**IE 405**

**Decision Analysis**

**Course Syllabus**

**Fall 2020-2021**

**October 2nd 2020, version 1**

**Instructor**

Dr. Murat Kaya FENS G020, mkaya@sabanciuniv.edu

Office Hours: Mondays 10:40-11:40

**Teaching Assistants**

Graduate TAs: To be announced

Undergraduate TA: Ahmet Eren Keser, Talha Balın

**Prerequisite**

MATH 306

**Course Description**

The course provides a broad practical overview of topics and techniques in the field of decision analysis. As an engineering course for undergraduate students, the course will address advanced technical subjects that can be found in management science and operations research domains. At the end of the term, the students will be able to formulate decision-making problems that have multiple decisions in time, uncertain events, and conflicting objectives. We will also discuss certain behavioral issues related to decision making.

**Textbook**

Making Hard Decisions – with Decision Tools, by Robert T. Clemen, Duxbury (2nd or 3rd Edition)

Link for order (from Homer bookstore)

https://www.homerbooks.com/urun/making-hard-decisions-with-decisiontools

**Suggested Reading**

* Smart Choices: A Practical Guide to Making Better Decisions, by John S. Hammond, Ralph L. Keeney, Howard Raiffa
* Judgment in Managerial Decision Making, 9th Edition, by Max H. Bazerman,‎ Don A. Moore

**Grading**

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| --- | --- |
| 3 Midterm exams | 17% each |
| Final exam | 24% |
| Quizzes & TopHat responses | 25% |

* The lowest graded two quizzes for each student will be dropped from consideration.
* The letter grade you achieve in this course will be determined according to the weights outlined above; not according to “what letter grade you might need” for graduation. If you need a high letter grade, perform accordingly. I will be happy to provide you with guidance and support for that during the semester.
* I do NOT discuss grading-related issues with students; hence, please do not even bother to ask, especially at the end of the semester. If I receive any email about your letter grade, I delete it without reading its contents. Likewise, I do NOT grant any extra opportunity (such as an extra project etc.) to increase a particular student’s letter grade as this would be unfair to others.

**Make-up Exam Policy**

* There will be a single make-up exam to replace any one of the midterm exams or the final exam.
* The make up exam will be conducted some time after the final exam.
* A student who wants to enter into a make-up exam needs to document the reason to miss the exam (such as sickness or official appointment) and inform the instructor immediately before/after missing the exam.
* The make-up exam will be comprehensive (Includes all topics)
* The make-up exam cannot be taken to replace an already-taken exam.

**Course Policies**

* All lectures, as well as exams and quizzes will be online due to Covid-related restrictions.
* All three hours per week will be conducted live online (synchronously) via Zoom software.
* Attendance records will be taken in most lectures. These have no course grade value.
* Partial (not complete) lecture slide sets will be posted to SUCourse+.
* Recitation solutions will NOT be posted (to SUCourse+ or elsewhere).
* Students cannot share (or post to the Web) any document or recording of the course material with third parties.

**Warnings about Online Exams and Quizzes**

* Students are expected to answer online exam questions using their own sentences, based on the concepts discussed in our lectures. Online exams are not "research assignments". Students cannot use text from online or offline resources. Our lecture presentations or other course material can be used as references, but their text shall not be simply copied and pasted.
* Answers will be checked against plagiarism through TurnItIn software. Students submitting very similar answers to a question will raise suspicion. Such an act cannot be defended with statements such as "we studied and prepared answers to potential questions together". Answers that are irrelevant to our lecture discussions may also raise suspicion of web search during the exam, or the use of third-party solution services.
* Students whose online exam/quiz answers seem suspicious will be called to recorded oral exams with the instructor. The oral exam questions will not be limited only to the suspicious answers in exams; the instructor may ask other questions to evaluate the student's understanding of course material. Depending on the oral exam performance, the student may directly get an F grade or be subjected to lesser penalties.

**Disclaimer**

The instructor may have to make modifications in the syllabus due to unforeseen reasons. Students are responsible for such modifications that will be announced in lectures and/or in SUCourse+.

**List of Topics**

1) Structuring Decisions

* Elements of decision problems (objectives, alternatives, consequences etc.)
* Decision trees
* Sensitivity analysis

2) Modeling Uncertainty

* Probability review
* Bayesian inference
* Value of information
* Subjective probability
* Monte Carlo simulation

3) Modelling Preferences

* Risk attitudes
* Utility theory
* Conflicting objectives

4) Advanced Topics

* Analytical Hierarchy Process – AHP
* Decision heuristics and biases
* Judgment under uncertainty