



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

PRINCIPLES OF ARTIFICIAL INTELLIGENCE

VII Semester: CSIT

Course Code	Category	Hours /Week			Credits	MaximumMarks		
		L	T	P		CIA	SEE	Total
AITC26	Elective	3	0	0	3	30	70	100
ContactClasses:45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes:45			

Prerequisite: Data Structures, LAC

I. COURSEOVERVIEW:

Artificial Intelligence has emerged as an increasingly impactful discipline in science and technology. AI applications are embedded in the infrastructure of many products and industries search engines, medical diagnoses, speech recognition, robot control, web search, advertising and even toys.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. Gain a historical perspective of AI and its foundations.
- II. The basic principles of AI toward problem solving, inference, knowledge representation, and learning.
- III. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- IV. The AI development tools such as Prolog (AI language), expert system shell, and/or data mining tool.
- V. The current scope, potential, limitations, and implications of intelligent systems.

III. COURSE SYLLABUS:

MODULE-I INTRODUCTION OF AI AND KNOWLEDGE REPRESENTATION (08)

Definition of AI, The AI Problems, The Underlying Assumption, AI Techniques, The Level of the Model, Criteria for Success, The importance of AI, Early works in AI, AI and Related fields, The Foundations of Artificial Intelligence, The History of Artificial Intelligence. Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.

Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation.

AI Languages and Tools: Lisp, Prolog, CLIPS.

MODULE-II FIRST ORDER LOGIC AND INFERENCE(10)

Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Properties of Wff, Clausal Forms, Conversion to clausal forms, Resolution.

Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.

MODULE-III SEARCH TECHNIQUES (08)

Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-first Search, A* algorithm, AO* algorithm, Problem Reduction, And-Or search, Constraint Satisfaction, Means-ends Analysis.

Adversarial Search and Game Playing: Optimal Decision in Games, The minimax algorithm, Alpha-Beta pruning, Iterative Deepening, Expectimax search.

MODULE-IV HANDLING UNCERTAINTY (10)

Symbolic Reasoning Under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting Problem-solver.

Statistical Reasoning: Probability and Bayes' Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.

MODULE-V PLANNING, LEARNING AND EXPERT SYSTEMS (09)

Planning: Overview, An Example Domain: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems.

Learning: What is learning, Rote learning, learning by taking Advice, learning from example: Induction, Explanation based learning (EBL), Discovery, Clustering, Analogy, Neural net and genetic learning, Reinforcement learning.

Expert System: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition.

IV. TEXT BOOKS:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, "Artificial Intelligence", McGraw Hill, 3rd Edition, 2019.
2. Dan W. Patterson, "Introduction to AI and Expert Systems", Prentice Hall, 2007.

V. REFERENCE BOOKS:

1. Nils J. Nilsson, "Principles of Artificial Intelligence", Narosa Publishing House, 1990.
2. Stuart Russell and Peter Norvig, "Artificial Intelligence A Modern Approach", Pearson Education, 2nd Edition, 2010.
3. VS Janakiraman K, Sarukesi Gopalakrishnan, "Foundations of Artificial Intelligence & Expert Systems", Macmillan.

VI. WEB REFERENCES:

1. <http://www.youtube.com/playlist?list=PLD52D2B739E4D1C5F>
2. NPTEL: Artificial Intelligence, <https://nptel.ac.in/courses/106105077/>
3. <http://www.udacity.com/>
4. <http://www.library.thinkquest.org/2705/>
5. <http://www.ai.eecs.umich.edu/>

VII. E-TEXT BOOKS:

1. <http://www.stpk.cs.rtu.lv/sites/all/.../Artificial%20Intelligence%20A%20Modern%20Approach.pdf>
2. <http://www.bookboon.com/en/artificial-intelligence-ebooks>
3. <http://www.onlineprogrammingbooks.com/ai-and-robotics>
4. <http://www.e-booksdirectory.com>