

جامعة الزيتونة الأردنية Al-Zaytoonah University of Jordan كلية العلوم وتكنولوجيا المعلومات Faculty of Science and IT



" عراقة وجودة" "Tradition and Quality"

Ai tinciai intelligence Depai tinent	QF01/0408-4.0E	Course Plan for Bachelor program - Study Plan Development and Updating Procedures/ Artificial Intelligence Department
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Study plan No.	2021/2022		University Specialization		Artificial Intelligence	
Course No.	0142231		Course name		Principles of Artificial Intelligence	
Credit	3				Introduction to	
Hours			Prerequisite Co-requisite		Information	
					Technology	
Course	□ MANDATORY □ UNIVERSITY	UNIVERSITY ELECTIVE	□ FACULTY MANDATORY	□ Support course family	Mandatory requirement	✓Elective requirements
type	REQUIREMENT	REQUIREMENTS	REQUIREMENT	requirements	s	
Teaching style	□ Full online learning		□ Blended learning		Tradition	nal learning
Teaching model	□ 2Synchronous: 1	asynchronous	$\square 2 \text{ face to face :}$	1synchronous	3 Tradit	ional

Faculty member and study divisions information (to be filled in each semester by the subject instructor)

Name	Academic rank	Office No.	Phone No.	E-mail	
Division number	Time	Place	Number of students	Teaching style	Appro ved model

Brief description

This course aims to give an introduction to artificial intelligence, symbolic logic and its uses in knowledge representation, control methods, discretionary research methods, and applications of artificial intelligence (expert systems, natural language processing, robotics...). Introduction to Neural Networks, Genetic Algorithm, and Introduction to Machine Learning.

Learning resources

Learning resources	
Course book information (Title, author, date of issue, publisher etc)	 George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving: Addison-Wesley, latest edition. ISBN 0-201-64866-0 Artificial Intelligence: Building Intelligent Systems. (1st edition) by P. Kulkarni and P. Joshi, PHI Learning Private Limited, 2015. ISBN: 978-81-203-5046-5
Supportive learning resources (Books, databases, periodicals, software, applications, others)	 Russell and Norvig, Artificial Intelligence: A Modern Approach, 3rd edition, Pearson Education, Inc., Prentice-Hall-Series, 2010. Jeff Heaton, Artificial Intelligence for Humans, Volume.1,





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 Fundamental Algorithms, Kindle Edition, 2013. 3- Alan Mackworth and David Poole, Artificial Intelligence Foundations of Computational Agents, Cambridge Canada Press 2010. 4- Robots Are People Too: How Siri, Google Car, and Artificia Intelligence Will Force Us to Change Our Laws by John H Weaver. Praeger,Nov. 2013. ISBN: 1440829462, 9781440829468. 					idge Canada Press, Car, and Artificial Laws by John F.		
Supporting websit	es	 Artificial Intelligence Applications Institute (AIAI) <u>http://www.aiai.ed.ac.uk</u> 2. 					
The physical envir teaching	ronment for	Class room	□ labs	☐ Virtual educational platform	□ Others		
Necessary equipm software	ient and	PROLOG, JAVA, PYTHON					
Supporting people needs	with special						
For technical supp	oort						

Course learning outcomes (S = Skills, C= Competences K= Knowledge,)

