جمهورية مصر العربية
وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research

SH. A.
أكاديمية الشروق

المعهد العالى للحاسبات وتكنولوجيا المعلومات
مدينة الشروق ـ القاهرة
شعبة علوم الحاسب

Course specification

Course Code: CS 360

Course Title: Artificial Intelligence

Academic Year: /

Course specification
(CS 360 - Artificial Intelligence)

Course Outline	
Faculty:	*HICIT- (**Higher Institute for Computers & Information Technology**-El Shorouk Academy)*
Programme(s) on which the course is given:	Undergraduate program in Computer Science
Major or minor element of programme:	Compulsory
Department offering the program	Department of Computer Science
Department offering the course:	Department of Computer Science
Level	Third Level- second semester
Date of specification approval	/ /2023

Basic Information				
Code:	CS 360	***Title:***	Artificial Intelligence	
Prerequisites:		***CS 312 Analysis of Algorithms***		
Weekly Hours:				
Lecture: 2		**Exercise: -**	**Practical :** 2	**Total:** 3 credit hours

Professional Information

Course Aims:

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.

Program ILOs Covered by Course

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**

Program ILOs Covered by Course

A. Knowledge and Under-Standing:

A7. Show a critical understanding of the principles of artificial intelligence, image Processing, Machine Learning, Neural Networks, and Virtual Reality.

A12. Select advanced topics to provide a deeper understanding of some aspects of the Game Design & Development, Geographic Information Systems, and computer graphics & animation.

A21. Identify Modeling and design of computer-based systems bearing in mind the trade-offs

B. Intellectual Skills:

B1. Define traditional and non-traditional problems, set goals towards solving them, and observe results.

B2. Perform comparisons between (algorithms, methods, techniques, etc.).

B3. Perform classifications of (data, results, methods, techniques, algorithms, etc.).

B4. Identify attributes, components, relationships, patterns, main ideas, and errors.

B5. Summarize the proposed solutions and their results.

B10. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.

C. Professional and practical skills

C1. Use appropriate programming languages and design methodologies.

C5. Specify, design, and implement and manage computer-based systems.

C6. Evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem.

C10. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.

D. General and transferable skills

D5. Demonstrate efficient IT capabilities.

Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

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, A21]

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]

c2. Discover the working process of python. [C5, C6]
c3. Solve different AI problems such as constraint satisfaction problem using python.[C10]

d. General and transferable skills

d1. Work as a part of a team to produce reports. [D5]
d2. Work as a part of a team to find a solution for practical problems and projects. [D5]
d3. Write structural reports. [D5]
d4. Make oral communication skills by making report presentation. [D5]
d5. Make specific task in certain period of time "training problems in labs". [D5]

Contents		
Topic	**Contact Hours**	
	lecture	**Lab**
Introduction to AI	2	2
Intelligent Agents	2	2
Multi-Agent Systems	2	2
Implementing Intelligent Agents	2	2
Problem Solving by Search	2	2
Backtracking, depth, and breadth first search	2	2
Heuristic (Informed) Search	2	2
Generate and test, Best first search, A* algorithm.	2	2
Hill climbing, Simulated Annealing.	4	4
Genetic algorithms.	4	4
Knowledge Representation	2	2
Production rules, semantic networks, Frames, … etc.	2	2
Course Project	2	2

Teaching and learning methods	
Teaching and learning methods	**Used**
Lectures	√
Tutorial Exercises	-
Practical Lab	√
Discussions.	√
Self – Learning (Reading material, Websites search,)	√
Self-studies	-
Group work	√
Presentation	√
Problem solving/problem solving learning based	√
Case study	-
Synchronous E-Learning	-

Video lectures	√
Asynchronous E-Learning	√

Student assessment methods & Schedule		
Methods	**Used**	**Week#**
Midterm Exam	√	**8**
Final Exam	√	**16**
Course Project	√	**3-14**
Course Work & Quizzes	√	**2-14**
Practical Exam	√	**15**

