Future Academy
Higher Future Institute for Specialized Technological Studies

Course Specification

1- Course information:

Course Code:	CSC462
Course Title:	Artificial Intelligence
Year/level	4th
Academic Programs	Computer Science Program (B.Sc.)
Contact hours/ week	(Theoretical = 2hrs, Practical = 2hrs), Total = 4hrs

2- Course aims:

Artificial intelligence (AI) is a research field that study the simulation of human intelligence processes by machines, especially computer systems. In this course, students will learn the basics of modern AI as well as some of the representative applications of AI. This course will introduce the fundamentals AI techniques and approaches including: The Intelligent Agents, the search techniques for problem solving such as the depth first search, the breadth first search and the Backtracking algorithms. Heuristic search such as best first search… etc. Knowledge Representation, Inference in propositional and first order logic, Theorem proving, decision tree learning, Neural Network and Bayesian learning also will be discussed through this course.

3- Intended learning outcomes of the course (ILOs):

a- Knowledge and understanding:

On successful completion of this course, the student should be able to:
a1- Recognize the basic ideas and techniques underlying the design of intelligent computer systems.
a2- Recognize a comprehensive understanding of the activities necessary to synthesis solutions to tasks in AI.
a3- Know and understand the latest generation of AI techniques can actually do.
a4- Define the main paradigms, and the challenges of AI.
a5- Identify the contribution and impacts of artificial intelligence in scientific, social, economic, environmental, political and cultural terms.
a6- Understand some AI methods, list their advantages and disadvantages, and apply them to simple problems.

b- Intellectual skills:

On completing this course, the student should be able to:

b1- Realize the idea and aspects of AI.
b2- Compare between the suitability of AI techniques for a given problem/domain.
b3- Classify AI search algorithms and know how to build simple knowledge-based systems.
b4- Compare the basic AI algorithms and evaluate them on simple problems.

c- Professional and practical skills:

At the end of this course, the student will be able to:
c1- Utilize knowledge of understanding of AI techniques to solve real- world issues.
c2- Use internet resources to deploy research skills.
c3- Employ Python to solve searching techniques problems.
c4- Apply practical skills by learning Python and finding and using appropriate code libraries.

d- General and transferable skills:

On successful completion of this course, the student should be able to:
d1- Mange student understanding of the necessity of AI and its current scope of ongoing development through the need for lifelong learning.
d2- Display the skills necessary to manage how to use scientific methods to solve problems relevant to AI.
d3- Retrieve different applications of basic AI techniques as well as selection of appropriate technologies for a given problem and anticipation of design implications.
d4- Demonstrate abilities of time management during working effectively in groups.

4- Course contents

Week No.	Topics/units	Number of hours		ILO's
		Lecture hours	**Practical hours**	
1	**Building Autonomous agents that efficiently make decisions in fully informed** (AI as the Study & Design of Intelligent Agents)	2	2	a1,a2,a3,a6,b1,c1,d1
2	Intelligent "Rational" Agents	2	2	a3,b1,b2,c1,c2,d4
3	**Partially observable and adversarial settings Building agents that draw inferences in uncertain environments and optimize actions for arbitrary reward structures** (Specifying the Task Environment)	2	2	a3,a4,a5,c2
4	Learning Agents AI vs. Machine Learning vs. Deep Learning Machine Learning. +Quiz1	2	2	a6,b3,b4,d3
5	Solving Problems by Searching, State Space Search Graph & Strategies	2	2	a2,a3,a6,b4,c3,d3
6	Basic Idea of Search & the Backtracking Search Algorithm, Problem Solving as Search (Blind / Uninformed vs. Heuristic / Informed.	2	2	a3,b4,d1,c4
7	**Midterm Exam**			
8	**Blind search techniques (depth and breadth first search)** Blind vs. Heuristic Strategies, More Heuristic Search & Functions, Repeated States	2	2	a1,b1,c2,c3,c4,d3

9	Game paly/ Game tree	2	2	a2,b1,c3,d3
10	Minimax search, pruning search	2	2	a2,b1,c3,d3
11	Knowledge representation, expert system+ Quiz2	2	2	a2,b1,c2,c3,d3,d4
12	Reinforcement learning	2	2	a2,a3,b1,c3,d3
13	Robotics and computer vision	2	2	a2,a3,b1,b2,c3,d3
14	**Final Revision**			

5- Teaching and learning methods

Methods	ILO's																				
	a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	b5	c1	c2	c3	c4	c5	d1	d2	d3	d4	d5
Lectures	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√	
Practical sections														√	√						
Self-learning																					
Assays and reviews																					
Discussion groups																				√	
Brainstorming																					
Blended-learning																					
E-learning																					

6- Teaching and learning methods for Low-achieving students

- Extra teaching hours for those who need help
- More quizzes to assess their ability for understanding the course
- Encourage the team work for those students with other advanced ones to increase their participation and understanding

7- Student assessment

Assessment method	Time	Grade weight (%)	Week	ILOs
Course Work (Tutorial Exercise and Assignments)	Through the semester	10	Every Week	a1,a2,a3,a4,a6,b1,b2,b3,b4
Quiz 1	Through the lecture	5	Week#4	a2,b4,c4,d3

Mid-term exam	1 hours	10	Week#7	a1,a2,a3,a5,b1,b3
Quiz 2	Through the lecture	5	Week#11	a1,a2,a3,a5,b1,b3
Practical exam	2 hours	10	Week#14	a1,a2,a3,a5,b1,b3,c3,c4
Final Written exam	2 hours	60	Week# 15-16	

8- List of references

8.1. Student notebooks:

- Comprehensive instructor notes ("PowerPoint slides") are available on the course web page ("Google Classroom")

8.2. Essential textbooks:

- Russell, Stuart J., and Peter Norvig. Artificial intelligence: a modern approach. Pearson, 2016.

8.3. Recommended textbooks:

- Mitchell, Melanie. "Artificial intelligence: A guide for thinking humans." (2019).
- Warwick, Kevin. "Artificial intelligence: the basics", Routledge, 2013.

8.4. Journals, Periodical and Reports ……..etc.

………………………………………………………………………………………….

8.5. Websites

- **https://www.youtube.com/watch?v=hiXGwDfE_js&t=80s**

Course Coordinator: *Dr. Fatma Harby*
Head of department: *Prof. Dr. Yasser F. Ramadan*
Date of Approval: 24/7/2024