# ÇANKAYA UNIVERSITY
# Department of Industrial Engineering

## IE 512 – Decision Analysis
Spring 2020

**Instructor:**
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> Office: L-306

**Course Schedule:**
> Tuesday 18:00- 20:50 (Balgat Campus Sedam-1)

**Textbook:**
> Making Hard Decisions with Decision Tools, Clemen, R. T. and Reilly T., Duxbury Press, 2001 (HD30.23.C577C54 2001 C.1).
>
> Selected readings that will be posted on course WebOnline pages.

**Reference Books:**
> Decision Analysis, Raiffa H., Addison-Wesley, 1968.
> Decision Analysis for Management Judgement, Goodwin P. and Wright G., Wiley, 1999 (HD 30.23 G66).
> Decision Making Under Uncertainty, Holloway, C. A., Prentice-Hall, 1979.
> Decisions with Multiple Objectives, Keeney, R.L. and Raiffa, H., Wiley, 1976 (T57.95K44 1993).
> An Introduction to Bayesian Inference and Decision, Winkler R. L., Probabilistic Publishing, 2003 (QA279.5W56 2003 C.2).

**Course Description:**
> Fundamentals of decision analysis. Conflicting objectives. Decision making problems under certainty and uncertainty. Decision trees and Bayesian decision making. Risk preference of decision makers. Utility functions. The cases of single-attributes and multi-attributes. Individual versus group decisions.

**Course Objectives:**
> The ability to make good decisions is a fundamental skill for engineers and managers in any organization. This course aims to help you to make better decisions by teaching you the techniques to deal with complex and hard decisions, and by pointing out the common mistakes of intuitive decision making.
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> At the end of the course, the students will
> 1. learn engineering principals relevant to decision making,
> 2. appreciate the challenges when making decisions,
> 3. be able to identify uncertainties and multiple objectives in decision problems,
> 4. understand the behavioral aspects of risk attitudes and the utility theory
> 5. be able to structure and model real life complex decision problems,
> 6. able to resolve a decision making problem using the analytical tools of decision analysis
> 7. communicate their choices and recommendations clearly.

**Tentative Course Outline:**

Introduction to Decision Analysis
A Brief Review of Probability Theory
Decision Analysis

- Decision Rules for Stochastic and Nonstochastic Criteria
- Decision Trees
- Expected Monetary Value
- Sensitivity Analysis
- Value of Information
- Subjective Probability
- Risk Attitudes
- Utility Theory
- Group Decisions

Multiple Criteria Decision Making

- Multi-attribute Utility Theory
- Outranking Relations
- Analytic Hierarchy Process

**Course Web Page:**

A web page will be available for this course at https://webonline.cankaya.edu.tr. You will need to access this web page for announcements about class, lecture notes, and assignments. A copy of the lecture slides will be posted on Moodle at the beginning of every week. These lecture slides may not contain all the discussion, examples, and the solutions of the problems solved in the class; you are expected to use the slides to go over the plan of the week and to take notes during the class.

**Grading:**

| Midterm | 30 % |
|---|---|
| Final Exam | 35 % |
| Project | ≥ 20 % |
| Homework | ≤ 15 % |
| Total | 100 % |

**Classroom Policy:**

Every student is expected to respect the other students' right to learn. Any behavior which distracts or disturbs the other students or the instructor, or disrupts class in any way is unacceptable and will not be tolerated.

**Make-up Policy:**

A make-up examination for the midterm and the final exam will only be given under highly unusual circumstances (such as serious health or family problems). The student should contact the instructor as early as possible and provide the instructor with proper documentation (such as a medical note certified by Çankaya University's Health Center). A make-up exam may have a different format and may contain different type of questions than the regular exam.

**Attendance:**

Attendance will be taken every lecture hour. It is strongly recommended to attend all the lecture hours to understand the course material.

**Conditions that lead to the letter grade "NA":**

Not attending the Midterm Exam (or its makeup) or the Final Exam (or its makeup).