



### **Course Name**

English Name      **DECISION ANALYSIS**  
Turkish Name      **KARAR ANALİZİ**

### **Course Description**

This course is designed to cover quantitative decision analysis. The course is mainly divided into three parts, a review and general introduction to decision analysis, decision tree analysis with a single and multiple objectives and corresponding risk profiles; and introduction to utility theory including sensitivity analysis. In the first part, general introduction to decision analysis, structuring and developing a decision model; decision situations, screening alternatives and decision-making traps are covered. The merits of a structured rational decision-making process are emphasized. In the second part, the structuring of decision elements (values, objectives, alternatives, measures, tradeoffs, and uncertainty), expected value analysis; decision tree analysis with a single objective and corresponding risk profiles are covered. Multi-attribute utility theory (MAUT) and analytic hierarchy process (AHP) for decision under certainty, and decision trees for decisions under uncertainty are introduced. Finally, in the third part, probabilistic and non-probabilistic criteria for decision making under uncertainty; value of information; introduction to utility theory; sensitivity analysis. are discussed. Value-added risk management is also covered.

### **Course Objectives**

This course aims to introduce decision-analysis problems and techniques to resolve decision analysis situations with an overview of sample real life problems.

The main aims of this course are:

- to help students recognize types of problems that can be addressed using decision analysis and differentiate between risk and uncertainty,
- to develop skills in identifying decision elements,
- to introduce graphical and mathematical approaches for structuring and solving decision problems,
- to develop skills in applying decision analysis concepts and techniques to identify good decisions and strategies,
- to introduce sensitivity analysis tools that will help identify importance of parameters on the results of a decision analysis.

### **Learning Outcomes**

On successful completion of the course, all students will have developed:

1. skills in identifying decision elements, building and solving a decision model,
2. skills in identifying and dealing with uncertainty and risk in decision making.

On successful completion of the course, all students will be:

3. involved in teamwork,
4. aware of ethical issues.

## Teaching Policy

Each week, 3 hours of lecturing.

## Computer Usage

Spreadsheet software available at the university may be used.

## Textbook(s)

Author(s)	Title	Publisher
Robert T. Clemen and Terence Reilly	Making Hard Decisions with DecisionTools	Cengage Learning

Publication Year	ISBN
2014	978-0538797573

## Reference Books

Author(s)	Title	Publisher
Winston, Wayne L.	Operations Research: Applications and Algorithms	Cengage Learning

Golub, Andrew Lang	Decision Analysis: An Integrated Approach	Wiley
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Publication Year	ISBN
2003	978-0534380588
1997	978-0471155119

## Course Outline

Week Topic(s)

- 1 Variety of decision-making situations. General introduction to decision analysis, structuring and developing a decision model; decision situations, screening alternatives and decision-making traps
- 2 Background and formal definitions of decision making. the structuring of decision elements (values, objectives, alternatives, measures, tradeoffs, and uncertainty).
- 3 Multiple and contradicting objectives. Decision trees. Overview of problems under certainty and uncertainty.
- 4 Defining objectives and sub-objectives. Comprehensive and measurable attributes. Domination and efficient frontier solutions.
- 5 Expected value analysis; decision tree analysis with a single objective and corresponding risk profiles
- 6 Multi-attribute utility theory (MAUT) and analytic hierarchy process (AHP) for decision under certainty, and decision trees for decisions under uncertainty
- 7 Probabilistic and non-probabilistic criteria for decision making under uncertainty; value of information; introduction to utility theory; sensitivity analysis

- 8 Problems under uncertainty. The Expected Monetary Value approach to multiple objective decision making. Utility Theory. Utility functions for single-attribute problems. Assessment of utility functions. Risk aversion.
- 9 Problems under uncertainty and the Utility Theory. Utility functions for single-attribute problems. Assessment of utility functions. Risk aversion.
- 10 Utility functions for single-attribute problems. Assessment of utility functions. Risk aversion.
- 11 Multi-attribute problems under uncertainty and utility independence.
- 12 Value-added risk management
- 13 Overview of applications of decision making.
- 14 Advanced topics in decision making.

### **Lecture Hours**

Section 1: Wednesday 09:20—12:00 (Merkez Kampüs H-130 Amfi-6)

### **Grading**

Midterm-1 30%

Complementary Project 25%

Final Exam 45%

### **Lecturer**

Birce Boğa, Ph.D in Industrial Engineering

[birceboga@cankaya.edu.tr](mailto:birceboga@cankaya.edu.tr)

Office hour: TBA

### **IMPORTANT NOTES**

- Spreadsheet and some decision analysis software (e.g., Palisade Decision Tool Suite\_student trial version) may be used in class, assignments
- Communication will be made through <http://webonline.cankaya.edu.tr> Announcements should be checked regularly. Students should check their accounts to make sure that they can access the page of IE 435 through web online,
- Every student should study regularly from the textbooks.
- Regular attendance for lectures as well as recitation hours is expected. It is the responsibility of the students to avoid timetable clashes during registrations.
- Any student who has not attended at least 20% of the lectures will not be admitted to the Final exam.
- Make-up exams for the Midterms are given only for students who have medical reports given (or approved) by Çankaya University Health Center. All medical excuse reports should be officially submitted within 7 working days (starting from the end date of the medical excuse). Make-up exams will not be given for applications which are not submitted on time.
- There are no make-ups for missing complementary projects or homework.
- It is expected that interactive learning and teaching will enrich the learning experience of all students, and that each student will work in partnership with the Learning Facilitator to create a positive learning experience for all. Student engagement is a necessary condition for an effective learning experience, and includes contributions to debate and discussion, positive interactive learning with others, and an enthusiastic attitude towards inquiry.
- Everyone is expected to be a positive contributor to the class learning community, and students are expected to share the responsibility of teaching each other.

Please take a moment to read and get familiarized with the following learning concepts:

### Executive Summary

What is an Executive Summary? How to develop an Executive Summary?

Executive Summaries are much like any other summary in that their main goal is to provide a condensed version of the content of a longer report.

The executive summary is usually no longer than 10% of the original document. It can be anywhere from 1-10 pages long, depending on the report's length. Executive summaries are written literally for an executive who most likely DOES NOT have the time to read the original [document].

Executive summaries make a recommendation. Accuracy is essential because decisions will be made based on your summary by people who have not read the original.

Executive summaries frequently summarize more than one document”

In addition, please find the following Good and poor examples of executive summaries at <http://unilearning.uow.edu.au/report/4bi1.html>.

Finally, please find a more comprehensive definition and know how about Executive Summaries at the:

University Writing Center at Texas A&M

<http://writingcenter.tamu.edu/2008/types-communication/business-professional-writing/executive-summary/>