Identification	Subject	CMS 425 Soft Computing 3KU /6ECTS		
	Department	Computer Science		
	Program	Undergraduate		
	Term	Fall 2023		
	Instructor	PhD. Associate Professor Levla Muradkhanli		
	E-mail:	levla@khazar.org		
	Phone:	$(+994\ 12)\ 421-10-93$		
	Classroom/hours	11 Mehseti str. (Neftchilar campus)		
	Office hours	hy appointment		
Duouoquigitag	CMS 204 C Drogramming Language CMS 216 Database Management			
I l'éléquisités	Systems	mining Language, CMS 510 Database Management		
Longuaga	English			
Commulative	Description d			
Compulsory/Elective	Required			
Textbooks and course	Textbooks:			
materials	1. Principles of Soft	t Computing by S.N. Sivanandam, S.N. Deepa, 3 ^{ra}		
	edition, Wiley, 2019	•		
	2. Concepts of Soft	Computing: Fuzzy and ANN with Programming by		
	Snehashish Chakray	verty, Deepti Moyi Sahoo, Nisha Rani Mahato,		
	Springer, 2019.			
	3. Neural Networks	and Deep Learning, Charu C. Aggarwal, Springer,		
	2018.			
	Web Resources:			
	Fuzzy Logic Tutor	ial:		
	Fuzzy Logic Tutor https://www.tutori	ial: alspoint.com/fuzzy_logic/index.htm		
	Fuzzy Logic Tutor <u>https://www.tutori</u> Artificial Neural N	ial: <u>alspoint.com/fuzzy_logic/index.htm</u> etwork Tutorial:		
	Fuzzy Logic Tutor https://www.tutori Artificial Neural N	ial: <u>alspoint.com/fuzzy_logic/index.htm</u> etwork Tutorial: alspoint.com/ortificial_pourol_potwork/index.htm		
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	Fuzzy Logic Tutor https://www.tutori Artificial Neural N https://www.tutori Genetic Algorithm https://www.tutori	ial: alspoint.com/fuzzy_logic/index.htm etwork Tutorial: alspoint.com/artificial_neural_network/index.htm s Tutorial: alspoint.com/genetic_algorithms/index.htm		
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	Fuzzy Logic Tutor https://www.tutori Artificial Neural N https://www.tutori Genetic Algorithm https://www.tutori Matlab Tutorial : https://www.tutori	ial: alspoint.com/fuzzy_logic/index.htm etwork Tutorial: alspoint.com/artificial_neural_network/index.htm s Tutorial: alspoint.com/genetic_algorithms/index.htm alspoint.com/matlab/index.htm		
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Course outline	Fuzzy Logic Tutor https://www.tutori Artificial Neural N https://www.tutori Genetic Algorithm https://www.tutori Matlab Tutorial : https://www.tutori This course provide Computing methodo Logic, Neural Netw The course combine using different tools	ial: <u>alspoint.com/fuzzy_logic/index.htm</u> etwork Tutorial: <u>alspoint.com/artificial_neural_network/index.htm</u> s Tutorial: <u>alspoint.com/genetic_algorithms/index.htm</u> <u>alspoint.com/matlab/index.htm</u> s an introduction to the basic concepts of Soft blogy and covers three main components - Fuzzy orks, and Evolutionary Computation. s theoretical foundations with practical applications and techniques.		
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	To familiarize with neural networks and learning methods for neural			
	networks:			
	 To introduce basics of genetic algorithms and their applications in 			
	 To introduce basics of genetic algorithms and their applications in optimization and planning; 			
	To introduce students too	g, Is and techniques of Sof	t Computing.	
	 To introduce students to: To develop skills thorous 	the understanding of the f	heoretical and	
	practical aspects of Soft	Computing.	neoretical and	
Learning outcomes	After studying this course the	e student should be able	to:	
_	 Understand the need for Soft Computing; 			
	• Understand different uses of Soft Computing in various areas;			
	 Understand the steps involved in the development of Soft 			
	Computing;			
	Acquire a working kr	nowledge of some popula	ar tools for Soft	
	Computing;			
	• Design, implement an	nd verify computing syst	ems by using	
	appropriate Soft Com	puting techniques and to	ools.	
Teaching methods	Lecture		Х	
	Group discussion		Х	
	Experiential exercise		Х	
	Simulation		Х	
	Course paper		Х	
Evaluation	Methods	Date/deadlines	Percentage (%)	
	Midterm Exam		30	
	Assignment and quizzes		20	
	Project		15	
	Final Exam		35	
	Total		100	
	 Assignment and quizzes 			
Policy	Three assignments and one	e quiz will be during	the semester. These	
	assignments will range f	from small programm	ing assignments to	
	assignments using a set of t	tools, such as Matlab. Q	Juiz will cover Fuzzy	
	Logic topics.			
	Project			
	Students will develop appli	ications choosing one of	of the topics on Soft	
	Computing (Fuzzy Logic N	aural Networks, Genetic	Algorithms) Students	
	should submit 12 15 pages n		Algorithms). Students	
	should sublint 12-15 pages fo	esearch paper, program d	codes and will give 15	
	minute presentation to the class, in the last week of the semester.			
	 Preparation for class 			
	The lecture material will	focus on the major points	introduced in the text.	
	Reading the assigned ch	apters and having some	familiarity with them	
	before class will greatly	assist your understandin	g of the lecture. After	
	the lecture, you should st	udy your notes and work	relevant problems.	
	We will also have many review sessions throughout the semester. These			
	review sessions will take place during the regular class times			
	review sessions will take place during the regular class times.			
	This source strictly full	va andina nalifu	School of Science 1	
	This course strictly follows grading policy of the School of Science and			
	Engineering. Thus, a student is normally expected to achieve a mark of			
	at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year.			

