

The Islamia University of Bahawalpur
Faculty of Engineering
Course Outline: Artificial Intelligence

General Information:

Course:	Artificial Intelligence	Instructor	Dr.Nadia Rasheed
Course Code		Office	
Credit Hours	3 (Theory) + 1 (Lab)	Email	
Contact Hours		Contact No.	
Pre-Requisite(s)	Data Structures and Programming	Office Hours	

Course Description:

Artificial intelligence is the science that studies and develops methods of making computers more /intelligent/. The focus of this course is on core AI techniques for search, knowledge representation and reasoning, planning, and designing intelligent agents. The course also aims to give an overview of the historical, philosophical, and logical foundations of AI.

Course Learning Outcomes (CLOs):

CLOs	Description	Domain	PLOs
CLO1	Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.	C-2	PLO1
CLO2	Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.	C-2	PLO2
CLO3	Use classical Artificial Intelligence techniques, such as search algorithms, minimax algorithm, Logic, neural networks, Probabilistic reasoning.	C-3	PLO3
CLO4	Ability to apply Artificial Intelligence techniques for problem solving.	C-3	PLO4
CLO5	Explain the limitations of current Artificial Intelligence techniques.	C-2	PLO1
CLO6	Use modern tools/simulators for implementation of AI algorithms.	P-4	PLO5
CLO7	Develop team work / integrate individual contributions into a final deliverable to solve complex engineering problem (of AI ROBOTICS domain)	A-4	PLO-9

Relation of CLOs to the Program Learning Outcomes (PLOs):

	1	2	3	4	5	6	7	8	9	10	11	12
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	Engineering Knowledge	Problem Analysis	Design & Development of Solutions	Investigation	Modern Tool Usage	The Engineer and Society	Environment and Sustainability	Ethics	Individual and Team Work	Communication	Project Management	Life Long Learning
CLO1	√											
CLO2		√										
CLO3			√									
CLO4				√								
CLO5	√				√							
CLO6												
CLO7									√			
Total	2	1	1	1	1				1			
Impact	High	Medium	Medium	Medium	Medium				Medium			

Justification of Program Learning Outcomes (PLO's) Coverage:

PLO1 - Engineering Knowledge:

The assignments, exams, and laboratory experiments require engineering knowledge to successfully complete the course. Students will have the knowledge of different AI techniques. (Relevance to course).

PLO2 - Problem Analysis

The course shows the value of theory, by making it possible for the students examine the different AI strategies for software agent design (Relevance to course).

PLO3 - Design & Development of Solutions

Through the theory and different problems analysis, student will be able to use knowledge representation, reasoning, and machine learning techniques to real-world problems(Relevance to course).

PLO4 - Modern Tool Usage

Through the theory and different problems analysis, student will be able to apply knowledge representation, reasoning, and machine learning techniques to real-world problems(Relevance to course)

PLO5 - Modern Tool Usage

This objective addressed in this course.

PLO6 - The Engineer and Society

This objective is not directly addressed in this course.

PLO7 - Environment and Sustainability

This objective is not directly addressed in this course.

PLO8 - Ethics

This objective is not directly addressed in this course.

PLO9 - Individual and Team Work

This objective is not directly addressed in this course.

PLO10 – Communication

This objective is not directly addressed in this course.

PLO11- Project Management

This objective is not directly addressed in this course.

PLO12 - Life Long Learning

This objective is not directly addressed in this course.

Assessment of CLOs:

	CLO1	CLO2	CLO3	CLO4	CLO5
Assignments	√	√	√		√
Quizes	√	√			√
Midterm Exam	√	√	√		
Finalterm Exam			√	√	
Others (Projects/presentations)			√	√	

Textbook(s)/Reference Books:

1. Artificial Intelligence: A Modern Approach, 3rd Edition, Stuart Russell and Peter Norvig, Prentice Hall, 2009.
2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving. (George F. Luger, and William A. Stubblefield).
3. Mathematical Methods in Artificial Intelligence. (Edward A. Bender).
4. Principals of Artificial Intelligence and Expert Systems Development. (David W. Rolston)

Lecture Plan:

Topics	Hours	CLOs
Artificial Intelligence <ul style="list-style-type: none"> ○ Introduction ○ The Foundations of Artificial Intelligence ○ History of Artificial Intelligence ○ The State of the Art 	Week 1	CLO1
Intelligent Agents <ul style="list-style-type: none"> • Agents and Environments • Good Behavior: The Concept of Rationality • The Nature of Environments • The Structure of Agents 	Week2	CLO1
Search Methods <ul style="list-style-type: none"> ○ Introductions ○ State Space Search <ul style="list-style-type: none"> ▪ Depth First Search ▪ Breath first search ○ Heuristic search ○ Hill climbing ○ Best first search ○ A* method ○ Adversary search <ul style="list-style-type: none"> ▪ Alpha Beta Pruning ▪ Min Max Approach ○ Control and implementation of search ○ Adversarial Search 	Week 3-Week6	CLO2 ,CLO3, CLO4
AI Languages <ul style="list-style-type: none"> ○ Standard vs AI languages 	Week 7	CLO2,CLO3, CLO4

<ul style="list-style-type: none"> ○ Prolog 		
Logic & Reasoning Logical Agents Knowledge-Based Agents <ul style="list-style-type: none"> ○ The Wumpus World . ○ Logic ○ Propositional Logic: A Very Simple Logic ○ Propositional Theorem Proving ○ Effective Propositional Model Checking ○ Agents Based on Propositional Logic First-Order Logic <ul style="list-style-type: none"> ○ Representation Revisited ○ Syntax and Semantics of First-Order Logic ○ Using First-Order Logic ○ Knowledge Engineering in First-Order Logic 	Week8-Week 10	CLO2,CLO3, CLO4
Planning <ul style="list-style-type: none"> ○ Classical Planning ○ Definition of Classical Planning ○ Algorithms for Planning as State-Space Search ○ Planning Graphs ○ Other Classical Planning Approaches ○ Analysis of Planning Approaches 	Week 11	CLO2,CLO3, CLO4
Uncertain knowledge and reasoning Quantifying Uncertainty <ul style="list-style-type: none"> ○ Acting under Uncertainty ○ Basic Probability Notation ○ Inference Using Full Joint Distributions ○ Independence ○ Bayes' Rule and Its Use Probabilistic Reasoning <ul style="list-style-type: none"> ○ Representing Knowledge in an Uncertain Domain ○ The Semantics of Bayesian Networks ○ Efficient Representation of Conditional Distributions ○ Exact Inference in Bayesian Networks ○ Approximate Inference in Bayesian Networks ○ Other Approaches to Uncertain Reasoning 	Week 12-Week 13	CLO2,CLO3, CLO4
Machine Learning Learning from Examples Forms of Learning <ul style="list-style-type: none"> ○ Supervised Learning ○ Learning Decision Trees ○ Evaluating and Choosing the Best Hypothesis ○ The Theory of Learning ○ Regression and Classification with Linear Models ○ Artificial Neural Networks ○ Nonparametric Models ○ Support Vector Machines ○ Ensemble Learning ○ Practical Machine Learning Review	Week 14- Week16	CLO2, CLO3, CLO4 CLO6

Grading Policy vis-à-vis CLO Mapping

Assignments, Quizzes, Projects/presentations etc	20%	CLO1 to CLO5
Midterm	30%	CLO1 to CLO2
Final	50%	CLO2 to CLO4

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