GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Post Graduate Diploma In Data Science
Level: PG
Branch: Data Science
Subject Code: DS02080021
Subject Name: Artificial Intelligence

w. e. f. Academic Year:	2024-25
Semester:	2
Category of the Course:	Core Course

Prerequisite:	Nil
Rationale:	Nil

Course Outcomes:

Sr. No.	CO statement
1	Understand the principles and techniques of AI, including search strategies and problem-solving.
2	Design and implement intelligent systems using AI tools and frameworks.
3	Develop AI models for real-world applications, including natural language processing, robotics, and vision.
4	Evaluate the performance of AI algorithms and optimize them for efficiency and accuracy.

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR		ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
4	0	2	5	70	30	0	50	150

Content:

Sr. No.	Content	Total Hrs
1.	Introduction to Artificial Intelligence Definition, History, and Scope of AI, Applications of AI in various domains, Intelligent Agents and their types, Applications of AI in various domains	2
2.	Problem Solving and Search Techniques Problem Formulation and Representation, State-Space Search, Uninformed search: DFS and BFS, Informed search: A* and Greedy search, Constraint Satisfaction Problems, Adversarial Search: Minimax Algorithm, Alpha-Beta Pruning	10
3.	Knowledge Representation and Reasoning Logic-Based Representation: Propositional and Predicate Logic, Rule-Based Systems and Expert Systems, Ontologies and Semantic Networks, Reasoning under	10

	Uncertainty: Bayesian Networks	
4.	Machine Learning Fundamentals Supervised Learning: Linear Regression, Decision Trees, Neural Networks, Unsupervised Learning: Clustering (K-Means, Hierarchical), Reinforcement Learning, Metrics: Accuracy, Precision, Recall, F1-Score	8
5.	Natural Language Processing (NLP) Introduction to NLP, Text preprocessing techniques, Language models and word embeddings, Sentiment analysis and chatbot basics	8
6.	Applications and Case Studies in AI AI in healthcare, robotics, and gaming, AI in vision and image processing, AI project case Studie	2
	TOTAL	

- **Reference Books:**

Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig
Machine Learning by Tom M. Mitchell
Deep Learning by Ian Goodfellow, Yoshua Bengio, and Aaron Courville
Python Machine Learning by Sebastian Raschka and Vahid Mirjalili
Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig

- **This is the suggested list of practical but it may not be limited only to this list.**

1. Implement a Tic-Tac-Toe game using a search algorithm.
2. Develop a chatbot using rule-based logic.
3. Solve a pathfinding problem using the A* algorithm.
4. Create a simple classifier using a supervised learning algorithm.
5. Perform clustering on a dataset using K-means.
6. Build a sentiment analysis model for text data.
7. Develop a face detection system using computer vision libraries.
8. Train a basic neural network using TensorFlow or PyTorch.
9. Develop a recommendation system using collaborative filtering.
10. Implement reinforcement learning for a game-playing agent.

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