoffs, monetary exchange, even swaps

Importance-weighted impact model, box format

Pre HW: Ch. 6 (Conflicting Value Models)

Post HW: exercises

6a. Values (cont.)

6b. Term projects (Cont)

Post HW: plan group model

7a Review of course to date

7b. Unfinished business

8a. Mid-term Test

Techniques and concepts covered to date

8b. Mid-term post-mortem

9. Case: Arctic environmental construction

Whether to permit BP to build a causeway into the Arctic Ocean

Pre HW: Read Ch. 11 (Arctic case)

Post HW: Hand-in comments

10a Choice under uncertainty

Two, many-valued and continuous facts; probabilities

Maximizing expectations, risk premiums, trees

Substituting few for many-valued assessments

Pre HW: Ch. 7--not appendix (Uncertain Outcomes)

Post HW: exercises

10b. Factual Assessment

Direct elicitation

Indirect assessment

Diagnostic updating

Conditioned Assessment

Pre HW: Ch. 9

Post: Exercises

11a. Eliciting Values

Direct

Indirect

Pre HW: Ch. 10

Post: Ex

11b. Personal Analytic strategy

Model management;

Plural evaluation

Using model output

Non-equivalent substitution;

Unreal options: e.g. final vs. incremental commitment

Pre HW: Ch. 8 (Personal Strategy)

12a. People and organizations

Individual vs. institutional behavior

Cognitive issues

Pitfalls: How aids mislead

Post HW: Ch. 13 (People); paper on misleading aids

12b. Case: Reactor safety measures

Pre HW: Read Ulvila and Brown article

Post HW: reactor assignments

Pre HW: Exercises

13a. DA Practice

Pre HW: Reread App 1A

13b. Professional Strategy

Personal vs. professional

Pre-HW: Ch. 12

14a. Misc. Issues

Where to go next

Pre HW: Ch. 14 (Next?)

14b. Group presentation

Pre-HW: Group project

14c. Wrap-up