

AI3001: Artificial Intelligence**Course Prerequisites:**

- A course on “Computer Programming and Data Structures”
- A course on “Mathematical Foundations of Computer Science”
- Some background in linear algebra, data structures and algorithms, and probability will be helpful

Course Objectives:

1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Credits: 4**Teaching Scheme Theory: 2 Hours/Week****Tutorial: 1 Hour/Week****Lab: 2 Hours/Week**

Course Relevance: Technologies driven by artificial intelligence (AI) have transformed industries and everyday life. The possibilities for AI applications are virtually unlimited and sought after in practically every industry segment. That's why global organizations are actively recruiting professionals with specialized skills and proficiencies needed to develop future AI technological innovations.

SECTION-I**Topics and Contents:****Unit-I Title: Fundamentals of Artificial Intelligence**

Introduction: A.I. Representation, Non-AI & AI Techniques, Representation of Knowledge, Knowledge Base Systems, State Space Search, Production Systems, Problem Characteristics, Types of production systems, Turing Test.

Intelligent Agents: Agents and Environments, concept of rationality, the nature of environments,

structure of agents, problem solving agents, problem formulation. **Formulation of problems:** Vacuum world, 8 queens, Route finding, robot navigation.[CO1, CO2] [PO1, PO2]

Unit-II Title: Uninformed Search Strategies

Uninformed Search Methods: Depth First Search, Breadth First Search, Depth Limited Search, Iterative Deepening Depth First Search, Bidirectional Search, Comparison of Uninformed search Strategies.[CO3] [PO3, PSO1]

Unit-III Title: Informed Search Methods:

Generate & test, Hill Climbing, Best First Search, A* and AO* Algorithm, Constraint satisfaction, Means Ends Analysis, **Game playing:** Minimax Search, Alpha-Beta Cut offs, Waiting for Quiescence.[CO3, CO6] [PO3]

SECTION-II

Topics and Contents:

Unit-IV Title: Logical Agents:

Knowledge based agents, Wumpus world. **Propositional Logic:** Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining. **First order Logic:** Representation, Inference, Reasoning Patterns, Resolution, Forward and Backward Chaining.

[CO4] [PO2]

Unit-V Title: Basics of PROLOG:

Representation, Structure, Backtracking. **Expert System:** Design, Implementation, Case study of Expert System in PROLOG.[CO4] [PO2]

Unit-VI Title: Planning:

Blocks world, STRIPS, Implementation using goal stack, **Planning with state space search:** Forward state space search, Backward state space search, Heuristics for state space search. Partial Order Planning, Planning Graphs, Hierarchical planning, Least commitment strategy.

Conditional Planning, Continuous Planning. [CO5] [PO4]