

OR-681/SYST-573: Decision and Risk Analysis (Spring 2018)

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Office Hour: By appointment

Place/Time: Nguyen Engineering Building 1108, Thursday 4:30 – 7:10 PM

Prerequisites: STAT 346 (Probability for Engineers) or equivalent level

Course Description: The intent of this course is to provide a modern perspective on analytical methodologies to support the decision-making process. Decision analysis offers a set of structured procedures that assist decision-makers in structuring decision problems and developing creative decision options, quantifying uncertainty (probabilities of various outcomes estimated through expert judgments and personal beliefs), and quantifying preferences (through structuring value tradeoffs and examining 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.

Course Objective: At the end of this course, students will be able to:

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

Textbooks: **Required Textbook:**

- *Making Hard Decisions with Decision Tools Suite (3rd Edition)*, Robert T. Clemen, Terence Reilly, South-Western CENGAGE Learning, 2014 (ISBN: 978-0-538-79757-3)

Recommended Books:

- *Strategic Decision Making: Multiobjective Decision Analysis with Spreadsheets*, Craig W. Kirkwood, CENGAGE Learning, 1997. (ISBN: 978-0-534-51692-5)
- *Advances in Decision Analysis: From Foundations to Applications*, Ward Edwards, Ralph F. Miles, Detlof von Winterfeldt, Cambridge, 2007. (ISBN: 978-0-521-68230-5)

- *Business Analytics: Data Analysis & Decision Making, (6th Edition)*, S. Christian Albright, Wayne L. Winston, CENGAGE Learning, 2017. (ISBN: 978-1-305-94754-2)

Grading: The course grade is based on individual homework assignments, midterm exam, final exam and team project. Each grading component is described below.

Homework:	25%
Midterm Exam:	25%
Team Project:	20%
Final Exam:	30%

The +/- grades will be used.

The instructor reserves the rights to make minor modifications in the percentages.

- Topics:**
- Introduction to Decision Analysis
 - Elements of Decision Problems
 - Influence Diagram, Decision Trees
 - Review of Probability Theory
 - Probability Models for Decision Analysis
 - Making Choices - Solving Decision Trees
 - Sensitivity Analysis
 - Value of Information
 - Subjective Probability
 - Utility Functions, Risk Measures
 - Conflicting Objectives and Multiattribute Utility Models
 - The Analytics Hierarchy Process (AHP)

- Software:**
- *Palisade Decision Tools Suite* (PrecisionTree, @Risk)
Palisade Decision Tools are excel-based software, and it comes along with the required textbook.
 - *Logical Decisions for Windows (LDW)*
LDW is a useful tool to evaluate choices by considering many variables at once, a free-trial version is available to download.

Class Website: **Blackboard:** <http://mymson.gmu.edu>

Click on the Courses tab in the green area (top right-of-center) and then on the SYST 573 or OR 681 link when the course list column appears.

The left column menus include the following:

Syllabus: Class syllabus, schedule, course overview information.

Content: Links to weekly modules with lectures, data files, R scripts and functions, and external readings.

Assignments: Homework/Projects information, data and guidance. Solutions to Quizzes and Assignments. Links to submit assignments/projects.

Software: Some resources and materials for software are available here.

My Grades: This is the place to check on your grades.

Discussion Board: At least one discussion board will be open to support communication among students.

General Material

Academic Integrity

Mason is an Honor Code university; please see University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely.

Mason Email Accounts

Students must use their MasonLive email account to receive important University information, including the messages related to this class. See Mason Live (<http://masonlive.com>) for more information.

Office of Disability Services

If you are a student with a disability and you need academic accommodations, please see me and contact the Office of Disability Services (ODS) at (703) 993-2474. All academic accommodations must be arranged through the ODS (<http://ods.gmu.edu>).

Other Resources

Writing Center: Robinson Hall A114. Phone: (703) 993-1200. Webpage: <http://writingcenter.gmu.edu>

University Libraries: “Ask a Librarian”. Webpage: <http://library.gmu.edu/mudge/IM/IMRef.html>

Counseling and Psychological Services (CAPS): Phone (703) 993-2380. Webpage: <http://caps.gmu.edu>

University Policies: The University Catalog (<http://catalog.gmu.edu>) is the central resource for university policies affecting student, faculty, and staff conduct in university academic affairs. Other policies are available at University Policy (<http://universitypolicy.gmu.edu>). All members of the university community are responsible for knowing and following established policies.