Software and Informatics Engineering Department

College of Engineering

Salahaddin University

Artificial Intelligence Course Book – (Year 4)

Lecturer's name: Dr. Abbas M. Ali

Academic Year 2022/2023

Course Book

1. Course name	Artificial Intelligence
2. Lecturer in charge	Dr. Abbas M. Ali
3. Department/ College	SIE Engineering/College of Enineering
4. Contact	e-mail: abs20002000@gmail.com
5. Time (in hours) per week	Theory: 2 Practical: 2
6. Office hours	Sunday 10:30 – 12:30
7. Course code	SE403
8. Teacher's academic profile	Dr.Abbas M. Ali Lecturer at Software Engineering Department College of Engineering – Salahaddine University Hawler – Kurdistan Current Lecture : Machine learning & A.I. (MSc level) Operating Systems (4th year) theory and practical and Compilers principles (3rd year) theory Past: Microprocessors (2nd year) theory and practical, Compilers (3rd year) . Education: B.Sc in Computer science M.Sc in Computer science Ph.D in Computer A.I.
9. Keywords	DFS, BFS, Heuristic Search , Predicate Calculus, Semantic Nets, Expert System

10. Course overview:

This is an introductory course covering basic Artificial Intelligence (AI) concepts and implementations. The course captures the essence of AI and introduces basic ideas regarding knowledge representation and search algorithms. The course will introduce the concepts and the techniques for implementing these ideas that are behind many of the "smart" software applications found today. The goal of Artificial Intelligence is to build software systems that behave "intelligently". Artificial Intelligence is a branch of Computer science to make computer software that reasons about the world around it. The theory and insights brought about by AI research will set the trend in the future of computing.

11. Course objective:

The course has the following objectives:

- Define the reasons, goals and trends of AI.

- Introduce AI application areas.

- Introduce the basic knowledge representations schemes and their associated search techniques covering the concepts of State-Space-Search and related search algorithms.

12. Student's obligation

Homework is normally given and unexpected quizzes provide an active way to keep the students active and more in touch with the subject. In addition quizzes, students attendance and their activity on the lectures will all collected together to form the 3% assessment of each semester.

In the laboratory there will be weekly programmes to be written by the students and the achievement of these programmes will be graded. We may have assignments and practical exams also.

13. Forms of teaching

Lectures:
power point presentations are used in addition to the whiteboard clarification which is usually used to make a frequent step by step communication with the students

Practices:

In the lab the students will use their computers and the principles taken in the theory will be run by the students to give them more information.

14. Assessment scheme

The course breaks compound two parts theortical, and practical sessions. There are exams to assess each student; 1st semester exam, 2nd semester exam, and the final exam.

The theoretical Exams only cover the theoretical part of the unit. The total marks will be as follows:

First Semester Exam: 12 %

First Semester daily activities (quize and homewoks): 3%

First Semester LAB exam and activity (exams, assighnments and projects): 10 %

Second Semester Exam: 12%

Second Semester daily activities (quizzes and homeworks): 3%

Second Semester LAB exam and activity (exams, assighnments and projects): 10%

Average Marks for both semesters (1&2) are: 50 %

Final Exam: 50%

15. Student learning outcome:

At the end of this course, students will be able to:

1- Describe the purpose and function of A.I.

2- Identify the importance of A.I. in computer field.

3- Understand the fundamental of structure and architecture of Expert systems.

4- Install and gain basic of how A.I. Treats facts to inference new facts.

5- Understand the fundamental concepts of Knowledge representation techniques.

6- Write fundamental programs of A.I. algorithms.

16. Course Reading List and References:

- *Artificial Intelligence (6th Edition),* by George F. Luger, Pearson/Addison Wesley 2009.
- *The Quest for Artificial Intelligence: A History of Ideas & Achievements, by Nils J. Nilsson, Standford University.*

17. The Topics:

<table>
<tr><td colspan="3"></td><td>Lecturer's name</td></tr>
<tr><td>Week</td><td>Subject</td><td colspan="2">Details</td></tr>
<tr><td>1</td><td>Introduction</td><td colspan="2">Introduce subject's syllabus, lectures' delivery methods,</td></tr>
<tr><td>2</td><td>Lecture 1-2</td><td colspan="2">A.I. Definition, A.I. Goals, The Turing Test, Why AI is not a science, Mental Faculties THE AI SCIENTIFIC ISSUES</td></tr>
<tr><td>3</td><td>Lecture 3-4</td><td colspan="2">A.I. Application Areas. , REPRESENTING FACTS</td></tr>
<tr><td>5</td><td>Lecture 4 -5</td><td colspan="2">Knowledge Representation & Search.</td></tr>
<tr><td>6</td><td>Lecture 5 -6</td><td colspan="2">The Predicate Calculus: Function, Predicates & Sentences.</td></tr>
<tr><td>8</td><td>Lecture 7 -8</td><td colspan="2">Predicate Calculus Inference Rules & Examples.</td></tr>
<tr><td>9 – 10</td><td>Lecture 9 – 10</td><td colspan="2">Semantics for the predicate Calculus</td></tr>
<tr><td>11 – 12</td><td>Lecture 11 -12</td><td colspan="2">Inference rules</td></tr>
<tr><td>13 – 14</td><td>Lecture 13 – 14</td><td colspan="2">The Unification Algorithm.</td></tr>
<tr><td>15-17</td><td>Lecture 15,16,17</td><td colspan="2">Semantic Nets , Frames Scripts</td></tr>
<tr><td>18-19</td><td>Lecture 18-19</td><td colspan="2">Structures & Strategies for State-Space Search.</td></tr>
<tr><td>20-22</td><td>Lecture 20 -22</td><td colspan="2">Forward & Backward Chaining Algorithms.</td></tr>
<tr><td>23-24</td><td>Lecture 23 -24</td><td colspan="2">Best-First Search & Heuristic Evaluation Functions.</td></tr>
<tr><td>25-26</td><td>Lecture 25 -26</td><td colspan="2">Heuristic Search</td></tr>
<tr><td>27-28</td><td>Lecture27-28</td><td colspan="2">Using Heuristics in Games.</td></tr>
<tr><td>29-30</td><td>Lecture 29-30</td><td colspan="2">Expert Systems.</td></tr>
<tr><td>31-32</td><td>Lecture 31-32</td><td colspan="2">Examples (Selected topics).</td></tr>
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18. Practical Topics

First Term - Writing some programs in Prolog language - Construct some knowledgebase for family, animals, etc. - Writing a program to solve the tower of Hanoi - Problem using Backward and forward chaining Algorithm - Writing Prolog programs to simulate Computational Linguistics'.	(2hrs/week) 15/10/2022 – 1/2/2023
Second Term - Writing Prolog programs to read and write from/to files - Writing Prolog programs to add or delete facts to/from the knowledge base.	(2hrs/week) 7/2/2022 – 20/5/2023