

ARTIFICIAL INTELLIGENCE-1

Course Code: 22CM1101

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COURSE OUTCOMES:

At the end of the Course the student shall be able to

CO1: demonstrate various AI applications, languages and Intelligent Agents.(L2)

CO2: solve problems using uninformed and informed search strategies.(L2)

CO3: make use of local and backtrack search techniques in constraint satisfaction problems(L3)

CO4: apply propositional logic techniques for knowledge representation.(L3)

CO5: utilize the algorithms and their heuristics in the planning problems.(L2)

UNIT-I

10 Lectures

Introduction to Artificial Intelligence, Foundations of Artificial Intelligence, History of Artificial Intelligence, Intelligent Agents : Agents and Environments, concept of Rationality, Nature of Environments, Structure of Agents

Learning Outcomes: At the end of this unit, the student will be able to

1. list AI Environments. (L1)
2. summarize various types of Agents. (L2)
3. illustrate the various AI Applications. (L2)

UNIT-II

10 Lectures

Problem-solving: Problem-Solving Agents, Example Problems, Search Algorithms, Uninformed Search Strategies, Informed Search Strategies: greedy best first search, A* search, Heuristic functions.

Learning Outcomes: At the end of this unit, the student will be able to

1. outline Characteristics of a Problem. (L2)
2. discuss problem-solving agent. (L2)
3. apply informed and uninformed search techniques to problems. (L3)

UNIT-III

10 Lectures

Adversarial Search and Games: Game Theory, Optimal Decisions in Games, Heuristic Alpha-Beta Tree Search, Stochastic Games, Limitations of Game Search Algorithms.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Learning Outcomes: At the end of this unit, the student will be able to

1. develop game playing strategies using AI techniques. (L3)
2. discuss limitations of game search algorithms. (L2)
3. apply search techniques for CSP's. (L3)

UNIT-IV

10 Lectures

Knowledge-Based Agents, The Wumpus World, Logic , Propositional Logic: A Very Simple Logic, Propositional Theorem Proving, First-Order Logic : Syntax and Semantics of First-Order Logic, Using First-Order Logic

Inference in First-Order Logic : Propositional vs. First-Order Inference, Unification and First-Order Inference, Forward Chaining, Backward Chaining, Resolution

Learning Outcomes: At the end of this unit, the student will be able to

1. demonstrate logic techniques using Predicate Logic. (L2)
2. illustrate inference in first order logic (L2)
3. apply forward and backward reasoning to infer knowledge. (L3)

UNIT-V

10 Lectures

Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Objects and Modal Logic, Reasoning Systems for Categories

Automated Planning: Definition of Classical Planning, Algorithms for Classical Planning, Heuristics for Planning, Hierarchical Planning, Planning and Acting in Nondeterministic Domains.

Learning Outcomes: At the end of this unit, the student will be able to

1. apply logic and reasoning for categories (L3)
2. demonstrate algorithms for planning (L2)
3. summarize planning and acting in different domains (L2)

Text Book:

1. Stuart J. Russell and Peter Norvig, *Artificial Intelligence A Modern Approach*, Fourth Edition, Pearson, 2020

References:

1. Dr.Nilakshi Jain, *Artificial Intelligence: Making a System Intelligent*, Wiley Publications,1st Edition,2019.
2. Elaine Rich, Kevin Knight and Shivashankar B. Nair, *Artificial Intelligence*, Third Edition, McGrawHill, 2017

Web References:

1. <https://ai.google/>
2. https://swayam.gov.in/nd1_noc19_me71/preview