MIDDLE EAST TECHNICAL UNIVERSITY FALL 2024
DEPARTMENT OF BUSINESS ADMINISTRATION

BA 4517/5517 – Decision Analysis: Tools & Methods
Tuesday & Thursday 10.40 – 11.55 @G207

Instructor:	Dr. Gülşah Karakaya
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Office Hours:	Monday: 14.00 – 15.00
Course Web Page:	https://odtuclass.metu.edu.tr

Course Description:

Decision analysis is an interdisciplinary field that aims to provide a structured and systematic approach to guide the decision making activities involved in complex problems. This is generally achieved through a set of formal methods, models and analytical tools. In addition to this approach, it also attempts to understand the preliminary mechanisms underlying human judgment as well as the cognitive and psychological factors that affect the mental processes behind decision making. In this aspect, decision analysis incorporates both quantitative and qualitative perspectives and, in fact, is an effective combination of both.

The primary objective of this course is to provide a preliminary understanding on the former perspective. In other words, it will attempt to convey the basic concepts and principles on the quantitative methods and techniques of decision analysis. Even though no high level mathematics is required for taking this course, a basic knowledge on probability theory and familiarity with quantitative modeling will be highly helpful. Topics to be covered include multi-objective decision making, SMART, AHP, EVEN SWAPS, Single-Attribute Utility Theory, Multi-Attribute Utility Theory, influence diagrams, decision trees, value of information and scenario planning.

For this course, as a prerequisite, students should have taken BA 3504 with a semester grade of at least DD.

Course Student Learning Objectives: (CSLO)

Upon successful completion of this course, students should be able to:
Course Specific Skills:
1. Attain an understanding on the basic philosophy, tools and techniques related with decision analysis
2. Develop the analytical and critical thinking skills to model a decision problem by selecting an appropriate tool/technique
3. Understand how to follow the steps/procedure of the selected technique by using a spreadsheet program and develop a solution
4. Understand how to interpret the solution and make a meaningful recommendation to the decision maker
5. Understand how to apply SMART, SMARTER, Even Swaps and AHP
6. Understand the concepts of utility theory and multi-attribute utility theory
7. Understand how to construct/use influence diagrams and decision trees

Discipline Specific Skills:

8. Understand the concepts of decision analysis techniques
9. Recognize how decision analysis techniques are useful in making the best managerial decisions

Personal and Key Skills:

10. Develop problem solving skills
11. Develop writing and discussion skills
12. Learn to apply the abstract concepts learned in the classroom to everyday decisions made by people and organizations
13. Prepare a group term-project that involves the application of the techniques learnt in the course to a particular decision problem consisting of real data and real decision makers

Learning and Teaching Methods:

This course is going to make use of formal lectures, in-class discussions and problem solving, written homework assignments, term-project presentations.

Required Reading:

Decision Analysis for Management Judgment, 5th Edition, Paul Goodwin and George Wright, Wiley, 2014.

Suggested Reading:

Give Yourself a Nudge: Helping Smart People Make Smarter Personal and Business Decisions, Ralph L. Keeney, Cambridge University Press, 2020.

Thinking, Fast and Slow, Daniel Kahneman, London: Penguin Books, 2011.

Decisions with Multiple Objectives: Preferences and Value Tradeoffs, Ralph L. Keeney and Howard Raiffa, Cambridge University Press, 1993.

Assessment and Grading (tentative):

Form of Assessment	% Contribution	Size of the assessment	CSLOs covered by the assessment	Feedback Method
Midterm 1	30	Individual, 75-min exam	1-5,8-12	Written
Midterm 2	30	Individual, 75-min exam	1-12	Written
Project	20	Group work, written report and in-class presentation	1-13	Written and oral
Assignments, in-class exercises, etc.	15	Homework problems	1-12	Written and oral
Attendance, Participation	5	Class participation during lectures	1-13	Oral

Course Policies:

No “extra” work above the aforementioned will be accepted or credited.

Attendance and Participation: Students are expected to attend the lectures and be active in the discussions.

Missed Exams: In case you cannot attend one of the examinations, you will be eligible to a make-up examination if and only if you can present an official (dean's or president's office approved) excuse or METU Medical Center certified Health Report. There will be one single, comprehensive and detailed make-up examination during the final period and it will be counted towards whichever exam(s) you are missing.

Late Submission Policy: Late submissions will NOT be accepted.

Term Project: This project will be done in teams of students and the number of students will be announced after the add-drop period. The primary aim of the term project is the application of various tools and techniques learnt during the course to a real-life setting. You are expected to define a valid and real decision problem (one that conforms to the requirements of being a decision problem) that can be about anything (e.g., choosing what to do after graduation, selecting a new job, choosing a holiday resort, buying a new laptop computer, reserving a restaurant to celebrate an anniversary, etc.) and work with real decision makers on this problem to come up with recommendations about the best course of action(s) to take. You are expected to structure the analysis in three separate parts. These parts will involve analyzing the decision problem by:

1. Using intuitive techniques of multi-objective decision making
2. Applying two deterministic decision-making techniques
3. Adapting the problem and its assumptions to the requirements of a probabilistic setting and then applying a probabilistic decision-making technique in line with the methods of decision-making under risk, multi-attribute utility theory and decision trees

In order to be able to apply all these tools and methods, the necessary assumptions should be made, the necessary data should be collected, the appropriate probabilities should be assigned, and the problem should be converted into the relevant format for each part.
The decision makers from whom the preferences will be gathered should be external decision makers. Neither yourself, your teammates nor any classmate of yours will be eligible for this task.
In your project report, you should define and explain your decision problem, and express your alternatives and objectives/criteria in detail. You should also introduce the decision maker(s) you will employ. You should state the assumptions you make and the data you gather, and provide all the necessary information about the problem with proper references if any. You should discuss about the methods/techniques you use. The complete analysis and findings, the assumptions made, recommendations about the best course of action(s) to take, and a general discussion about the reliability/validity of these recommendations should be included in your report.

