



**ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT
COURSE INFORMATION FORM**

Course Title	Course Code
Fuzzy Logic	151228545

Semester in Program	Number of Course Hours per Week		ECTS Credit
	Theory	Practice	
8	3	2	7

Course ECTS Credit Distribution				
Basic Sciences	Engineering Sciences	Design	General Education	Social
2	5	0	0	0

Language of Instruction	Course Level	Course Type
English	Undergraduate	Elective

Prerequisite	None
Objectives of the Course	To introduce the fuzzy logic concept, to teach the principles of fuzzy logic and to make the students gain the ability of modeling and interpreting sophisticated systems by using fuzzy logic aspects.
Brief Course Content	Classical sets and fuzzy sets, classical and fuzzy relations, membership functions, crisp-to-fuzzy and fuzzy-to-crisp conversions, fuzzy arithmetic, extension rule, fuzzy rule based systems, fuzzy clustering, fuzzy classification.

Learning Outcomes of the Course	Contributed POs	Teaching Methods *	Assessment Methods **
1 To understand the fundamental concepts of fuzzy logic.	1	1	A,D,E,J
2 To gather sufficient information for analyzing a pre-designed fuzzy system.	2,4	1,4,6	A,D,E,J
3 To gain the ability to create basic designs using fuzzy logic, including determining membership functions, constructing fuzzy rule-based systems, and converting crisp values to fuzzy values through fuzzification, as well as converting fuzzy values to crisp values through defuzzification.	2,3,4	1,4,6	A,D,E,J
4			
5			
6			
7			
8			

*Teaching Methods 1:Lecture, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

**Assessment Methods A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

Main Textbook	Timothy J. Ross, Fuzzy Logic With Engineering Applications, Wiley, 2010.
Supplementary Resources	J.R. Jang, C.Sun, Neuro-Fuzzy and Soft Computing, Prentice Hall, 1997. Kar, R., Le, D. N., Mukherjee, G., Mallik, B. B., & Shaw, A. K. (Eds.), Fuzzy Logic Applications in Computer Science and Mathematics. John Wiley & Sons, 2023.
Necessary Course Material	

Course Weekly Schedule	
1	Fuzzy logic – introduction (Lab: MATLAB – introduction)
2	Classical sets, fuzzy sets (Lab: Fuzzy set operations (complement, union, intersection))
3	Classical relations, fuzzy relations (Lab: Classical Cartesian product, fuzzy Cartesian product)
4	Discrete and continuous membership functions (Lab: Classical and fuzzy relations and compositions)
5	Membership function generation methods (Lab: Membership functions)
6	Fuzzy-to-crisp conversions (Lab: Fuzzification and defuzzification methods)
7	Fuzzy arithmetic, fuzzy numbers (Lab: Fuzzy arithmetic examples)
8	Mid-Term Exams
9	Fuzzy extension principle (Lab: Fuzzy extension problems)
10	Comparisons of classical sets and fuzzy sets (Lab: MATLAB fuzzy logic toolbox)
11	Fuzzy rule based systems (Lab: Fuzzy inference systems)
12	Mamdani fuzzy inference system (Lab: Mamdani FIS examples)
13	Sugeno fuzzy inference system (Lab: Sugeno FIS examples)
14	FIS with MATLAB (Lab: advanced applications)
15	Fuzzy clustering, fuzzy classification (Lab: Fuzzy clustering examples)
16,17	Final Exams

Calculation of Course Workload			
Activities	Count	Time (Hour)	Total Workload (Hour)
Weekly classroom time	14	5	70
Weekly study time (review, reinforcing, preparation)	14	3	42
Homework	6	3	18
Taking a quiz			
Studying for a quiz			
Oral exam			
Studying for an oral exam			
Report writing (Preparation and presentation time included)	6	3	18
Project (Preparation and presentation time included)	1	20	20
Presentation (Preparation time included)			
Mid-Term Exam	1	2	2
Studying for Mid-Term Exam	1	20	20
Final Exam	1	2	2
Studying for Final Exam	1	20	20
		Total workload	212
		Total workload / 30	7.07
		Course ECTS Credit	7

Assessment	
Activity Type	%
Mid-term	20
Homework	10
Project Observation	30
Bir öğe seçin.	
Bir öğe seçin.	

Final Exam	40
Total	100

COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES

(5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)

NO	PROGRAM OUTCOMES	Contribution
1	a. Sufficient knowledge of mathematics	3
	b. Sufficient knowledge of basic sciences	
	c. Sufficient basic engineering and Electrical-Electronics engineering knowledge	
	d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems	
2	Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.	5
3	Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.	4
4	To analyze and solve the complicated engineering problems:	4
	a. skill of developing, selecting and applying the required techniques and devices	
	b. skill of using information technologies effectively	
5	To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects:	
	a. skill of experimental design	
	b. skill of performing the experiments, collecting the data and analyzing and interpreting the results	
6	a. Skill of performing individual studies	
	b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies	
7	a. Skill of effective oral and written communication in Turkish and English	
	b. Skill of improving and using foreign language knowledge	
	c. Skill of effective reporting, understanding the reports and preparing the design and production reports	
	d. Skill of effective presentation and giving and getting clear and understandable instructions.	
8	Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology	
9	a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities	
	b. Knowledge about legal regulations and standards of engineering	
10	a. Knowledge about project management, risk management and change management	
	b. Awareness of the significance of entrepreneurship and innovation	
	c. Knowledge about sustainable development	
11	Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions	
12	Knowledge about modern problems in local and universal scale	

INSTRUCTORS

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Date:18.07.2024