No.	Course learning outcomes	The associated program learning output code
	Knowledge	
K1	1. Identify and apply knowledge representation formalisms with	MK1
	emphasis on propositional and predicate calculus but also with	
	conceptual graphs, including representation of uncertainty	
K2	2. Analyse problems as state space graphs, and apply heuristic state	MK2
	space searches including planning using Prolog or Lisp.	
K3	3.1 Understanding the concepts of production systems.	MK3
	3.2 Learning the main components of production systems.	
K4	4.1 Learning the concepts of PROLOG language.	MK4
	4.2 Learning the statements, rules and queries of Prolog language.	
K5	5.1 Learning the concepts of expert systems and applications.	MK5
	5.2 Learning the concepts of Knowledge Based Systems.	
	5.3 Learning the concepts of machine learning.	
K6	6. Evaluate a state space search algorithm in terms of admissibility,	MK6
	monotonicity, and informedness.	
K7	7. Analyze and evaluate expert systems.	MK7
K8	8. Identify learning techniques: symbol based (supervised and	MK8
	unsupervised), reinforcement, neural networks, and genetic algorithms	
K9	9. Analyse the main approaches to natural language processing	MK9
	Skills	
S1	Knowledge and its application. Demonstrate and apply critical	MS1
	understanding of the artificial intelligence (AI) principles.	
S2	Research skills. Gain skills how to synthesize and apply theoretical	MS2
	knowledge of AI.	



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S 3	-	ies. Be able to analyze the organizational capability to provide recommendations from an AI perspective.	MS3		
S4	citizenship pa	es. Adhere to the principles of professional ethics and rticipating in discussions on relevant academic issues. Be te team and be accountable for its performance.	MS4		
S 5	Personal abil thinking, and	ities. Develop personal and professional abilities, critical creativity.	MS5		
		Competences			
C1	Use programm	ning languages	MC1		
C2	Solve comput	er problems with Math	MC2		
C3	Exploit the pr	MC3			
C4	Develop trans	actional web applications	MC4		
C5	Develop game	e or simulation applications	MC5		

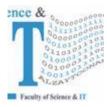
Mechanisms for direct evaluation of learning outcomes

Type of assessment / learning style	Fully electronic learning	Blended learning	Traditional Learning (Theory Learning)	Traditional Learning (Practical Learning)
First exam				
Second / midterm exam			%30	
Participation / practical applications			20	
Asynchronous interactive activities			0	
final exam			%50	

Note: Asynchronous interactive activities are activities, tasks, projects, assignments, research, studies, projects, work within student groups ... etc, which the student carries out on his own, through the virtual platform without a direct encounter with the subject teacher.

Schedule of simultaneous / face-to-face encounters and their topics

Week	Subject		learning style*	Reference **
1	AI: HISTORY AND APPLICATIONS 1.1. Attitudes toward Intelligence, Knowledge, and Human Artifice 1.2. Overview of AI Application Areas 1.3. Artificial Intelligence: An Attempted Definition	•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving.
2	2. THE PREDICATE	•	Classroom lectures,	George F. Luger.



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2	2.2. The P Using Infe Predicate	ropositional Calculus redicate Calculus 2.3. erence Rules to Produce Calculus Expressions	 discussions, and review of theoretical concepts. Laboratory practical sessions. slides 	Artificial Intelligence: Structures and Strategies for Complex Problem Solving
3	STRA SPAC 3.1. Graph 3.1.1. Space Sea 3.1.2. Represent Strategies Searches 3.2.1. Driven Sea 3.2.2. D First Sear 3.3. Usin Represent 3.3.1. S of a Logic	Structures for State rches State Space ations of Problems 3.2. for State Space Data-Driven and Goal- arches Depth-First and Breadth- ches g the State Space to Reasoning State Space Descriptions	 Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides 	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving
4	4. HEURI "Best-Firs Heuristic S Systems 4.3. Admis Inforn 4.4. Heuris 4.4.1. Proce 4.4.2. Proce 4.5. Comp	STIC SEARCHES 4.1. at'' Searches 4.2. Searches and Expert ssibility, Monotonicity, medness stics in Games The Minimax dure The Alpha-Beta dure lexity Issues	 Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides 	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving
5		vision Midterm exam 30%		
6	SPACE SI 5.1. Recur 5.2. Patter	ROL AND ENTATION OF STATE EARCHES sion-Based Searches n-Directed Searches ction Systems	 Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides 	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem



