Course Specification

(4101 Artificial Intelligence)

Faculty:	*HICIT- **Higher Institute for Computers & Information Technology**-El Shorouk Academy*
Programme(s) on which the course is given:	Under graduate program in Computer Science
Major or minor element of programme:	Compulsory
Department offering the programme	Department of Computer Science
Department offering the course:	Department of Computer Science
Year / Class	4th Year – 1st semester
Date of specification approval	1/8/2022

A- Basic Information

Title: **Artificial Intelligence**	***Code:*** **4101**		
Weekly Hours:			
Lecture : 3	**Exercise: -**	**Practical :**3	**Total:** 6

B- Professional Information

1.Overall aims of course

This course will introduce the fundamentals AI techniques and approaches starting with the Intelligent Agents and how to implement the multi-agent systems. The search techniques for problem solving such as the depth first search, the breadth first search and the Backtracking algorithms. HEURISTIC search such as generate and test, hill climbing, best first search… etc. Knowledge Representation is discussed through the course such as predicate logic, production rules, semantic network, frames. And some part of course discusses the genetic algorithms.

2. Program ILOs Covered by Course

Program Intended Learning Outcomes			
Knowledge and understanding	**Intellectual Skills**	**Professional and practical skills**	**General and Transferable skills**
A7, A12, A21	**B1, B2, B3, B4, B5, B10**	**C1, C5, C6, C10**	**D5**

3. Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

a1. Understand the fundamental principles of artificial Intelligence.[A7]
a2. Explain python programming language and Prolog. [A12]
a3. Describe the basic skills intelligent agents programming. [A7]
a4. Differentiate between informed search and uninformed search [A12]
a5. Recognize the value of problem solving methods [A7]
a6. Define essential facts, concepts, principals and theories for learning algorithms [A12, A22]

b- Intellectual skills.

b1. Select the most suitable search techniques for solving problems [B2,B3]
b2. Construct intelligent agents in various domains [B1].
b3. Apply any search technique to any problem [B4]
b4. Design an algorithm for real life application [B5,B10]

c- Professional and practical skills.

c1. Implement various systems in these areas.[C1,C5,C6,C10]

d- General and transferable skills.

d1. Write a technical report.[D5]
d2. Work with a team to implement different AI System.[D5]

4. Contents

Topic	Hours	Lecture	Practical
Introduction to AI	**6**	**3**	**3**
Intelligent Agents	**6**	**3**	**3**
Multi-Agent Systems	**6**	**3**	**3**
Implementing Intelligent Agents	**6**	**3**	**3**
Problem Solving by Search	**6**	**3**	**3**
Backtracking, depth, and breadth first search, Heuristic (Informed) Search	**6**	**3**	**3**
Generate and test, Best first search, A* algorithm	**6**	**3**	**3**
. Hill climbing, Simulated Annealing,	**6**	**3**	**3**
Genetic algorithms.	**6**	**3**	**3**
KnowledgeRepresentation Production rules, semantic networks, Frames,	**6**	**3**	**3**
Selected topics	**6**	**3**	**3**
Selected topics(Machine Learning Algorithm)	**6**	**3**	**3**
Course Project	**6**	**3**	**3**

5. Teaching and learning methods

Teaching and learning methods	Used
Active Learning	
Lectures	√
Tutorial Exercises	√

Practical Lab	√
Discussions.	√
Self – Learning strategy	
Reading material	√
Websites search	√
Research and reporting	√
Self-studies	√
Experimental strategy	
Group work	√
Presentation	√
Problem solving strategy	
Problem solving/problem solving learning based	√
Case study	-
Synchronous E-Learning	
Virtual lab	-
Virtual class	-
Chat Room	-
Video lectures	√
Asynchronous E-Learning	
E-Learning	√

6. Student assessment methods.

Methods	Assessment	Used
Pop Quiz (Formative assessment)	Give the students a quiz at the beginning, middle, or end of a lesson that involves just 5 to 10 questions, to assess the knowledge and understanding achieved by the student during lecture	√
Think-Pair-Share(Formative assessment)	Students spend one minute individually writing down key points from what they learned. They then pair up with a partner and compare notes, to assess the knowledge ,understanding and general skills achieved by student during lecture.	√
Electronic Midterm Exam	To assess the knowledge and understanding achieved by the student during the previous weeks. (online on e-learning hub)	√
Pencil-to-Paper Final Exam	To evaluate what the student gain at the end of the course, and to assess: the knowledge and understanding, general skills, and intellectual skills.	√
Course Project	To allow students work in team, and to evaluate knowledge, understanding, intellectual, and transferable skills. (online on e-learning hub , FTF)	√
Electronic Course Work & Quizzes	To keep the student always in the course, and to evaluate knowledge, understanding, intellectual, and transferable skills.(online on e-learning hub)	√

Practical Exam	to measure the ability of students to design and implement a software program(FTF).	√
Participation	To assess the knowledge and understanding achieved by the student during the previous weeks.	√

Assessment Schedule

Assessment	Week #
Pop Quiz	**weekly**
Think-Pair-Share	**weekly**
Participation	**weekly**
Electronic Mid Term Exam	**8**
Final Exam	**16**
Course Project	**3-14**
Reporting	**3-14**
Electronic Course Work &Quizzes	**2-14**
Practical Exam	**15**

Assessment Weight

Assessment	Weight %
Pop Quiz	**5%**
Think-Pair-Share	
Participation	
Electronic Mid Term Exam	
Final Exam	**70%**
Course Project	**10%**
Electronic Course Work &Quizzes	**5%**
Practical Exam	**10%**
Total	**100**

