COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Multi Criteria Decision Making	**ESYE562**	**2**	**3+0**	**3**	**10**

Prerequisites	

Language of Instruction	English
Course Level	M. Sc.
Course Type	Elective
Course Coordinator	
Instructors	Assist.Prof. Dilek Kaptanoğlu
Assistants	
Goals	This course is designed to introduce various multiple criteria decision making techniques and their applications to complex real life problems.
Content	Determination of alternatives, criteria, and weights for complex decisions. Analysis of multi criteria decision making methods such as AHP, TOPSIS, ELECRE, and PROMETHEE. Fuzzy multi criteria decision making approaches. Introduction to goal programming.

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
Can define multi criteria decision making problems and describe basic properties of these problems.	1,2	1,2	A,D
Can propose appropriate solution techniques to real life multi criteria decision making problems and can collect the necessary data properly.	2,3,5,10	1,2,4	A,D
Can solve multi criteria decision making problems by using one of the AHP, TOPSIS, ELECTRE, PROMETHEE and similar methods or an hybrid approach.	2,3,5	1,2,4	A,D
For problems where data is not well defined can apply AHP, TOPSIS and similar approaches by using fuzzy numbers.	1,2,5	1,2	A,B
Can understand, interpret and present new multi criteria decision making approaches and applications in Literature.	4,9	1,2	B
Can develop new solution techniques.	3,7,8,9	1,2	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	Introduction to multi criteria decision making	Lecture Notes Textbook
2	Attribute generation, data, and weights	Lecture Notes Textbook
3	Noncompensatory Methods	Lecture Notes Textbook
4	Analytic Hierarchy Process (AHP)	Lecture Notes Textbook
5	TOPSIS & ELECTRE Methods	Lecture Notes Textbook
6	Introduction to fuzzy set theory	Lecture Notes
7	Fuzzy MCDM	Lecture Notes Textbook
8	Fuzzy AHP applications	Papers
9	Fuzzy TOPSIS applications	Papers
10	Fuzzy ELECTRE applications	Papers
11	PROMETHEE method and its applications	Papers
12	AHP-SWOT integration	Papers
13	Multi attribute utility theory	Lecture Notes Papers
14	Introduction to goal programming	Lecture Notes Papers

RECOMMENDED SOURCES

Textbook	Multiple Attribute Decision Making : An Introduction – K . Paul Yoon, Ching-Lai Hwang, SAGE Publications, 1995
Additional Resources	Lecture notes, selected papers

MATERIAL SHARING

Documents	Lecture Notes

Assignments	Papers, project
Exams	1 Final

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Paper Presentations	2	30
Term Project	1	70
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		30
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		70
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.				X	
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.				X	
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.				X	
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.					

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration	14	3	42
Paper reading and presentations	5	25	125
Term Project	1	50	50
Off-the-classroom study for the final	1	40	30
Final examination	1	3	3
Total Work Load			250
Total Work Load / 25 (h)			10
ECTS Credit of the Course			10