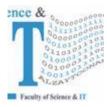
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	5.4. The B for Proble	lackboard Architecture m Solving			Solving
7	6.1. AI Re 6.1.1. S 6.1.2. S Conce Types, 6.2.2. T 6.2.3. G Specia 6.2.4. P 6.2.5. L 6.3. Alter Repres 6.4. Agen	ENTATION presentational Schemes Semantic Networks Scripts, Frames 6.2. ptual Graphs 6.2.1. Individuals, and Names he Type Hierarchy eneralization and lization ropositional Nodes	•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving
8	7. STRON PROBLE 7.1. Exper 7.2. Rule- 7.2.1. Driver Heuris 7.3. Mode	IG METHOD M SOLVING et Systems Technology Based Expert Systems Goal-Driven and Data- a Reasoning 7.2.2. Stics and Control el-Based, Case-Based, rid Systems 7.4.	•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving
9	8. REASO UNCERT 8.1. Logic Inferences 8.2. Abdue Logic 8.2.1. T Factor 8.2.2. F 8.2.3. T Theory of	NING UNDER AINTY Based Abductive ction: Alternatives to The Stanford Certainty fuzzy Sets The Dempster-Shafer Evidence 8.3. The Approach to	•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving Artificial Intelligence: Building Intelligent Systems.
10	9. LANGU	JAGES AND	•	Classroom lectures,	George F. Luger.



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	ARTIFIC 9.1. Proto 9.1.1. S Calcul 9.1.2. I 9.1.3. S 9.1.4. A	QUES FOR IAL INTELLIGENCE og Implementation Syntax for Predicate us Programming Lists and Recursions Gearch Controls Abstract Data Types Implementation	•	discussions, and review of theoretical concepts. Laboratory practical sessions. slides	Artificial Intelligence: Structures and Strategies for Complex Problem Solving Artificial Intelligence: Building Intelligent Systems.
	NATURA Deconstru 10.2. Synt 10.2.1. Parsing U Grammar 10.2.2. 7 Parsers 10.2.3. T and Conte 10.2.4. A 10.3. Stock Language	Specification and sing Context-Free s Fransition Network The Chomsky Hierarchy ext-Sensitive Grammars TN Parsers nastic Tools for Analysis (Overview) ral Language	•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving Artificial Intelligence: Building Intelligent Systems.
12	2 11. MACH SYMBOL 11.1. A Fr Based Lea Space Sea 11.3. The Induction 11.4. Indu Learnabil 11.5. Knov 11.5.1. N 11.5.2. E Learning 11.5.3. E Level Lea	HNE LEARNING: -BASED amework for Symbol- arning 11.2. Version rches ID3 Decision Tree Algorithm (Overview) ctive Bias and ity wledge and Learning Ieta-DENDRAL explanation-Based	•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving



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13	 11.6. Unsupervised Learning 11.6.1. Discovery 11.6.2. Conceptual Clustering 11.6.3. COBWEB (Overview) 11.7. Reinforcement Learning 12. MACHINE LEARNING: CONNECTIONIST 12.1. Foundations for Connectionist Networks 12.2. Perceptron Learning 12.3. Backpropagation Learning 12.4.1. A Kohonen Network 12.4.2. Outstar Networks and Counterprobagation 12.5. Hebbian Coincidence of Learning (Overview) 12.6. Attractor Networks or ''Memories'' 		•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving
14	13. MACHINE LEARNING: SOCIAL AND EMERGENT 13.1. The Genetic Algorithm 13.2. Classifier Systems and Genetic Programming 13.3. Artificial Life and Society- Based Learning 13.3.1. The Game of Life 13.3.2. Evolutionary Programming		•	Classroom lectures, discussions, and review of theoretical concepts. Laboratory practical sessions. slides	George F. Luger. Artificial Intelligence: Structures and Strategies for Complex Problem Solving
15		inal Exam 50%			

* Learning styles: Lecture, flipped learning, learning through projects, learning through problem solving, participatory learning ... etc.

** Reference: Pages in a book, database, recorded lecture, content on the e-learning platform, video, website ... etc.