Presentation - (last week of the classes): Every group will prepare and give a 20 min presentation of their project. The presentations will be held during last week. Every member of the group is expected to participate the presentation.

Report Submission - (due on January, 10): It should be around 15 pages excluding the appendices (Times New Roman, 12-point font, 1.5 spacing).

You will be graded based on the clarity and correctness of your modeling and explanations, the complexity of your problem, and your effort as well as the format.

STUDENT DISABILITIES: Any student, who, because of a disabling condition, may require special arrangements in order to meet course requirements, should contact the instructor as soon as

possible. Students should present the appropriate documentation from the university's Disability Support Office (Engelsiz ODTÜ Birimi, ODTÜ Kütüphanesi, Solmaz İzdemir Salonu, Tel: 210.7196; engelsiz@metu.edu.tr) verifying their disability, and outlining the special arrangements required. Please note that no accommodations will be provided to the disabled students prior to the completion of this approved University process.

ACADEMIC DISHONESTY: The Department of Business Administration has no tolerance for acts of academic dishonesty. Such acts damage the reputation of METU, the department and the BS degree and demean the honest efforts of the majority of the students. The minimum penalty for an act of academic dishonesty will be a zero for that assignment or exam.

CHEATING: All university, faculty/institute, and department principles on academic honesty will be strictly enforced. The usual consequence for academic dishonesty is failure of the course and referral of the case to the Dean of the Faculty for additional disciplinary action. Examinations are individual and are to be completed without outside assistance of any sort. Persons observed cheating during examinations will receive a failing grade in the course. Homework assignments are individual, unless otherwise specified by the instructor, and are to be completed without outside assistance of any sort, as well. Persons observed cheating in their homework assignments will receive a score of zero for the portion of the semester grade that is allocated to such assignments.

PLAGIARISM: The instructor assumes that students will do their own work. By placing their names on assignments (individual or team), students are affirming that the contents are their original work. Any previous work available from files or past students, as well as materials available on the internet may be used only as a suggestive model. Violation of this provision will be considered as unethical behavior, subject to disciplinary action. If you have any doubt about the use of a specific material, see the instructor ahead of time. Any material used from outside sources should be referenced appropriately. Persons observed to plagiarize while preparing assignments will be referred to the Dean of the Faculty for additional disciplinary action and also they will receive a score of zero for the portion of the semester grade that is allocated to such assignments.

METU HONOR CODE

Every member of METU community adopts the following honor code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted.

"The members of the METU community are reliable, responsible and honorable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."

CIVILITY IN THE CLASSROOM: Students are expected to assist in maintaining a classroom environment which is conducive to learning. In order to assure that all students have an opportunity to gain from time spent in class, unless otherwise approved by the instructor, students are prohibited from using laptop computers and cellular phones, making offensive remarks, reading newspapers, sleeping, or engaging in any other form of distraction. Inappropriate behavior in classroom shall result, minimally, in a request to leave class.

KNOW YOUR RIGHTS AND RESPONSIBILITIES! http://oidb.metu.edu.tr/en/academic-rules-and-regulations

NOTE THE IMPORTANT DATES ON THE ACADEMIC CALENDAR!
http://oidb.metu.edu.tr/en/academic-calendar

Good luck ☺

The following table gives the tentative schedule for the semester and is subject to change. The lectures will stress the most important and/or most difficult material. Appendices are required only if they are assigned.

Tentative Course Schedule				
Month	Day	Topic	Reading/ Assignment	CSLO
October	1	Introduction	Chapter 1	1,8,9
	3-8	What is decision analysis?	Chapter 1	1,8,9
	10	Multi-objective decision making (MODM)	Chapter 2	1-4,8,9
	15-17	Intuitive techniques & heuristics	Chapter 2	1-4,8,9
	22-24	MODM - the SMART technique	Chapter 3	1-5,8-11
	29	National holiday		
	31	MODM - the SMARTER technique	Chapter 4	1-5,8-11
November	5	MODM - the EVEN SWAPS technique	Chapter 4	1-5,8-11
	7	Midterm 1	All so far	1-5,8-12
	12-14	MODM - the AHP technique	Chapter 4	1-5,8-11
	19-21	Decision making under uncertainty/risk	Chapter 6	1-4,6,8-11
	26-28	Multi-attribute utility theory	Chapter 6	1-4,6,8-11
December	3	Influence diagrams	Chapter 7	1-4,7,8-11
	5-10	Decision trees	Chapter 7	1-4,7,8-11
	12	Bayesian analysis	Chapter 9	1-4,7,8-11
	17-19	Value of information	Chapter 9	1-4,7,8-11
	24	Midterm 2	All after Midterm 1	1-12
	26	Feedback session about projects		
January	31-2	Term project presentations		1-13