Artificial Intelligence – Fall 2025

Course Objectives

• Learn foundational and modern AI algorithms for building intelligent systems, including search, decision making, learning, and game-playing.
• Understand the strengths and limitations of different AI approaches and tools.
• Gain practical skills in implementing AI algorithms and applying them to real-world problems.

Faculty

Dr. Arun Chauhan – Email: arun@sitare.org
Dr. Alapan – Email: alapan@sitare.org

Class Schedule

Monday: 1:00 PM – 1:55 PM, 2:00 PM – 2:55 PM
Tuesday: 3:00 PM – 3:55 PM, 4:00 PM – 4:55 PM

Office Hours: 3:00 PM – 3:55 PM

Course Outline

Sub Code	Subject	L	T	P	CIE	ESE	Total / Credits
	Artificial Intelligence	3	0	2	50	50	100 / 4

Syllabus

• Graph and Tree Search Algorithms (BFS, DFS, A*)
• Decision Making under Uncertainty (Bayes, MDPs)
• AI in Games (Mini-Max, Alpha-Beta Pruning)
• Constraint Satisfaction Problems (CSPs, backtracking, propagation)
• Reinforcement Learning (theory and applications)

• Basic Machine Learning Algorithms (Naive Bayes, Regression, Clustering)
• Modern AI Tools (LLMs for text, Diffusion models for images)

Prerequisites

• Mathematical Foundations of Computing
• Programming Methodology in Python

Course Learning Outcomes (CLOs)

• CLO1: Understand the fundamental concepts, history, and modern applications of AI.
• CLO2: Apply graph and tree-based search, adversarial search, and CSP techniques to problem solving.
• CLO3: Apply probabilistic reasoning, reinforcement learning, and machine learning algorithms in decision making.
• CLO4: Explore modern AI tools and understand how to build simple AI-driven applications.

Teaching Methodology

• A mix of lectures, tutorials, and coding sessions.
• In-class problem solving for reinforcement.
• Weekly assignments and hands-on practice with Python/AI libraries.

Weekly Session Plan

Week	Topics	CLO
1	Foundations and History of AI; Natural vs Artificial Intelligence; Weak vs Strong AI	CLO1
2	Uninformed Search: BFS, DFS	CLO2
3	Informed Search: Greedy Best-First, A*	CLO2
4	Adversarial Search: Mini-Max, Alpha-Beta Pruning	CLO2
5	Constraint Satisfaction Problems: Definition, Propagation, Backtracking	CLO2
6	Uncertainty: Probability, Bayes' Rule, Markov Decision Processes	CLO3
7	Reinforcement Learning – Theory	CLO3
8	Reinforcement Learning – Implementation	CLO3

9	Naive Bayes Algorithm	CLO3
10	Linear & Logistic Regression	CLO3
11	K-Means Clustering	CLO3
12	Modern AI Tools: Large Language Models (Text-to-Text)	CLO4
13	Modern AI Tools: Diffusion Models (Text-to-Image)	CLO4
14	Building AI Applications – From Idea to Prototype	CLO4
15	Revision & Open Discussions	CLO1–4
16	Student Presentations	CLO1–4

Assessment Structure

- Continuous Assessment:
    - 5 Marks (Teacher's assessment)
    - 5 Marks (Appreciation for Innovation)
    - 5 Marks (Class Participation)
- Internal Assessment Tests (2 × 10 marks): 20 Marks
- Mid-Term Exam: 15 Marks
- End-Term Exam: 50 Marks
- Total: 100 Marks

Assessment Philosophy

- Assignments and quizzes test application and coding skills.
- Internal and end-term exams test both theory and practical algorithm implementation.
- Students should demonstrate not only knowledge of algorithms but also reasoning about when to use them.

Policies

- Unfair Means: Any form of plagiarism or cheating results in an F grade.
- AI Use Policy: Students must not use AI tools (e.g., ChatGPT, Copilot) for assignments. They are encouraged to explore these tools only for learning purposes.