

✓ Course Title: Introduction to Artificial Intelligence
✓ Course no: CSC-355
Credit hours: 3

Full Marks: 60+20+20
Pass Marks: 24+8+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. Agent and its type and performance measures.

Unit 2. Problem Solving 6 Hrs.

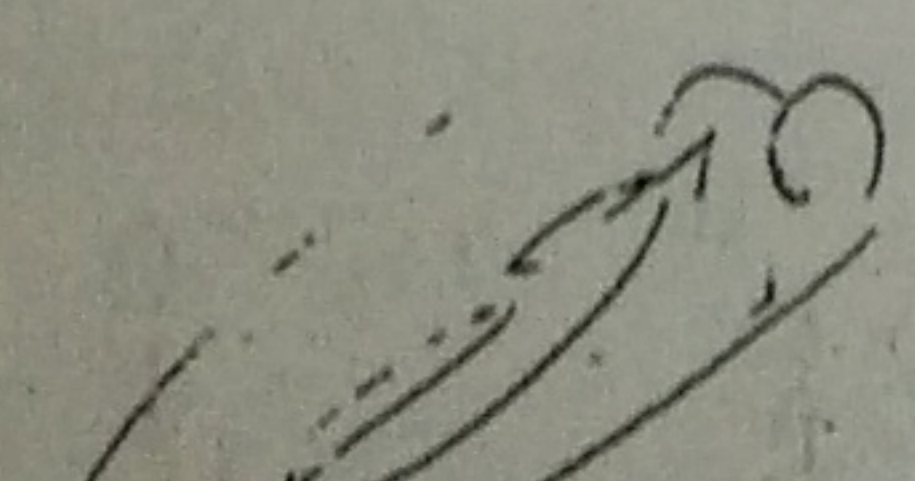
Problem Definition, Problem as a state space search, Problem formulation, Problem types: Toy problems, Real World Problems, Well-defined problems, Constraint satisfaction problem (Basic concept and examples), Production systems (Defn, Architecture, examples).

Unit 3. Search Techniques 9 Hrs.

Uninformed search techniques: depth first search, breadth first search, depth limit search, Iterative deepening search, Bidirectional search, and search strategy comparison, Informed search techniques: Greedy Best first search, A* search, Hill Climbing, Simulated Annealing, Game playing, Adversarial search techniques-mini-max procedure, alpha beta pruning.

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

Formal logic-connectives, truth tables, syntax, semantics, tautology, validity, well-formed-formula, propositional logic, Inference with PL: Resolution, Backward Chaining and Forward Chaining, predicate logic(FOPL), quantification, inference with FOPL: By converting into PL (Existential and universal instantiation), Directly with FOPL (unification and lifting, resolution Backward chaining, Forward Chaining), 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 (Rich and Knight)

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 perceptions.

Unit 7. Applications of Artificial Intelligence

6 Hrs.

Expert Systems (Architecture, Expert system development process), Neural Network (Mathematical model, get realization, Network structure) Natural Language Processing (Steps of NLP, parsing), Basic Concepts of Machine Vision

Laboratory work: Laboratory exercises should be conducted in either LISP or PROLOG. Laboratory exercises must cover the fundamental search techniques, Concept of Knowledge representation.

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*

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