Course Title	Code	Semester	L+P Hour	Credits	ECTS
Modeling and Decision Making for Industrial Systems	ESYE565	1-2	3	3	10

Prerequisites	None

Language of Instruction	English
Course Level	M.Sc.
Course Type	Elective
Course Coordinator	Prof. Dr. Melek BASAK
Instructors	
Assistants	
Goals	Aim of this course is to review the basics of decision making processes and developing modeling and solving skills of the students.
Content	This course covers the basics of decision making process and various approaches utilized in this process. The decision process approaches are exemplified by student presentations.

Course Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
1) Identifies the modelling steps in decision theory and recognizes the related basic concepts.	3	1,2,4	C
2) Reviews probability theory and statistical concepts including data analysis, estimation, correlation and linear regression. Uses all these concepts in the uncertainty modelling phase of Decision process.	1,2	1,2,4	C
3) Discusses various approaches in decision process via example and case presentations.	5,9	2,4	B,D
4) Examines and finalises a real world decision problem by applying all stages that take place in a decision process.	1,4,12	2,4	B,D

Teaching Methods:	1: Lecture, 2: Paper Discussion, 3: Lab, 4: Case-study
Assessment Methods:	A: Testing, B: Paper Summary, C: Homework, D: Project

COURSE CONTENT		
Week	Topics	Study Materials
1	Overview of the course, Decision making; uncertainty, preferences, and actions; decision support systems. Decision modeling tools; decision trees (influence diagrams), Bayesian networks, probability trees.	Textbook
2	Decision trees, EMV, Risk profiles, Dominance, Making Choices and Case studies	Textbook
3	Case Studies	Textbook
4	Sensitivity Analysis / Case studies	Textbook

5	Modeling Uncertainty	Textbook
6	Modeling Uncertainty: Case studies and discussions	Textbook
7	Presentations	Paper discussion
8	Presentations	Paper discussion
9	Presentations	Paper discussion
10	Presentations	Paper discussion
11	Presentations	Paper discussion
12	Presentations	Paper discussion
13	Presentations	Paper discussion
14	Discussions	

RECOMMENDED SOURCES	
Textbook	Making Hard Decisions by R.T. Clemen & T. Reilly South – Western Cengage Learning Academic Press. ISBN 0-495-01508-3.
Additional Resources	Research papers

MATERIAL SHARING	
Documents	
Assignments	
Exams	

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Assignments	4	20
Presentation	2	80
Attendance is required	14	
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

	COURSE'S CONTRIBUTION TO PROGRAM					
No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	Ability to reach knowledge in breadth and depth through scientific research in Systems Engineering field; to have extensive knowledge about current techniques and procedures together with their constraints.				X	
2	Ability to complement and apply knowledge by scientific methods utilizing limited or missing data; to use knowledge in different disciplines effectively by blending them.			X		
3	Ability to formulate Systems Engineering problems; to develop novel and original ideas and procedures for their solutions and to use innovative procedures in solutions.			X		
4	Awareness of new and developing applications in Systems Engineering; ability to investigate and learn these applications when required.			X		
5	Ability to design and apply analytical, and modeling and experimental based research; to solve and interpret complex situations encountered in this process.	X				
6	Ability to lead multi-disciplinary teams; to develop solution approaches in complicated situations and to take responsibility.					
7	Ability to develop novel and/or original ideas and methods; to develop innovative solutions for the design of systems, parts or the processes.					
8	Ability to communicate orally or in writing the process and the results of Systems Engineering studies systematically and openly in national or international platforms.					
9	Ability to master a foreign language (English) at the European Language Portfolio B2 General Level to communicate orally or in writing.				X	
10	Ability to recognize social, scientific and ethical values in the process of collection, interpretation and publishing of data, and in all professional activities.					
11	Ability to visualize social and environmental dimensions of Systems Engineering applications and to observe these dimensions in professional practice.					
12	Ability to develop appropriate methodology and procedures for the modeling, improvement, control and design of complex systems for a specified target.				X	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 13 x Total course hours)	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	13	15	195
Midterm examination	0	0	0
Project	0	0	0
Final examination	0	0	0
Presentation	2	3	6
Total Work Load			240
Total Work Load / 25 (h)			9,6
ECTS Credit of the Course			10