

Introduction to Artificial Intelligence (CSC-304)
Trubhuvan University
Bachelors of Computer Science and Information Technology
Soch College of Information Technology

Course Title: Introduction to Artificial Intelligence

Course No.: CSC 304 -----Full Marks: 60+20+20

Credit hours: 3 ----- 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 & machine learning.

Goal: The main objective of the 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 AI, Definition & importance of knowledge & learning, Agent & its type and performance measures.

Unit 2: Problem Solving ----- 6 hrs.

Problem definition, problem as a state space search, problem formulation, problem types: Tor problems, Real world problems, Well-defined problems, Constraint satisfaction problem (Basic concept & examples), Production systems (Definition, Architecture, examples).

Unit 3: Search Techniques -----9 hrs.

Uniformed search techniques: depth first search, breadth first search, depth limit search, Iterative deepening search, Bidirectional search, & search strategy comparison. Informed search techniques: Greedy best first search, A* search, Hill climbing search, Simulated annealing, Game playing, Adversarial search techniques-mini-max procedure, alpha beta pruning.

Unit 4: Knowledge Representation, Inferential reasoning ----- 12 hrs.

Formal logic connectives, truth table, syntax, semantics, tautology, validity, well-formed formula, propositional logic, Inference with PL: Resolution, Backward chaining & Forward chaining, predicate logic (FOPL), quantification, inference with FOPL by converting into PL (Existential & Universal instantiation), Directly with FOPL. (Unification & lifting, resolution, backward chaining, forward chaining), Rule based deduction system, Statistical reasoning-probability & Bayes theorem & causal networks, reasoning in belief network.

Unit 5: Structured Knowledge Representation ----- 4 hrs.

Representation 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 system (Architecture, Expert system development process), Neural Network (Mathematical model, gate 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 & Expert Systems, Printice Hall.

P.H. Winston, Artificial Intelligence, Addison Wesley.

Stuart Rusel and Peter Norvig, Artificial Intelligence A Modern Approaches, Pearson Ivan Bratko, PROLOG Programming for Artificial Intelligence.