



**The University of Jordan**  
**School of Engineering**  
**Industrial Engineering Department**  
**Second Semester 2023/2024**

<b>Course name:</b>	Selected Topics in Manufacturing engineering		
<b>Course code:</b>	IE 0906501		
<b>Credits hours</b>	3		
<b>Contact hours/room:</b>	13:00-14:30 Mon & Wed		
<b>Course instructor's name, E-mail, and phone:</b>	Wafa' AlAlaween, Ph.D., AFHEA		
	<a href="mailto:w.alaween@ju.edu.jo">w.alaween@ju.edu.jo</a>		
	22942		
<b>Office hours</b>	12:30-13:30 Sun, Tue & Thu, 14:30-15:00 Mon & Wed		
<b>Text books:</b>	Timothy R.J., Fuzzy Logic with Engineering Applications (3rd Edition), 2010. John Wiley & Sons.		
<b>Other reference(s):</b>	-		
<b>Course Description:</b>	This course introduces students to the different algorithms presented in the field of Machine Learning 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.		
<b>Providing Department:</b>	Industrial Engineering		
<b>Prerequisite Course:</b>	IE 0906415		
<b>Course type</b>	Elective		
<b>Assessment Methods:</b>	<b>Method</b>	<b>Weight %</b>	<b>Date</b>
	Midterm Exam	30	TBDL
	Project	20	TBDL
	Quizzes	10	TBDL
	Final Exam	40	TBDL
<b>Course Learning Outcomes:</b>	#	<b>After successful completion of this course, the student will be able to</b>	<b>SO</b>
	<b>CLO1</b>	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.	<b>1</b>
	<b>CLO2</b>	Learn how to mathematically represent, model and deal with uncertainties.	<b>1,4,7</b>

	<b>CLO3</b>	Demonstrate, in the form of a group project, the ability to design and program an intelligent system for a selected application.	<b>1,2,3,4,5,6</b>
	<b>CLO4</b>	Use the graphical user interface and program the given algorithms using Matlab software.	<b>6,7</b>
	<b>CLO5</b>	Use the fuzzy set theory on the statistical method to analyze statistical data by using fuzzy logic methods.	<b>1,2</b>
	<b>CLO6</b>	Integrate the statistical methods with the fuzzy logic theory to analyze complex systems. Also, make decision based on fuzzy and probabilistic information.	<b>1,7</b>
	<b>CLO7</b>	Understand and appreciate the basic concept of Genetic algorithms and use the various Genetic algorithm operators to solve different types of problems.	<b>1,2,7</b>
	<b>CLO8</b>	Use Genetic algorithms and neural networks to define the fuzzy membership functions.	<b>1,2,7</b>
<b>Brief list of topics</b>	<b>Credit hours</b>	<b>Reading materials</b>	<b>Topics</b>
	<b>3</b>	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
	<b>7</b>	Ch. 2, 3	Crisp and fuzzy 1. Operations 2. Properties 3. Relations
	<b>20</b>	Ch. 4, 5, 6, 7	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
	<b>7</b>	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
	<b>7</b>	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.

<b>Important Notes:</b>	<ul style="list-style-type: none"> <li>• Do not hesitate to ask questions</li> <li>• You are required to bring a notebook and take notes in classes.</li> <li>• Students are expected to attend every class session and they are responsible for all material, announcements, schedule changes, etc., discussed in class.</li> <li>• Discuss the assignments among yourselves</li> <li>• 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.</li> <li>• 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</li> <li>• 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.</li> <li>• 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.</li> </ul>
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<b><i>The B.Sc. in industrial Engineering program enables students to achieve, by the time of graduation the following program learning outcome (SOs)</i></b>			
<b>1</b>	<i>An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.</i>	<b>5</b>	<i>An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.</i>
<b>2</b>	<i>An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.</i>	<b>6</b>	<i>An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.</i>
<b>3</b>	<i>An ability to communicate effectively with a range of audiences.</i>	<b>7</b>	<i>An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.</i>
<b>4</b>	<i>An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.</i>		