

Course Title	Artificial Intelligence	
Course Code	CE709	
Course Credit	Lecture	: 03
	Practical	: 01
	Tutorial	: 00
	Total	: 04
Students Learning Outcomes		
<p>At the end of this course, the students will:</p> <ul style="list-style-type: none"> • Understand the fundamental concept, history, development and various applications of artificial intelligence. • Learn the knowledge representation and reasoning techniques in rule-based systems, Case-based systems, and model-based systems and assess the applicability, strengths, and weaknesses. • Familiarize with propositional and predicate logic and their roles in logic programming. • Develop intelligent systems by assembling solutions to concrete computational problems. • Deepen thoughts and understanding of human abilities such as learning, reasoning and planning. • Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems. • Explore the nature of human intelligence and its role in problem solving of different application area like expert systems, neural networks and game playing. • Develop an interest in the field sufficient to take more advanced subjects. • Understand the programming language Prolog and write programs in declarative programming style. 		
Detailed Syllabus		
Sr. No.	Name of chapter & details	Hours Allotted
Section – I		

1	Introduction to Artificial Intelligence Definition of an AI, Major areas of Artificial Intelligence, AI techniques, Introduction to AI Problems and applications, Defining problems as a state space search, Problem characteristics, Production systems.	04
2	Search Techniques Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.	06
3	Knowledge Representation theory and Predicate logic Representation and Mappings, Different Approaches, Issues in knowledge representation, Representation Simple Facts In Logic, Representing Instance And Is Relationships, Computable Functions And Predicates, Resolution.	06
4	Representing Knowledge Using Rules Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning.	04
5	Symbolic Reasoning Under Uncertainty and Statistical Reasoning Introduction To Non-monotonic Reasoning, Logics For Non-monotonic Reasoning. Probability And Bays' Theorem, Certainty Factors And Rule-Base Systems, Bayesian Networks, Dempster-Shafer Theory.	06
6	Weak Slot-And-Filler Structure Semantic Net, Frames.	02
Section – II		
7	Adversarial search Introduction to Game playing, The Min-max Search Procedure, Alpha-Beta Procedure, The Search Efficiency of Alpha-Beta Procedure, Recent applications.	04
8	Planning The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques	04

9	Connectionist Models Introduction: Hopfield Net world, Learning In Neural Net world, Application Of Neural Networks, Recurrent Networks, Connectionist AI And Symbolic AI.	06
10	Expert Systems An Introduction To Expert System, Architecture of Expert System , knowledge Acquisition ,Application area of Expert system	04
11	Introduction to Prolog Introduction To Prolog: Syntax and Numeric Function, Facts, clauses, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, compound object and List, LISP and Other AI Programming Languages.	10

Instructional Method and Pedagogy:

- Power point presentations integrated with video lectures.
- Small group activities to be conducted for different AI problems.
- Feedback by posing a question, quiz, multiple choice questions.
- Group work assigning for solving real world problems using various techniques.
- Assignments and tutorials based on course content.

Text Books

- E.Rich & K. Knight, Artificial Intelligence, Second Edition, Tata-Mc Graw Hill.
- S. Russel & P. Norvig, Artificial Intelligence:A Modern Approach, Second Edition, Pearson Education.

Reference Books

- P. H. Winston, Artificial Intelligence, Third Edition, Pearson Education.
- G.F. Luger, Artificial Intelligence, Fourth Edition, Pearson Education.
- P. Jackson, Introduction to Expert Systems, Third Edition, Pearson Education
- N. J. Nilsson, Principles of Artificial Intelligence, First Edition, Springer-Verlag
- N.P. Padhy, Artificial Intelligence and Intelligent Systems, First Edition, Oxford Univ. Press
- Robert J. Schalkolf, Artificial Intelligence: an Engineering approach, 1990, McGraw Hill

Additional Resources

- NPTEL Lecture Series on Artificial Intelligence in Computer Science and Engineering by Prof. S.Sarkar and Prof. Anupam Basu, IIT Kharagpur.
- NPTEL Lecture Series on Artificial Intelligence in Computer Science and Engineering by Prof. P.Mitra and Prof. S. Sarkar, IIT Kharagpur.
- NPTEL Lecture Series on Artificial Intelligence in Computer Science and Engineering by Prof. Deepak Khemani, IIT Madras.