East West University
Department of Computer Science and Engineering
Course Outline of CSE366/ICE476/ICE475
Summer 2025 Semester

Course: CSE366 Artificial Intelligence

Credits and Teaching Scheme

	Theory	Laboratory	Total
Credits	3	1	4
Contact Hours	3 Hours/Week for 13 Weeks + Final Exam in the 14th Week	2 Hours/Week for 14 Weeks	5 Hours/Week for 13 Weeks + Final Exam in the 14th Week

Prerequisite

CSE246 – Algorithms

Instructor Information

Instructor: Dr. Raihan Ul Islam
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Course Objective

This course introduces the fundamental concepts and knowledge of Artificial Intelligence (AI) principles and techniques, the state-of-the-art models and algorithms used to undertake these problems. This course is also designed to expose students to the frontiers of AI-intensive computing, while providing a sufficiently strong foundation to encourage further research in machine learning. Knowledge of this course will be needed as prerequisite knowledge for future courses such as CSE475 Machine Learning, CSE477 Data Mining, and CSE492 Robotics.

Course Outcomes (COs) with Mappings

After completion of this course students will be able to:

CO 1	**Interpret** and **apply** the key components and classical search algorithms of Artificial Intelligence (AI) for solving real-life problems.
CO 2	**Understand** and **apply** non-classical search algorithms such as metaheuristics, adversarial search and constant satisfaction algorithms for solving complex problems.
CO 3	**Interpret, apply,** and **examine** knowledge-based and learning-based AI systems for solving complex problems.
CO	Use AI concepts and techniques; perform and demonstrate skills and write report

4	for solving complex real-life problems.

Course Topics, Teaching-Learning Method, and Assessment Scheme

Course Topic	Teaching-Learning Method	CO	Mark of Cognitive Learning Levels				CO Mark	Exam Mark
			C2	C3	C4	C5		
Artificial Intelligence and Agents: Introduction to artificial intelligence and the role of agents. **Agent Architectures and Hierarchical Control:** Agent architecture and control, Hierarchical control.	Lectures and discussions inside and outside the class	CO1	1	2			3	Mid Mark 25
Uninformed search strategies: BFS, DFS, UCS, DLS, IDS, bidirectional **Informed search strategies:** Greedy best first, A*, IDA*	Do	CO1	2	3			5	
Metaheuristic algorithms: Hill climbing search and its variations Simulated annealing Genetic algorithm Differential Evaluation	Do	CO1	3	4			7	
Adversarial Search: Game vs Single-agent search Game tree Minimax algorithm Alpha-beta pruning	Do	CO1		2	3		5	
Constraint satisfaction (CS) problem: Problem formulation CS algorithms: Constraint propagation Backtracking search.	Do	CO2		2	3		5	
Learning in AI: Introduction to machine learning and the issues facing any learning algorithm. Neural Networks and Deep Learning: Feed-forward Neural Networks Backpropagation	Do	CO2	5	5			10	Final Mark 35
Advanced Applications (Computer Vision) Introduction to Advanced Deep Learning applications (Example: Convolutional neural networks etc.)	Do	CO2		2	3		5	
Knowledge Base: Propositional reasoning, Propositional Definite Clauses and proof procedures Ask-the-user and knowledge-level debugging Proof by contradiction, conflicts, and	Do	CO3		3	2		5	

consistency-base diagnosis.								
Planning with Certainty: Action semantics and representations Forward planning	Do	CO3		2	3		5	
Reasoning with Uncertainty: Probability, Conditional independence and belief networks Properties of conditional independence, Learning with Uncertainty: Bayesian Learning Learning belief networks Markov Decision Process (MDP) Hidden Markov Model (HMM)	Do	CO3		3	3		6	
Reinforcement Learning: Learning Reinforcement: basic algorithms Exploration and exploitation	Do	CO3		2	2		4	

