



ESOGÜ Electrical-Electronics Engineering Department

COURSE CODE: 151228545 - 151248545

COURSE TITLE: Fuzzy Logic

Semester	Weekly Hours		COURSE					
	Theoretical	Practical	Credits	ECTS	Type	Language		
8	3	2	4	7	Compulsory () Elective (x)	Turkish () English (x)		
Write the credit (for non-credit courses weekly hours) below (If necessary distribute the credits.).								
Math and Basic Science			Electrical Engineering [mark (√) if there is high design content]		General Education	Humanities		
0			4 ()		0	0		
Assessment			THEORETICAL-PRACTICAL COURSES			LABORATORY COURSES		
Midterm			Type	Number	%	Activity Type	Number	%
			Midterm	1	30	Quiz		
			Quiz			Lab performance	10	30
			Homework			Report		
			Project			Oral exam		
			Other (.....)			Other (.....)		
Final				1	40			
Makeup exam (Oral/Written)			oral					
Prerequisites			none					
Brief content of the course			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 decision making, fuzzy classification.					
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.					
Contribution of the course towards professional education			Students will get familiar with the concept of fuzzy logic and they will use their knowledge in designing a fuzzy logic application or in understanding a fuzzy logic system.					
Outcomes of the course			1) To learn the principle information about fuzzy logic 2) To gain enough information to analyze a predesigned fuzzy system. 3) To be able to make basic designs (including determination of membership functions, construction of fuzzy rule-based systems and usage of crisp values in terms of fuzzy by making fuzzification and/or usage of fuzzy values in terms of crisp by making defuzzification) by using fuzzy logic					
Textbook of the course			Timothy J. Ross, Fuzzy Logic With Engineering Applications, Wiley, 2010.					
Other reference books			1) J.R. Jang, C.Sun, Neuro-Fuzzy and Soft Computing, Prentice Hall, 1997 2) G.J. Klir, B. Yuan, Fuzzy Sets and Fuzzy Logic Theory and Applications, Prentice Hall, 1995					
Required material for the course								

WEEKLY PLAN OF THE COURSE	
Week	Topics
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	Midterm
9	Midterm
10	Fuzzy extension principle (Lab: Fuzzy extension problems)
11	Comparisons of classical sets and fuzzy sets (Lab: MATLAB fuzzy logic toolbox)
12	Fuzzy rule based systems (Lab: Fuzzy inference systems)
13	Mamdani and Sugeno fuzzy inference systems (Lab: Mamdani FIS and Sugeno FIS examples)
14	Fuzzy decision making, fuzzy classification (Lab: Fuzzy clustering examples)
15,16	Final

NO	OUTCOMES OF THE PROGRAMME	4	3	2	1
1	Adequate knowledge of mathematics, science and Electrical and Electronic Engineering; ability to practice theoretical and practical knowledge of these areas into modeling and solving complex problems of Electrical and Electronic Engineering		X		
2	Ability to identify complex engineering problems in Electrical and Electronic Engineering and related fields, for this purpose having skills to formulate, select and apply appropriate methods.	X			
3	Having skills to apply modern design methods to design a complex system, process, equipment or product that should work under realistic conditions and constraints and satisfy specific requirements concerning the Electrical and Electronic Engineering.		X		
4	Having skills to develop, select and apply modern techniques and tools needed to analyze and solve complex applications in Electrical and Electronic Engineering, skills to use information technology effectively.		X		
5	Skills to design and conduct tests, collect data, analyze results, and interpret data for the experimental investigation of complex problems in Electrical and Electronic Engineering				
6	Ability to function effectively as an individual and as a member of teams within the discipline and in multidiscipline areas.				
7	Communicating effectively in oral and written form both in Turkish and English. Effective report writing and understanding written reports, preparing design and manufacturing reports, making effective presentations, skills to give and receive clear and concise instructions.				
8	Awareness of the necessity of lifelong learning, access to information, monitoring developments in science and technology and the ability to self-renewing				
9	Understanding of professional and ethical responsibility				
10	Information on project management, change management and risk management practices, awareness on entrepreneurship and innovation, knowledge on sustainable development.				
11	Information about universal and societal effects of engineering applications on health, safety and environment; awareness of the legal consequences of engineering solutions.				

Scale for assessing the contribution of the course to the program outcomes:

4: High 3: Medium 2: Low 1:None

Name of Instructor(s): Yrd. Doç. Dr. H. Serhan Yavuz

Signature(s): **Date:** March 10, 2016