



# Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

## Department of Computer Engineering

Course(Category) Code	Course Name	Teaching Scheme (Hrs/week)					Credits Assigned			
		L	T	P	O	E	L	T	P	Total
(PC)	Artificial Intelligence and Machine Learning	3	0	2	5	10	3	0	1	4
		Examination Scheme								
		Component		ISE		MSE		ESE		Total
		Theory		75		75		150		300
		Laboratory		50		--		50		100

**Pre-requisite Course Codes, if any.**

CS202/IT202: Data Structures, MA203: Probability and Statistics

**Course Objective:** This course covers the fundamental concepts of Artificial Intelligence and machine learning.

**Course Outcomes (CO):** *At the End of the course students will be able to*

<b>CS307B.1</b>	Understand AI building blocks presented in intelligent agents
<b>CS307B.2</b>	Solve the problems using suitable searching methods.
<b>CS307B.3</b>	Solve the problems using suitable reasoning and knowledge representation methods.
<b>CS307B.4</b>	Apply suitable machine learning technique for a given problem
<b>CS307B.5</b>	Design an intelligent system using different AIML techniques for real life problems.

### CO-PO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CS307B.1</b>	2	3	-	-	2	-	-	-	-	-	2	-
<b>CS307B.2</b>	2	3	2	2	-	-	-	-	-	-	2	-
<b>CS307B.3</b>	2	3	2	2	-	-	-	-	-	1	2	-
<b>CS307B.4</b>	2	3	-	-	2	-	-	-	-	2	2	-
<b>CS307B.5</b>	2	3	2	2	2	-	-	-	-	2	2	2

### CO-PEO/PSO Correlation Matrix (3-Strong, 2-Moderate, 1-Weak Correlation)

	PEO1	PEO2	PEO3	PEO4	PSO1	PSO2	PSO3
<b>CS307B.1</b>	-	-	-	-	-	-	-
<b>CS307B.2</b>	-	-	-	-	-	-	-
<b>CS307B.3</b>	-	-	-	-	-	-	-
<b>CS307B.4</b>	CS1/IT-1	CS:1/IT-1	CS:1/IT-1	-	-	-	-
<b>CS307B.5</b>	CS: 2 IT-2	CS: 2/IT- 2	CS: 2/IT- 2	-	IT-2	CS: 2	-

### BLOOM'S Levels Targeted (Pl. Tick appropriate)

Remember	Understand	Apply	Analyze	Evaluate✓	Create
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### Theory Component



## Department of Computer Engineering

Department of Computer Engineering				
Module No.	Unit No.	Topics	Ref.	Hrs.
1	Title	Introduction to Artificial Intelligence	1	04
	1.1	Definition of AI, History and Future of AI, Problem solving Approach to Typical AI problem.		
	1.2	Intelligent Agents and Environment What is an Intelligent Systems, Types of Agents, structure of agent.		
	1.3	Environments and Its Properties, PEAS Representation for an Agent		
2	Title	Problem solving by Searching	1	10
	2.1	Searching: characteristics and issues in design of search programs		
	2.2	Uninformed search techniques: State Space Search, Depth First Iterative Deepening		
	2.3	Informed Search methods: Heuristic Search, Hill Climbing.		
	2.4	Adversarial Search: Game playing, Min-Max Search, Alpha-Beta Pruning		
3	Title	Knowledge Representation and Reasoning		08
	3.1	Reasoning: Representing and Reasoning with Uncertain Knowledge		
	3.2	Knowledge representation: A Knowledge-Based Agent, The Wumpus World.		
	3.3	Propositional Logic, First-order predicate logic, Forward and Backward Chaining		
4	Title	Introduction to Machine Learning		12
	4.1	Introduction: What is Machine Learning, History and overview of machine learning,	2,3	
	4.2	Types of Machine Learning – Supervised, Unsupervised Semi-Supervised Learning and Reinforcement Learning, Design a Learning System, The curse of dimensionality		
	4.3	Evaluating a hypothesis: Model selection, training/validation/testing procedures, diagnosing bias versus variance and vice versa, regularization and bias/variance, learning curves	2,3	
5	Title	Linear Models for Regression		8
	5.1	Two Simple Approaches to Prediction: Least Squares and Nearest Neighbors	4	
	5.2	Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods		
6	Self Study	Linear model for Classification: Logistic Regression, Linear Discriminant Analysis, Perceptron, Support Vector Machines, PCA	3,4	5*
Total(* Not included)				42

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**Department of Computer Engineering****Laboratory Component, if any. (Minimum 10 Laboratory experiments are expected)**

Sr. No	Title of the Experiment
1	Implement an Intelligent agent.
2	Implement a given problem using the searching technique.
3	Implement a given problem using knowledge representation and reasoning rules
4	To design and implement an intelligent system, incorporating the matching algorithm and the rule language. 1. It should provide a fact base updating function. 2. It should provide a function that checks the rules' LHS and return which rules were matched. 3. It should support firing RHS according to matches. Using SWISH Prolog or Java or Python or any other open-source tool
5	Implement supervised learning algorithms.
6	Implement unsupervised learning algorithms.
7	Implement the regression model
8	Minor project covering the concepts of AIML on the real life problem statements.

**Text Books**

Sr. No	Title	Edition	Authors	Publisher	Year
1	Artificial Intelligence: A Modern Approach	Third Edition	Stuart Russell and Peter Norvig	Prentice-Hall	2009
2	Machine Learning A Probabilistic Perspective	First Edition	Kevin P. Murphy	Massachusetts Institute of Technology	2012
3	Machine Learning,	First Edition	Tom.M.Mitchell	McGraw Hill International Edition	1997
4	The Elements of Statistical Learning	Second Edition	Trevor Hastie Robert Tibshirani Jerome Friedman	Springer	2009

**Reference Books**

Sr. No	Title	Edition	Authors	Publisher	Year
5	Artificial Intelligence: Making a System Intelligent	First Edition	Nilakshi Jain	Wiley Publication	2019
6	Pattern Recognition and Machine Learning,	First Edition	C. M. Bishop	Springer	2013