

**Course Title: Introduction to Artificial Intelligence**

**Course no:** CSC-355

**Credit hours:** 3

**Full Marks:** 70+10+20

**Pass Marks:** 28+4+8

**Nature of course:** Theory (3 Hrs.) + Lab (3 Hrs.)

**Course Synopsis:** This course introduces the problem solving techniques, problem representation and machine learning.

**Goal:** The main objective of this course is to provide basic knowledge of Artificial Intelligence, with acquaintance of different search techniques and AI applications.

**Course Contents:**

**Unit 1. Introduction to Artificial Intelligence** **4 Hrs.**

Artificial Intelligence and related fields, brief history of AI, applications of Artificial Intelligence, Definition and importance of Knowledge, and Learning.

**Unit 2. Problem Solving** **6 Hrs.**

Problem Definition, Problem as a state space search, Problem formulation, Problem types, Well-defined problems, Constraint satisfaction problem, Game playing, Production systems.

**Unit 3. Search Techniques** **9 Hrs.**

Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison, Informed search techniques-hill climbing, best first search, greedy search, A\* search, Adversarial search techniques-minimax procedure, alpha beta procedure

**Unit 4. Knowledge Representation, Inference and Reasoning** **12 Hrs.**

Formal logic-connectives, truth tables, syntax, semantics, tautology, validity, well-formed-formula, propositional logic, predicate logic, FOPL, interpretation, quantification, horn clauses, rules of inference, unification, resolution refutation system (RRS), answer extraction from RRS, rule based deduction system, Statistical Reasoning-Probability and Bayes' theorem and causal networks, reasoning in belief network

**Unit 5. Structured Knowledge Representation** **4 Hrs.**

Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, Semantic nets, frames, conceptual dependencies and scripts

**Unit 6. Machine Learning****4 Hrs.**

Concepts of learning, learning from examples, explanation based learning, learning by analogy, learning by simulating evolution, learning by training neural nets, learning by training perceptrons.

**Unit 7. Applications of Artificial Intelligence****6 Hrs.**

Expert Systems, Neural Network, Natural Language Processing, Machine Vision

**Laboratory work:** Laboratory exercises should be conducted in either LISP or PROLOG. Laboratory exercises must cover the fundamental search techniques, simple question answering, inference and reasoning.

**Text / Reference books:**

- E. Rich and Knight, *Artificial Intelligence*, McGraw Hill.
- D. W. Patterson, *Artificial Intelligence and Expert Systems*, Prentice Hall.
- P. H. Winston, *Artificial Intelligence*, Addison Wesley.
- Stuart Russel and Peter Norvig, *Artificial Intelligence A Modern Approach*, Pearson
- Ivan Bratko, *PROLOG Programming for Artificial Intelligence*, Addison Wesley.