

PRINCIPLES OF ARTIFICIAL INTELLIGENCE

VI Semester: CSE / IT								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACSB13	Core	L	T	P	C	CIA	SEE	Total
		3	-	-	3	30	70	100
Contact Classes: 45		Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 45	
I. COURSE OVERVIEW:								
<p>Driven by the combination of increased access to data, computational power, and improved sensors and algorithms, Artificial Intelligence (AI) technologies are entering the mainstream of technological innovation. These technologies include search, machine learning, natural language processing, robotics and image processing. Artificial intelligence (AI) is a study field that examines how to achieve intelligent human behaviours on a computer. An ultimate objective of AI is to make a PC that can learn, plan, and take care of issues independently.</p> <p>In spite of the fact that AI has been thought for many years, we can't make a PC that is as clever as a human in all perspectives. Still, we do have several successful applications. In some cases, the computer implemented with AI technology can be even more clever than us. The Deep Blue system which won against the world chess champion is a great example.</p> <p>Presentation of artificial intelligence is through ideas and methods to familiarize the student with the basic programs in the field and their underlying theory. Students will explore this through problem-solving paradigms, logic and theorem proving, language and image understanding, search and control methods and learning.</p>								
II. OBJECTIVES:								
The students will try to learn:								
<ol style="list-style-type: none"> I. Gain a historical perspective of AI and its foundations. II. Become familiar with 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. Experience AI development tools such as Prolog (AI language), expert system shell, and/or data mining tool. V. Explore the current scope, potential, limitations, and implications of intelligent systems. 								
III. COURSE OUTCOMES:								
After successful completion of the course, students should be able to:								
CO 1	Summarize knowledge representation and issues in AI and Related fields.			Understand				
CO 2	Demonstrate knowledge reasoning with predicate logic and inference rules in the presence of incomplete and/or uncertain information.			Understand				
CO 3	Choose Heuristic, Adversarial search and game playing algorithms for addressing a particular AI problem and implement the selected strategy.			Apply				
CO 4	Experiment with uncertainty issues by using statistical and symbolic reasoning approaches.			Apply				
CO 5	Outline subfields and applications of AI such as planning, learning, and expert systems in specific domain problems.			Understand				
CO 6	Demonstrate knowledge representation with the help of Allanguages and tools.			Understand				

IV. SYLLABUS:		
MODULE-I	INTRODUCTION OF AI AND KNOWLEDGE EPRESENTATION	Classes: 08
<p>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.</p> <p>Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation.</p> <p>AI Languages and Tools: Lisp, Prolog, CLIPS.</p>		
MODULE-II	FIRST ORDER LOGIC AND INFERENCE	Classes: 10
<p>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.</p> <p>Representing Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.</p>		
MODULE-III	SEARCH TECHNIQUES	Classes: 08
<p>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.</p> <p>Adversarial Search and Game Playing: Optimal Decision in Games, The minimax algorithm, Alpha-Beta pruning, Iterative Deepening, Expectimax search.</p>		
MODULE-IV	HANDLING UNCERTANITY	Classes: 10
<p>Symbolic Reasoning Under Uncertainty: Introduction to Non monotonic Reasoning, Logics for Non monotonic Reasoning, Implementation Issues, Augmenting a Problem-solver.</p> <p>Statistical Reasoning: Probability and Bayes' Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic.</p>		
MODULE-V	PLANNING, LEARNING AND EXPERT SYSTES	Classes: 09
<p>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.</p> <p>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.</p> <p>Expert System: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition, Expert System Architectures, Rule based systems, Non production system, knowledge acquisition.</p>		

Textbooks:

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.

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.

Web References:

1. Department of Computer Science, University of California, Berkeley,
<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/>

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>