



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Degree

Subject Code: BE02R00041

Subject Name: Fundamental of AI

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

Prerequisite:	<ul style="list-style-type: none"> • Basic of computing and fundamental knowledge of problem solving techniques. • Understanding of key concepts related to algorithms.
Rationale:	The "Fundamental of AI" course is designed to provide undergraduate students with a comprehensive foundation in crucial domains of Artificial Intelligence. This interdisciplinary course aims to equip students with fundamental concepts and techniques that are essentially a pre-requisite in today's technology-driven world.

Course Outcome:

After Completion of the Course, Student will be able to:

No	Course Outcomes	RBT Level
01	Learn and enable them to discuss and comprehend AI-related topics.	Remember
02	Understand the fundamental concepts and terminology of Knowledge representation.	Understand
03	Understand the Machine Learning concepts and models to study fundamental problems of computing.	Understand
04	Understand the Deep Learning concepts and its applications for AI.	Understand
05	Apply various AI techniques to study real world scenarios and use cases.	Apply

Teaching and Examination Scheme:

Teaching / Learning Scheme (in Hours per semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
L	T	P	PBL*	TH		Theory		Tutorial / Practical			
						ESE (E)	PA (M)	PA/ (I)	PBL (I)	ESE (V)	
30	00	00	30	60	02	70	30	0	30	0	130

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, PA = Progressive Assessment, ESE = End-Semester Examination

** Problem Based Learning (PBL) aims to accommodate learning beyond syllabus as per clause 9.4 of NBA manual.*



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Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Introduction: <ul style="list-style-type: none">History & overview of Artificial IntelligenceDefinition of Artificial IntelligenceArtificial Narrow Intelligence, Artificial General Intelligence, Artificial Super IntelligenceConcepts of Production, Agents and EnvironmentsCharacteristic of Intelligent Agents, Concept of Rationality, Nature of Environments.	08	30
2.	Knowledge Representation: <ul style="list-style-type: none">Concept of Knowledge representationIntroduction to Natural Language processingConcept of Pattern recognitionIntroduction to Expert systems	06	20
3.	Basics of Machine Learning: <ul style="list-style-type: none">Learning from examplesForms of Learning -Supervised learning, Unsupervised learning, Reinforcement learningSimple Models –Linear regression, Logistic regression, Support Vector Machines (SVM) etc.	06	20
4.	Deep Learning: <ul style="list-style-type: none">Concept of Deep LearningIntroduction to Neural Networks.Types of Deep Learning models.Deep leaning applications.	06	20
5.	Modern Artificial Intelligence: <ul style="list-style-type: none">Large Language Models (LLMs)Use-cases: ChatGPT, Gemini, Bhashini, Krutrim etc.Current Issuess & Future Challenges of AI.	04	10
Total		30	100

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
30	50	20	00	00	00

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)



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References/Suggested Learning Resources:

1. Artificial Intelligence: Concepts and Applications by Lavika Goel, Latest Edition, Wiley.
2. Artificial Intelligence by Kevin Knight, Elaine Rich, Shivashankar B. Nair, Latest Edition, McGraw Hill.
3. Understanding Artificial Intelligence: Fundamentals and Applications by Albert Chun-Chen Liu, Oscar Ming Kin Law, Iain Law, Latest Edition Wiley-IEEE Press.
4. Fundamentals of Artificial Intelligence by K.R. Chowdhary, Latest Edition, Springer.
5. Artificial Intelligence A Modern Approach by Stuart J. Russell and Peter Norvig, Latest Edition, Pearson.

• List of suggested activities for Problem Based Learning:

Sr. No	Name of Activity	No. of Hours	Evaluation Criteria
1	Assignments	5 assignments \times 1h each; Total = 5h	Based on completeness, correctness and submission of assignments
2	Technical Video-Based Learning – Watch online lectures/tutorials on topics covered	Duration = 4h, Report & Presentation = 1h; Total = 5h	Report / Presentation on key learning outcomes
3	Preparing Posters, Charts, Power Point Presentation or documents (using equation editor, Mathtype, Latex etc.) of all important definitions, theorems, formulae etc on topics of syllabus	Preparing, Designing and Presenting Visual Content = 5h	Assessment based on creativity, clarity, and presentation skills
4	Seminar / Presentation – Study and present a technical topic beyond syllabus	Study/Prep = 3h, Report = 1h, Presentation = 1h; Total = 5h	Based on technical depth, quality of report and presentation skills
5	Real-World Case Study problems based on syllabus	Study = 4h, Report prep = 1h; Total = 5h	Based on correctness, completeness and analysis of the report
6	Implementing the concepts of syllabus in programs	Completing at least five programs = 5h	Review based on the implementation, results, and its output
7	Modeling and Simulation on use of concept in Engineering Systems (developing models and performing simulations)	Model formulation (4h) + Simulation and result analysis (1h) = 5h	Evaluation based on model accuracy, computational efficiency, and interpretation of results



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Note:

- The activities listed above are suggestive, and faculty members have the flexibility to select and modify them as needed.
- The total self-learning hours remain fixed at 15 hours, ensuring comprehensive coverage of topics of Discrete Mathematics.
- Faculty can adjust the distribution of hours across different activities while maintaining a balanced learning approach.
- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.
- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record keeping and to ensure transparency in the evaluation and assessment of self-learning activities.