Assessment Weight	
Assessment	Weight %
Mid Term Exam	15
Practical Exam and Project	15
Final Exam	60%
Course Work & Quizzes	10%
Total	100

Course Work &Quizzes
Short Exams, Assignments, Research, Reports, Presentations
Class/Project discussion

List of references	
Essential books (textbooks)	• 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]**
Recommended books	• Goodfellow, I., Bengio, Y., & Courville, A. (2017, January 3). *Deep 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]**
Videos link	-

Required Facilities		
Tools & SW (Technology 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	
Teaching facilities:	Whiteboard	√
	Computer Lab	√
	Data show	√
	E-Learning	√
	Videos	√
	Website	√

Course Content/ILO Matrix																		
Course Contents	**Knowledge & understanding**						**Intellectual skills**				**Professional and practical skills**			**General**				
	a1	**a2**	**a3**	**a4**	**a5**	**a6**	**b1**	**b2**	**b3**	**b4**	**c1**	**c2**	**c3**	**d1**	**d2**	**d3**	**d4**	**d5**
Introduction to AI	x	x										x	x					
Intelligent Agents	x	x	x	x				x			x	x	x					
Multi-Agent Systems	x	x	x	x				x			x	x	x					
Implementing Intelligent Agents	x	x	x	x				x			x	x	x					
Problem Solving by Search	x	x			x	x	x		x	x	x	x	x					
Backtracking, depth, and breadth first search	x	x			x	x	x		x	x	x	x	x					
Heuristic (Informed) Search	x	x			x	x	x		x	x	x	x	x					
Generate and test, Best first search, A* algorithm.	x	x					x		x	x	x	x	x					
Hill climbing, Simulated Annealing.	x	x					x		x	x	x	x	x					
Genetic algorithms.	x	x								x	x	x	x					
Knowledge Representation	x	x								x	x	x	x					
Production rules, semantic networks, Frames, … etc.	x	x					x	x	x									
Course																		

Learning Method /ILOs Matrix																		
Learning Methods	**Knowledge and understanding**						**Intellectual skills**				**Professional and practical skills**			**General**				
	a1	**a2**	**a3**	**a4**	**a5**	**a6**	**b1**	**b2**	**b3**	**b4**	**c1**	**c2**	**c3**	**d1**	**d2**	**d3**	**d4**	**d5**
Lectures	x	x	x	x	x	x	x	x	x	x	x	x	x					
Tutorial Exercises																		
Reading material	x	x	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	
Problem solving							x	x	x	x	x	x	x					
Group work											x	x	x	x	x	x	x	
Case study																		
Practical Lab							x	x	x	x	x	x						
Discussions.							x	x	x	x	x	x	x	x	x	x	x	

Assessment Methods /ILOs Matrix																		
Assessment Methods	**Knowledge & understanding**						**Intellectual skills**				**Professional & practical skills**			**General**				
	a1	**a2**	**a3**	**a4**	**a5**	**a6**	**b1**	**b2**	**b3**	**b4**	**c1**	**C2**	**C3**	**d1**	**d2**	**d3**	**d4**	**d5**
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	x	x	x	x	x
Course Work &Quizzes	x	x	x	x	x	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	x	x					

Course ILOs Vs Program ILOs																
Prog ILOs / Course ILOs		Knowledge & understanding			Intellectual skills						Professional and practical skills					General
		A7	A12	A21	B1	B2	B3	B4	B5	B10	C1	C5	C6	C10	C10	D5
Knowledge and Understanding	a1		√													
	a2	√	√													
	a3	√	√		√											
	a4			√												
	a5															
	a6															
Intellectual skills	b1					√	√									
	b2						√	√								
	b3							√	√							
	b4									√	√					
Professional and practical skills	c1											√		√		
	c2												√		√	
	c3															√
																√
General skills	d1															
	d2															
	d3															
	d4															
	d5															

Course Coordinator	Dr. Khaled El-Menshawy ( )
Head of Department	Dr. Ahmed El-Abbassy **(** **)**
Date:	--/--/2023