- Course Work &Quizzes:
  - Short Exams, Assignments, Researches, Reports, Presentations on e-learning hub
  - Class/Project discussion in virtual classroom
  - Pop quiz
  - think-pair share

7. List of references

Essential books (text books)	• **Russell, S., & Norvig, P. (2020, November 10).** ***Artificial Intelligence: A Modern Approach*****. Pearson** • **Poole, D. L., & Mackworth, A. K. (2019, August 12).** ***Artificial Intelligence: Foundations of Computational Agents*****.** **https://doi.org/10.1017/9781108164085** • **Teoh, T. T., & Rong, Z. (2022, March 17).** ***Artificial Intelligence with Python*****. https://doi.org/10.1007/978-981-16-8615-3**
Course notes	**[none]**
	• Goodfellow, I., Bengio, Y., & Courville, A. (2017, January 3). *Deep*

Recommended books	*Learning*. • Poole, D., Mackworth, A., & Goebel, R. (1997, December 1). *Computational Intelligence: A Logical Approach*. https://doi.org/10.1604/9780195102703
Periodicals,website	**Powerpoint presentations of all course materials** **All labs material** **[https://learn.sha.edu.eg/course/view.php?id=1368]**
Video	[https://drive.google.com/drive/folders/1CX8pLCVDMlVx2lY3_FlcXRd_tgA5cGBJ https://drive.google.com/drive/folders/1pXT1mqUy3IYGnETTBcC4qq6zeMzb5Hld]

8. Facilities required for teaching and learning

To assess professional and practical skills given the following facilities:

a. Tools & SW (Technologies facilities):

- **Anaconda platform distribution 2022.10 with python 3.9 ,conda v22.9.0 and anaconda version 2.3.1**
- **Natural language tool kit(NLTK 3.7 release) package in python**
- **Microsoft TEAMS to create virtual classrooms for lectures, discussions for project**
- **Academy Portal(MOODLE) to make electronic quizzes and electronic midterm exam**
- **Academy Portal(MOODLE) to upload project deliverable and assignment**
- **Academy portal(MOODLE) to upload electronic material**

b. Teaching facilities:

	Lecture	*class*	*Lab*
Whiteboard	used	-	used
Pc/laptop	used	-	used
Data show	used	-	used
Webinars	MS TEAMS	-	MS TEAMS
Social-Media	Facebook Page for 4th year	-	Facebook Page for 4th year
Chat-Room	Chat-Teams	-	Chat-Teams
Videos	Stream-MOODLE	-	Stream-MOODLE
Website	MOODLE	-	MOODLE

9. Course Matrices

9.1 Course Content/ILOs Matrix

Course Contents	Knowledge and understanding						Intellectual skills				Pand p skills	General	
	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	d1	d2
Introduction to AI	x	x											
Intelligent Agents	x	x	x	x				x			x		
Multi-Agent Systems	x	x	x	x				x			x		
Implementing Intelligent Agents	x	x	x	x				x			x		
Problem Solving by Search	x	x			x	x	x		x	x	x		
Backtracking, depth, and breadth first search, Heuristic (Informed) Search	x	x			x	x	x		x	x	x		
Generate and test, Best first search algorithm.	x	x			x	x	x		x	x	x		
Hill climbing, Simulated Annealing.	x	x					x		x	x	x		
Genetic algorithms.	x	x					x		x	x	x		
Knowledge Representation: Production rules, semantic networks, Frames, … etc.	x	x								x	x		
Selected topics							x	x	x	x	x		
Selected topics(Machine Learning Algorithm)					x	x			x	x	x		
Course Project	x	x	x	x	x	x	x	x	x	x	x	x	x

9.2 Learning Methods /ILOs Matrix

	Knowledge and understanding							Intellectual skills				P & p skills	General	
Learning Methods	a1	a2	a3	a4	a5	a6	a7	b1	b2	b3	b4	c1	d1	d2
Lectures	x	x	x	x	x	x	x	x	x	x	x	x		
Tutorial Exercises								x	x	x	x	x		
Reading material	x	x	x	x	x	x	x						x	x
Websites search	x	x	x	x	x	x	x	x	x	x	x	x		
Research and reporting	x	x	x	x	x	x	x						x	x
Problem solving					x	x	x	x	x	x	x			
Group work													x	x
Presentations												x	x	x
Practical Lab								x	x	x	x	x		
Discussions.								x	x	x	x	x	x	x

9.3 Assessment Methods /ILOs Matrix

Assessment Methods	Knowledge and understanding						Intellectual skills				P & p skills	General	
	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	d1	d2
Pop Quiz	x	x	x	x	x	x	x	x	x	x			
Think-Pair	x	x	x	x	x	x	x	x	x	x		x	x
Participation							x	x	x	x			
Electronic Mid Term Exam	x	x	x	x	x	x	x	x	x	x			
Final Exam	x	x	x	x	x	x	x	x	x	x			
Course Project	x	x	x	x	x	x	x	x	x	x	x	x	x
Electronic Course Work &Quizzes	x	x	x	x	x	x	x	x	x	x	x	x	x
Practical Exam	x	x	x	x	x	x	x	x	x	x	x		

9.4 Course ILOs Vs Program ILOs

Course ILOs \ Prog ILOs		Knowledge & understanding				Intellectual skills						Professional and practical skills					General skills
		A7	A12	A20	A21	B1	B2	B3	B4	B5	B10	C1	C5	C6	C10	C10	D5
Knowledge and Understanding	a1		√														
	a2	√	√														
	a3	√	√														
	a4			√	√												
Intellectual skills	b1					√	√										
	b2						√	√									
	b3							√	√								
	b4									√	√						
Professional and practical skills	c1											√	√	√	√	√	
General skills	d1																√
	d2																√

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Date :1/8/2022