Department of computer science

College of science

University of Cihan / Sulaimaniyah

Subject: Artificial Intelligent 1

Course Book – Year 3

Lecturer's name: Ardalan Hussein Awlla

Academic Year: 2023/2024

Course Book

1. Course name	**Artificial Intelligent 1**
2. Lecturer in charge	**Ardalan Hussein Awlla**
3. Department/ College	**Computer science**
4. Contact	**e-mail:** **Tel: 07702452429**
5. Time (in hours) per week	**Theory: 2** **Practical: 2**
6. Office hours	**Monday and Tuesday**
7. Course code	**CSC3201**
8. Teacher's academic profile	**B.Sc. in Computer Science, University Of Sulaimani, M.Sc. in Computer Science, NUIST. Areas of Specialization: Computer Science , Database management System, Information Security and Programming language**
9. Keywords	

10. Course overview:

The objective of this course is to provide students with comprehensive insights into Artificial Intelligence principles, methods, tools, and outcomes. Students will gain hands-on experience with at least one AI programming language such as Python. They will acquire knowledge about the theoretical and conceptual aspects of this field and reinforce their comprehension through practical application in laboratory sessions, projects, and assignments.

11. Course objective:

A student completing CSC3201 will be able to:

1. Learn AI Basics: Understand the core principles of AI, like reasoning and learning.
2. Assess Techniques: Evaluate AI methods for strengths and weaknesses in different tasks.
3. AI's Role: See how AI helps us understand intelligence and perception.
4. Classic Examples: Know famous AI applications.
5. Intelligent Programs: Identify traits of smart software.
6. Heuristic Strategies: Discover how heuristics assist in problem-solving and games.
7. Knowledge Handling: Understand various ways to store and retrieve information.
8. AI Programming: Get the basics of AI programming in modern languages.

12. Student's obligation

- The assignments that have work to be assessed will be given to the students in separate documents including the due date and appropriate reading material.
- Submit your homework covered with a sheet containing your name, course title and number, and type and number of the homework (e.g. tutorial, assignment, and project).

13. Forms of teaching

Duration: 16 weeks, 64 hours in total
Lectures: 64 hours (4 per week)

14. Assessment scheme

Midterm Tests	25 %
Practical midterm	15 %
Quizzes and reports.	10 %
Final Examination	35 %
Practical final exam	15 %

15. Student learning outcome:

- **Knowledge and understanding**
  - Understand the principles and tools of Artificial Intelligence
  - Understand how the basic knowledge representation, problem solving, and learning methods
  - Understand the Assess the applicability, strengths, and weaknesses of the basic knowledge representation
  - professional including understanding the need for intelligent systems
- **Cognitive skills (thinking and analysis).**
  - Solve a wide range of problems related to **knowledge representation, problem solving, And learning in intelligent-system engineering.**

16. Course Reading List and References:

1. Artificial Intelligence: Structures and Strategies for Complex Problem Solving. by George F. Luger (6/Edition 2009) ,
2. Artificial Intelligence (3rd Edition) by Stuart Russell and Peter Norvig (2009).
3. Introducing Artificial Intelligence by Henry Brighton (2008)
4. Artificial Intelligence: A Guide to Intelligent Systems.by Michael Negnevitsky (2nd Edition 2004)

17. The Topic

Week	Lecture No	Topic
(1)	1	**What is AI**
	2	Objectives of AI
	3	Approaches of AI
	4	Making Computer (Think and Act like a Human,
	5	AI – Bits of History
LAB		Review of Python

(2)	1	**Agent**
	2	Agents Classification.
	3	Define an Intelligent agent.
	4	Define a Rational agent.
	5	Explain classes or Types of intelligent agents
	6	Applications of Intelligent agent
LAB		Graph representation in python
(3) (4)	1	**Searching**
	4	Uninformed Search
	5	Informed Search
LAB		BFS , DFS and A* Algorithm
(5)	1	**Optimization**
	2	Local Search
	3	Hill Climbing
	4	global search
	5	Simulated Annealing
LAB		Hill Climbing and Simulated Annealing
(6) (7)	1	**Knowledge**
	2	Knowledge-Based Agents
	3	Propositional Logic
	4	Inference
	5	Knowledge Engineering
	6	Inference Rules
	7	Resolution
LAB		solving puzzles games
(8)	1	**Midterm Examination**
(9) (10)	1	**Uncertainty**
	2	Probability
	3	Conditional Probability
	1	Random Variables
	2	Joint Probability
	3	Probability Rules

LAB		
(11) (12)	1	**Learning**
	2	Supervised Learning
	3	Unsupervised Learning
LAB		Regression and k-means Clustering
(13) (14)	1	**Neural Networks**
	2	Activation Functions
	3	Neural Network Structure
	4	Gradient Descent
	5	Multilayer Neural Networks
	6	Backpropagation
LAB		Neural Networks
(15)	1	**Language**
	2	Syntax and Semantics
	3	Context-Free Grammar
	4	Tokenization
LAB		Markov Models
	Final Examination	
18. Practical Topics (If there is any)		

19. Examinations:

1. Compositional: In this type of exam the questions usually starts with Explain how, What are the reasons for…?, Why…?, How….?
With their typical answers
Examples should be provided

Q. Explain briefly (2 or 3 sentences each) the difference between
A. Depth-first search and iterative deepening search.
B. State space search and game tree evaluation.
C. Top-down parsing and bottom-up parsing.

Answer:

A. Iterative deepening involves carrying out a series of depth-first searches to successively increasing depths.

B. Both a state space and a game tree consist of states connected by operators. However, in a state space, all operators are actions of the problem solver, while in a game tree, operators alternate between actions of the player and actions of the adversary. Therefore, in state space search it suffices to find a goal state (or a path to a goal state), while in game-tree evaluation, one must show that there is an action of the player such that for any action of the adversary there is an action of the player ... ending in a win for the player.

C. In top-down parsing, the parser builds the tree from the root "S" down towards the leaves. In bottom-up parsing, the parser builds the tree from the words (leaves) up toward the root.

2. True or false type of exams:

In this type of exam, a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence.

Examples should be provided

Search

I. [true or false] Uniform-cost search will never expand more nodes than A*-search.
II. [true or false] Depth-first search will always expand more nodes than breadth-first

Search.

III. [true or false] The heuristic h(n) = 0 is admissible for every search problem.

IV. [true or false] The heuristic h(n) = 1 is admissible for every search problem.

V. [true or false] The heuristic h(n) = c(n), where c(n) is the true cheapest cost to get from the node n to a goal state, is admissible for every search problem

3. Multiple choices:

In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase.

Which kind of planning consists of successive representations of different levels of a plan?

A. Hierarchical planning

B. Non-hierarchical planning

C. Project planning

D. All of the above

E. None of the above

ANSWER: A. Hierarchical planning

20. Extra notes:

21. Peer review

Mr. Ardalan Hussein Awlla