OR 681/SYST 573
Decision and Risk Analysis
Fall 2015

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Office Hours: Before or after class, or by appointment

Text: Strategic Decision Making Author: Craig W. Kirkwood
ISBN-13: 978-0-534-51692-5
Publication Date: 1997

Software: *Logical Decisions for Windows*
Analytica

Description: The intent of this course is to provide a modern perspective on analytical methodologies to support decision making. Decision analysis offers a set of structured procedures that assist decision-makers in structuring decision problems and developing creative decision options, quantifying their uncertainty (this includes combining available statistics with expert judgments, and their own beliefs to arrive at estimates of the probabilities of various outcomes), quantifying their preferences (this includes structuring their value tradeoffs and examining their attitude towards risk), combining their uncertainty and preferences to arrive at "good" decisions. This course provides an introductory treatment of decision analysis. The intended participants are students who want to learn more about decision making under uncertainty and tools that can be used to support it.

Learning Objectives:
At the end of this course, students will be able to:

1. Organize or structure complex decision problems for analysis.
2. Identify and quantify tradeoffs between multiple objectives that a decision maker wants to accomplish.
3. Identify and quantify sources of *uncertainty and risk* in decision problems.
4. Quantitatively incorporate subjective decision maker judgments in decision problems.
5. Apply decision analysis techniques to a realistic decision problem and present the results both orally and in written form.

Topic	**Reading and Assignment***
Introduction	Read Chapter 1

Review of Probability	Read Chapt. 6 Sections 6.1-6.3 Probability HW
Value Focused Thinking	Read Keeney Article and Chapter 2, pg 11-23 Read How to Build an Affinity Diagram Affinity Diagram HW + Value Hierarchy HW
Value Functions and Weight Elicitation	Read Chapter 4, pgs. 53-68 (Single Dimensional Value Functions) Chapter 4, pgs. 68-98 (Weights), pgs. 259-260 (AHP) Single Dim VF HW Weights and AHP HW Hierarchical Value function HW Do Logical Decisions for Windows Tutorial
Decisions Under Uncertainty Influence Diagrams	Read Chapt.5 and article by Slovic Decision tree HW Read Pages 326-329 (Influence Diagram) Do Analytica Tutorial
Utility Functions, Multiattribute Utility	Read Chapt. 9 (Utility Theory) Utility HW
Sensitivity Analysis	Read pgs. 82-86 (Sensitivity)

Grading:

Midterm	30%
Project	30%
Final	30%
Class & Homework*	10%

*Homework will be assigned on a weekly basis from problems in the textbook and from handouts

Group Projects

A group project will be done by everyone in the class, and will count 30% of the course grade. The size of the groups will depend on the number of people in the class. The purpose of the project is to apply the concepts and techniques learned in this class to more realistic problems than any that could be found in a textbook. Thus the project is an important part of the course.

The topic of your project will be up to the group. Ideally, the topic should deal with some realist decision problem. I have no problem with using problems encountered by one or more of the group members in their life outside the classroom. The analysis and solution of the problem should make use of the techniques of decision analysis that you have learned in the

course, and it should apply to a decision problem that has at least 3 alternatives, at least 3 evaluation concerns, and significant uncertainty in at least one of the evaluation concerns

A one page proposal outlining the problem context, a preliminary list of alternatives, a preliminary list of evaluation concerns, proposed data sources, and group members is due on October 15, 2015. I will be happy to speak to groups who want to discuss potential topics.

Project grade will be based on a written report of about 10 pages, and a short oral presentation live on December 10, 2015. The length of the oral presentation will be based on the number of groups. The grading criteria will be the following:

Written Report
- Is the topic relevant to the course?
- Are the techniques used in the analysis used correctly?
- Is the analysis complete?
- Is the presentation clear and are good mechanics used (organization, format, and grammar)?
- Are sources adequately referenced?
- Does the analysis support decision making?

Oral presentation
- Is it interesting, and does the class learn anything new?
- Does the presentation adhere to the time limit?
- Is the presentation of high quality?

We will schedule a "in progress review" during the semester near the midterm. This will be a presentation to the class covering the problem and proposed methodology. It will be worthwhile from the standpoint of ensuring that you will not get too far down the wrong road.

Student Expectations:

Academic Integrity
Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture.

Honor Code
Students must adhere to the guidelines of the George Mason University Honor Code [See http://oai.gmu.edu/honor-code/masons-honor-code/].

MasonLive/Email (GMU Email)
Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent

to students solely through their Mason email account. [See https://thanatos.gmu.edu/masonlive/login].

Patriot Pass
Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, MasonLive, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See https://thanatos.gmu.edu/passwordchange/index.jsp].

University Policies
Students must follow the university policies. [See University Policies].

Diversity: George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

Responsible Use of Computing
Students must follow the university policy for Responsible Use of Computing. [See http://universitypolicy.gmu.edu/1301gen.html].

University Calendar
Students must follow the university policies. [See Catalogue].

Students with Disabilities
Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu].

Students are expected to follow courteous Internet etiquette.

Student Services:

University Libraries
University Libraries provides resources

Writing Center
The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See http://writingcenter.gmu.edu]. You can now sign up for an Online Writing Lab (OWL) session just like you sign up for a face-to-face session in the Writing Center, which means YOU set the date and time of the appointment! Learn more about the Online Writing Lab (OWL) (found under Online Tutoring).

Counseling and Psychological Services
The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu].

Family Educational Rights and Privacy Act (FERPA)
The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See http://registrar.gmu.edu/privacy].