COURSECONTENT

ARTIFICIAL INTELLIGENCE								
I Semester: CSE								
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
2415801	**Foundation**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	0	0	3	40	60	100
Contact Classes:45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**TotalClasses:45**		
Prerequisites: Computer Programming and Data Structures, linear algebra and probability								

Course Overview:

This course combines theoretical foundations with practical implementation using modern AI tools and programming techniques. Students will gain hands-on experience in designing intelligent applications for real-world problems in areas such as healthcare, cyber security, robotics, smart systems, business analytics, and autonomous technologies.

Course Objectives:

1. To understand the fundamental concepts, history, and applications of Artificial Intelligence in real-world problem solving.
2. To learn problem-solving techniques using state space representation, uninformed search, and heuristic search methods.
3. To study intelligent agents and their behavior in different environments for autonomous decision making.
4. To understand knowledge representation, reasoning methods, propositional logic, and first-order logic in AI systems.
5. To apply Artificial Intelligence techniques in areas such as game playing, planning, theorem proving, and machine learning applications.

Course Outcomes: After Completion of the Course, Students should be able to

1. Identify suitable machine learning algorithms for tasks such as classification, regression, and clustering.
2. Develop and implement machine learning models for various practical applications.
3. Evaluate model performance using relevant statistical and validation metrics to ensure reliability.
4. Utilize deep learning techniques, including multilayer neural networks and back propagation, to address complex problems
5. Compare reinforcement learning, active learning, and graphical models in terms of their applications and underlying mechanisms.

UNIT I:

Artificial Intelligence: What is AI, Foundations and History of AI.

Intelligent Agents: Introduction, how Agents Should Act, Structure of Intelligent Agents, Agent programs, Simple reflex agents, Goal based agents, Utility based agents, Environments and Environment programs.

Problem Solving by Search: Problem-Solving Agents, Formulating Problems, Example Problems, Searching for Solutions, Search Strategies (Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search).

UNIT - II:

Informed Search Methods: Best-First Search, Heuristic Functions, Memory Bounded Search, Iterative Improvement Algorithms.

Game Playing: Introduction, Games as Search Problems, Perfect Decisions in Two-Person Games, Imperfect Decisions, Alpha-Beta Pruning, Games That Include an Element of Chance, State-of-the- Art Game Programs.

UNIT-III:

Knowledge and reasoning: A Knowledge-Based Agent, The Wumpus World Environment, Representation, Reasoning, and Logic, Prepositional Logic, An Agent for the Wumpus World.

First-Order Logic: Syntax and Semantics, Extensions and Notational Variations, Using First-Order Logic, Logical Agents for the Wumpus World, A Simple Reflex Agent, Representing Change in the World

Building a Knowledge Base: Properties of Good and Bad Knowledge Bases, Knowledge Engineering, The Electronic Circuits Domain, General Ontology, Application: The Grocery Shopping World.

UNIT - IV:

Inference in First-Order Logic: Inference Rules Involving Quantifiers, An Example Proof, Generalized Modus Ponens, Forward and Backward Chaining, Resolution: A Complete Inference Procedure, Completeness of resolution.

Logical Reasoning Systems: Introduction, Indexing, Retrieval, and Unification, Logic Programming Systems, Theorem Provers, Forward-Chaining Production Systems, Frame Systems and Semantic Networks, Description Logics, Managing Retractions, Assumptions, and Explanations

UNIT - V:

Planning: A Simple Planning Agent, From Problem Solving to Planning, Planning in Situation Calculus, Basic Representations for Planning, A Partial-Order Planning Example, A Partial-Order Planning Algorithm, Knowledge Engineering for Planning.

Practical Planning: Practical Planners, Hierarchical Decomposition, Analysis of Hierarchical Decomposition, Resource Constraints

TEXTBOOKS:

1. Artificial Intelligence A Modern Approach, Stuart Russell and Peter Norvig, 3rd Edition, Pearson Education.

REFERENCEBOOKS:

1. Artificial Intelligence, E.Rich and K.Knight, , 3rd Edition, TMH
2. Artificial Intelligence, Patrick Henny Winston, 3rd Edition, Pearson Education.
3. Artificial Intelligence, ShivaniGoel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education

ELECTRONICRESOURCES:

1. https://www.edx.org/learn/artificial-intelligence
2. https://www.coursera.org/learn/ai-for-everyone
3. https://ocw.mit.edu/courses/6-034-artificial-intelligence-fall-2010/
4. https://www.tensorflow.org/tutorials

MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper–I
8. Model question paper–II
9. Lecture notes
10. E-Learning Readiness Videos (ELRV)