



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Master of Engineering

Level: PG

Branch: Computer Engineering (Artificial Intelligence And Data Science)

Course / Subject Code : ME01095021

Subject Name : Artificial Intelligence

WEF Academic Year :	2024-25
Semester :	1 st Semester
Category of the Course :	PCC

Prerequisite :	Complexity analysis $O()$ notation, basics of linear algebra, vectors , Matrices, probability distribution
Rationale :	Artificial Intelligence should be taught to augment human capabilities, automate repetitive tasks, and solve complex problems across various domains. AI algorithms can optimize processes by identifying patterns and making data-driven decisions faster and more accurately than humans. AI systems can be applied across diverse domains, from finance to healthcare, adapting their methods to different datasets and contexts. It also creates new opportunities in AI development, data science, and related fields.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Practical		
				ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	Introduction Philosophy of artificial intelligence, Definitions, Evolution of AI, Applications of AI, Classification of AI, conversational AI vs Generative AI, Intelligent Agents: Agents and Environment, Nature of Environment , Structure Environment	6	8
2	Searching based problem solving:	8	18



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	Problem Solving Agent, Blind Search, Performance measures, Informed Search, Introduction to Heuristics, Variants of heuristic search, uniform cost, A*, Greedy, Overview of Hill Climbing, Simulated Annealing, Genetic Algorithms, Adversarial Search – Minimax, Alpha beta pruning		
3	Knowledge Representation and Reasoning: Introduction to Knowledge Representation, Knowledge-based Agents Logic Based Representation: Propositional logic (PL), First-order logic (FoL), Using First-order logic, Inference in First-order logic, forward and Backward Chaining Reasoning under uncertainty: Definition of uncertainty, Utility Based System, Bayes Rule, Inference, Belief Network, Markov decision processes knowledge representation and reasoning through fuzzy logic and Bayesian networks	10	26
4	Planning: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems	4	8
5	learning Systems: Machine learning (supervised, unsupervised), reinforcement learning - Basics of Reinforcement learning, Active and Passive reinforcement learning, Generalization, Applications Making simple decisions: combining beliefs and desires, The basis of utility theory, Utility functions, multi attribute utility functions, decision networks – The value of information – Decision theoretic expert systems Sequential Decision problems – value iteration – policy iteration – Partially Observable MDPs Decisions with Multiple Agents: Game Theory – Mechanism Design. soft computing, Artificial Neural Network.	10	26
6	Ethics, challenges and societal impact of AI: Ethical Initiative: International ethical initiatives-Ethical harms and concerns-Case study: healthcare robots, Autonomous Vehicles, Warfare and weaponization.	7	14



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	Ethics: Human vs Robot, robustness and transparency of AI systems, data bias and fairness of AI system, privacy and human AI interaction Challenges and opportunities: Challenges - Opportunities- ethical issues in artificial intelligence- Societal Issues Concerning the Application of Artificial Intelligence in Medicine- decision-making role in industries- National and International Strategies on AI.		
	Total	45	100

Reference Book :

1. “Artificial Intelligence” -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill
2. “Artificial Intelligence: A Modern Approach” -By Stuart Russel, Peter Norvig, PHI
3. “Introduction to Prolog Programming” -By Carl Townsend.
4. “PROLOG Programming For Artificial Intelligence” -By Ivan Bratko(Addison-Wesley)
5. “Programming with PROLOG” –By Klocksins and Mellish.

Course Outcome :

After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Understand the foundational concepts, theories, and historical developments in artificial intelligence.	UN
02	Identify the role of logic in Artificial Intelligence	UN
03	Demonstrate an understanding of knowledge and reasoning under certainty and Uncertainty.	AP
04	Apply principles of AI in solutions that require problem solving, inference, perception	AP
05	Implement algorithms on simple and complex decision making.	CR
06	Engage in lifelong learning by staying current with advancements in AI research and technologies.	EL

*RM: Remember, UN: Understand, AP: Apply, AN: Analyse, EL: Evaluate, CR: Create

Suggested Course Practical List :

1. Solving Missionaries and cannibals problems
2. Water Jug Problem
3. 8-Queens Problem
4. Travelling Salesman Problem



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5. Solving Wampus Problem using Logic
6. Monkeys and Bananas Problem using Logic
7. Bayesian Classification Problem
8. Decision Tree Problem
9. Developing a sentiment analysis systems
10. Development of Medical Expert system with Recommendation system

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