		 Cheating/plagiarism Cheating or other plagiarism during the Quizze Examinations will lead to paper cancellation. In will receive a zero (0) without any considerations Professional behavior guidelines The students shall behave in the way to create far professional environment during the class hours. discussions and unethical behavior are strictly professional should not arrive in late to class. All cell phones must be turned off and stowed class. 	es, Midterm and Final a this case, the student vorable academic and Unauthorized bhibited. away before entering
		Use of any electronic devices is not allowed violators will be purished accordingly.	in the classroom and
		Tentative Schedule	
Week	Date/Day (tentative)	Topics	Textbook/Assignm ents
1	23.09.2023	Overview of course Basic of Soft Computing Introduction to Soft Computing. The main components and characteristics of Soft Computing.	Chapter 1 [1] Handout
2	30.09.2023	Fuzzy Logic and Systems Fuzzy Sets and Membership Functions. Operations on Fuzzy Sets. Fuzzification.	Chapter 10, 12 [1] Chapter 2 [2]
3	07.10.2023	Fuzzy Numbers Uncertain Fuzzy Values. Fuzzy Numbers and its L-R representation. Operations on Fuzzy Numbers.	Chapter 14 [1] Chapter 3 [2]
4	14.10.2023	Fuzzy Logic Toolbox in Matlab Assignment 1	Chapter 26 [1] Web Resources
5	21.10.2023	Fuzzy Relations Cartesian product. Binary Fuzzy Relations. IF-THEN fuzzy relation. n-ary Fuzzy Relations. Compositions of Fuzzy Relations. max-min composition. max-product composition.	Chapter 11 [1] Chapter 4 [2]
6	28.10.2023	Fuzzy Inference Systems Architecture of Fuzzy Inference System.	Chapter 15 [1]

		Fuzzy Inference Rules and Reasoning. Defuzzification. <i>Quiz</i>	
7	04.11.2023	Applications of Fuzzy Logic Fuzzy Control Systems. Pattern Analysis and Classification. Fuzzy Expert Systems.	Chapter 17, 24 [1]
8	11.11.2023	Midterm Exam	
9	18.11.2023	Neural Networks Artificial Neural Networks. Models of Neuron. Architecture of Neural Networks. Feed-forward Neural Networks. Recurrent Neural Networks. Network layers. Perceptrons.	Chapter 2 [1] Chapter 10 [2] Chapter 1[3]
10	25.11.2023	Learning Methods for Neural Networks Supervised Learning. Unsupervised Learning. Reinforcement Learning. Transfer Function. Back-Propagation Algorithm. Assignment 2	Chapter 3 [1] Chapter 10 [2] Chapter 2, 3 [3]
11	02.12.2023	Applications of Neural Networks Neural Networks in Business. Neural networks in Medicine.	Chapter 5, 24 [1]
12	09.12.2023	Genetic Algorithms and Evolutionary Computation Basics of Genetic Algorithms : Representation methods Selection Crossover Mutation	Chapter 21 [1]
13	16.12.2023	Applications of Genetic AlgorithmsGenetic Algorithms on optimization and planning : Traveling Salesman Problem. Genetic Algorithms in Business and their role in Decision Making. Intelligent Control Using Evolutionary Computation. Assignment 3	Chapter 22,24 [1]

14	23.12.2023	Hybrid Systems	Chapter 23 [1]
		Fuzzy-Evolutionary System Neuro-Fuzzy System Neuro-Fuzzy-Evolutionary System Neuro-Evolutionary System	
15	30.12.2023	Project Presentation	
		Final Exam	

This syllabus is a guide for the course and any modifications to it will be announced in advance.