

Course Code	:	<b>CSPC54</b>
Course Title	:	<b>Introduction to Artificial Intelligence and Machine learning</b>
Number of Credits	:	<b>3-0-2-4</b>
Pre-requisites (Course Code)	:	<b>CSPC11</b>
Course Type	:	<b>PC</b>

### Course Objectives

- To learn the concepts of searching for AI problems
- To learn about agents and knowledge representation
- To understand the various factors involved in inferences
- To get introduced to fundamentals of machine learning
- To learn about the possibilities of Supervised and Unsupervised learning

### Course Contents

#### UNIT I

AI - History of AI - Agents - Structure of Intelligent agents - Environments - Problem solving methods - Problem solving agents - Formulating problems - search strategies - Breadth-first - Uniform cost - Depth-first - Depth-limited - Bidirectional - Informed Search - Best-first Heuristic Functions - Memory bounded search - A\* - SMA\* - Iterative Improvement algorithms - Hill Climbing - Simulated annealing - Measure of performance and analysis of search algorithms.

Lab Component (Exercises similar to the following):

1. Heuristics and search strategy for Travelling salesperson problem.
2. Implement n-queens problem using Hill-climbing, simulated annealing, etc.

#### UNIT II

Game playing - Perfect Decisions - Imperfect Decisions - Alpha-beta pruning - Knowledge based agent - Wumpus World Environment - Propositional logic - agent for wumpus world - First order logic - syntax - semantics - extensions - Using First order logic - Representation change in the world - Goal based agents.

Lab Component (Exercises similar to the following):

1. Tic-tac-toe game simulation using search and heuristics.
2. Solve 3-SAT, 3-CNF algorithms using agents.
3. Describe the Sudoku game and represent the actions using First-order / Propositional logic.

#### UNIT III

Knowledge Base - Knowledge representation - Production based system - Frame based system - Inference - Backward chaining - Forward chaining.

Lab Component (Exercises similar to the following):

1. Sorting algorithms employing forward chaining.
2. Logical reasoning examples for E-commerce stores using forward/backward chaining.

#### UNIT IV

Learning from agents - inductive learning - Types of Machine learning - Supervised learning - learning decision trees - support vector machines - Neural and Belief networks - Perceptron - Multi-layer feed forward networks - Bayesian belief networks.

Lab Component (Exercises similar to the following):

1. Study of Machine learning tool.
2. Exercises on decision trees, SVM using the tool.

#### UNIT V

Unsupervised learning - K-means clustering - hierarchical clustering - Agglomerative and Divisive clustering - Fuzzy clustering.