Laboratory Experiments and Assessment Scheme

Experiment	**Teaching-Learning Method**	**CO**	**Mark of Cognitive Learning Levels**			**Mark of Psycho motor Learning Levels**		**CO Mark**
			C 3	C 4	C 6	P2	P3	
Introduction to Python Programming: A short introduction to basic python programming modules	Lab Experiment and Result Analysis	CO4	1	3	3	2	1	10
Agent Architectures and Hierarchical Control: Defines a simple agent controller, defines the environment and agent	Do	CO4						
Searching for Solutions: Defines a search problem in terms of the start nodes, a predicate to test if a node is a goal, the neighbor's function, and an optional heuristic function. The generic search algorithm that implements both depth-first search and A* search.	Do	CO4						
Multiagent Systems: Defines two-player zero-sum games Implements minimax with alpha-beta pruning	Do	CO4						
Introduction to Machine Learning: Introduction to machine learning and the issues facing any learning algorithm, Simplest cases of learning, Basic models of supervised learning (using **Neural Networks**), Handling overfitting (regularization and cross validation).	Do	CO4						
Deep Learning Applications: Training NNs, Convolutional neural networks, Neural models for sequences	Do	CO4						

Mini Projects and Presentations

Item	Teaching-Learning Method	CO	Mark of Cognitive Learning Level		Mark of Psychomotor Learning Levels		Mark of Affective Learning Level	CO Mark
			C3	C4	P3	P4	A2	
Lab-based Mini Project including Report and Presentation	Group-based moderately complex design project with report writing and oral/poster presentation	CO 4	2	4	4	4	1	15

Overall Assessment Scheme

Assessment Area	CO				Assessment Area Mark
	CO1	CO2	CO3	CO4	
Class Participation					
Class Test/Quiz	5	5	5		15
Midterm Assessment	20	5			25
Final Exam		10	20		30
Laboratory Performance and Lab Exam				10	10
Mini Project				15	15
Assignment/Presentation/Viva					0
Total	**25**	**25**	**25**	**25**	**100**

Teaching Materials/Equipment

Books:

- Artificial Intelligence: Foundations of Computational Agents, 3rd edition by David L. Poole and Alan K. Mackworth, Cambridge University Press 2023,

Reference Books

- Artificial Intelligence: A Modern Approach, 3rd Edition, S. Russell and P.
- Norvig, Prentice Hall. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, 6th Edition, G. Luger, Addison Wesley, 2009
- AI Algorithms, Data Structures, and Idioms in Prolog, Lisp, and Java, G. Luger and
- W. Stubblefield, Addison Wesley, 2009
- Artificial Intelligence: A Systems Approach, M. Tim Jones, Infinity Science Press, 2008

Software/Tools:

- Anaconda Distribution https://www.anaconda.com/products/individual

- Google Colab: https://colab.research.google.com/
- Other appropriate tools for data wrangling

** Lecture Slides and Lab Manuals will be made available to the students during the class in electronic form.*

Exam Dates

As per the schedule provided by the university.

Academic Code of Conduct

Academic Integrity:

Any form of cheating (physical/online), plagiarism, personification, falsification of a document as well as any other form of dishonest behavior related to obtaining academic gain or the avoidance of evaluative exercises committed by a student is an academic offence under the Academic Code of Conduct and **may lead to severe penalties as decided by the Disciplinary Committee of the university.**

Special Instructions:

- Students are expected to attend all classes and examinations. A student MUST have at least 80% class attendance to sit for the final exam.
- Students will not be allowed to enter into the classroom after 10 minutes of the starting time.
- For plagiarism, the grade will automatically become zero for that exam/assignment.
- Normally there will be **NO make-up exam**. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss any exam, the student MUST get approval of makeup exam by written application to the Chairperson through the Course Instructor **within 48 hours** of the exam time. Proper supporting documents in favor of the reason of missing the exam have to be presented with the application.
- For **final exam**, there will be NO makeup exam. However, in case of **severe illness, death of any family member, any family emergency, or any humanitarian ground**, if a student miss the final exam, the student MUST get approval of **Incomplete Grade** by written application to the Chairperson through the Course Instructor **within 48 hours** of the final exam time. Proper supporting documents in favor of the reason of missing the final exam have to be presented with the application. **It is the responsibility of the student to arrange an Incomplete Exam within the deadline mentioned in the Academic Calendar in consultation with the Course Instructor**.
- All mobile phones MUST be turned into silent mode during class and exam period.
- There is **zero tolerance for cheating** in exams. Students caught with cheat sheets in their possession, whether used or not; writing on the palm of hand, back of calculators, chairs or nearby walls; copying from cheat sheets or other cheat sources; copying from other examinees, etc. would be treated as cheating in the exam hall. The only penalty for cheating is **expulsion for several semesters as decided by the Disciplinary Committee of the university**.