



The University of Jordan
School of Engineering
Industrial Engineering Department
First Semester 2018/2019

Course name:	Algorithm Design and Programming		
Course code:	IE 0906454		
Credits hours	3		
Contact hours/room:	12:30-14:00 Mon & Wed / Almazar		
Course instructor's name, E-mail, and phone:	Wafa' AlAlaween, Ph.D., AFHEA		
	w.alaween@ju.edu.jo		
	22942		
Office hours	12:00-13:00 Sun, Tue & Thu; 11:30-12:30 Mon & Wed		
Text books:	Timothy R.J., Fuzzy Logic with Engineering Applications (3rd Edition), 2010. John Wiley & Sons.		
Other reference(s):	-		
Course Description:	<p>This course introduces students to the different algorithms presented in the field of Artificial Intelligence (AI) with emphasis on its deigning, modelling and programming. The real world systems are complex, the complexity arises from uncertainty in the form of imprecision/vagueness/ambiguity/fuzziness. Modelling these systems and expressing them using the traditional algorithmic approaches are not always possible. This course explores the essential theory behind designing, developing and programming systems that demonstrate intelligent behaviors, learning from experience and mimicking nature behaviors to represent real world systems and to consider uncertainties.</p>		
Providing Department:	Industrial Engineering		
Prerequisite Course:	Operations Research (1) (IE 0906353)		
Course type	Elective		
Assessment Methods:	Method	Weight %	Date
	Midterm Exam	30	1/11/2018
	Project	20	10/12/2018
	Quizzes	10	N/A
	Final Exam	40	TBDL
Course Learning Outcomes:	#	After successful completion of this course, the student will be able to	SO
	CLO1	Demonstrate good knowledge of basic theoretical foundations of the common intelligent system algorithms, such as neural network, fuzzy logic, fuzzy and probabilistic reasoning, genetic algorithm, etc.	a, e,
	CLO2	Learn how to mathematically represent, model and deal with uncertainties.	a, b, e

	CLO3	Demonstrate, in the form of a group project, the ability to design and program an intelligent system for a selected application.	a, b, c, d, e, f, g, k
	CLO4	Use the graphical user interface and program the given algorithms using Matlab software.	b, d, i, k
	CLO5	Use the fuzzy set theory on the statistical method to analyze statistical data by using fuzzy logic methods.	a, j
	CLO6	Integrate the statistical methods with the fuzzy logic theory to analyze complex systems. Also, make decision based on fuzzy and probabilistic information.	a, c, h, j
	CLO7	Understand and appreciate the basic concept of Genetic algorithms and use the various Genetic algorithm operators to solve different types of problems.	a, c, e, h
	CLO8	Use Genetic algorithms and neural networks to define the fuzzy membership functions.	a, b, c, e, j
Brief list of topics	Credit hours	Reading materials	Topics
	3	Ch. 1	Introduction to fuzzy logic 1. The Utility and limitations of Fuzzy Systems. 2. Uncertainty and Accuracy 3. Uncertainty and Information 4. Fuzzy Sets and Membership
	7	Ch. 2, 3	Crisp and fuzzy 1. Operations 2. Properties 3. Relations
	20	Ch. 4, 5, 6, 9	Fuzzy systems 1. Membership functions: Features and development 2. Fuzzification 3. Inference: Rules 4. Defuzzification 5. Logic and fuzzy systems 6. Fuzzy toolbox in Matlab
	7	Ch. 9	Decision making with fuzzy information 1. Multiobjective Decision Making 2. Fuzzy Bayesian Decision Method 3. Decision Making Under Fuzzy States and Fuzzy Actions
	7	Selected research papers	Neural Networks 1. Feedforward mappings 2. Backpropagation learning algorithm 3. Optimization algorithms Genetic Algorithms 1. Basic operators. 2. Coding genes and representation. 3. Population generation. 4. Various operators for selection, crossover, mutation.

Important Notes:	<ul style="list-style-type: none"> • Do not hesitate to ask questions • You are required to bring a notebook and take notes in classes. • Students are expected to attend every class session and they are responsible for all material, announcements, schedule changes, etc., discussed in class. • Discuss the assignments among yourselves • Don't Cheat; direct copying of others work will NOT be allowed or tolerated and will result in a reduction of grade. If you are found to be cheating in any way, on an exam or assignment, even signing the roll sheet for another student, you will be given an "F" for the course. There will be no exceptions. • All cases of academic dishonesty will be handled in accordance with university policies and regulations. JU policy requires the faculty member to assign ZERO grade (F) if a student misses 15% of the classes that are not excused, and 20% of the classes that are excused • Students are expected to be ready to take a quiz any time they have a class. There will be no make-up quizzes or home works. • Any students with disabilities who need accommodations in this course are encouraged to speak with the instructor as soon as possible to make appropriate arrangements for these accommodations.
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<i>The B.Sc. in industrial Engineering program enables students to achieve, by the time of graduation the following program learning outcome (SOs)</i>			
a	<i>An ability to apply knowledge of mathematics, science and engineering.</i>	g	<i>An ability to communicate effectively.</i>
b	<i>An ability to design and conduct experiments, as well as to analyze and interpret data.</i>	h	<i>An ability to understand the impact of engineering solutions in a global, economic, environmental and societal context.</i>
c	<i>An ability to design a system, component, or process to meet desired needs within realistic constraints.</i>	i	<i>An ability to engage in life-long learning.</i>
d	<i>An ability to function productively as part of multidisciplinary teams and show leadership qualities.</i>	j	<i>An ability to acknowledge contemporary issues related to the discipline.</i>
e	<i>An ability to identify, formulate and solve engineering problems.</i>		
f	<i>An ability to understand professional and ethical responsibilities.</i>	k	<i>An ability to use techniques, skills and modern engineering tools necessary for engineering practice.</i>