PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY

(Autonomous)

Kanuru, Vijayawada-520007

III B. Tech – II Semester

MACHINE LEARNING

Course Code	**23IT3603**	**Year**	III	**Semester**	II
Course Category	**PC**	**Branch**	**IT**	**Course Type**	Theory
Credits	3	**L – T – P**	3-0-0	**Prerequisites**	Artificial Intelligence
Continuous Evaluation:	30	**Semester End Evaluation:**	70	**Total Marks:**	100

Course Outcomes		
Upon successful completion of the course, the student will be able to:		
CO1	Describe the fundamental concepts, principles and techniques of machine learning to understand machine learning models.	L2
CO2	Apply supervised learning algorithms to build predictive models for classification and regression problems.	L3
CO3	Utilize unsupervised learning techniques to discover meaningful patterns and groupings within unlabeled data.	L3
CO4	Analyze machine learning problems, choose suitable algorithms and critically assess their performance and limitations.	L4

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	2											3	3
CO2	3										3	3	3
CO3	3										3	3	3
CO4		3									3	3	3

Syllabus		
Unit No.	**CONTENTS**	**Mapped CO**
I	**Introduction to Machine Learning:** Evolution of Machine Learning, **Paradigms for ML-** Learning by Rote, Learning by Induction, Reinforcement Learning. Types of Data, Matching, **Stages in Machine Learning**- Data Acquisition, Feature Engineering, Data Representation, Model Selection, Model Learning, Model Evaluation, Model Prediction. Search and Learning, Data Sets.	**CO1**
	Nearest Neighbor-Based Models: Introduction to Proximity Measures, **Distance Measures-** Non-Metric Similarity Functions, Proximity	**CO1, CO2,**

II	Between Binary Patterns. **Different Classification Algorithms Based on the Distance Measures:** K-Nearest Neighbor Classifier, Radius Distance Nearest Neighbor Algorithm. KNN Regression, Performance of Classifiers, Performance of Regression Algorithms.	**CO4**
III	**Models Based on Decision Trees:** Decision Trees for Classification, Impurity Measures, Properties, Regression Based on Decision Trees, Bias–Variance Trade-off, Random Forests for Classification and Regression. **The Bayes Classifier**: Introduction to the Bayes Classifier, Bayes' Rule and Inference. **The Bayes Classifier and its Optimality-** Multi-Class Classification. Class Conditional Independence and Naive Bayes Classifier (NBC).	**CO1, CO2, CO4**
IV	**Linear Discriminants for Machine Learning:** Introduction to Linear Discriminants, Linear Discriminants for Classification, **Perceptron Classifier-** Perceptron Learning Algorithm. **Logistic Regression-** Linear Regression, **Multi-Layer Perceptrons (MLPs)-** Backpropagation for Training an MLP.	**CO1, CO2, CO4**
V	**Clustering:** Introduction to Clustering, Partitioning of Data, Matrix Factorization. Clustering Algorithms, Divisive Clustering, Agglomerative Clustering, **Partitional Clustering-** K- Means Clustering, Rough Clustering, Rough K-Means Clustering Algorithm. Expectation Maximization-Based Clustering, Spectral Clustering.	**CO1, CO3, CO4**

Learning Resources
Text Books
1. "Machine Learning Theory and Practice", M N Murthy, V S Ananthanarayana, Universities Press (India), 2024.
Reference Books
1. "Machine Learning", Tom M. Mitchell, McGraw-Hill Publication, 2017 2. "Machine Learning in Action",Peter Harrington, DreamTech 3. "Introduction to Data Mining", Pang-Ning Tan, Michel Stenbach, Vipin Kumar, 7th Edition, 2019.
E-Resources & Other Digital material
1. Introduction to Machine Learning : https://nptel.ac.in/courses/106105152 2. Introduction to Machine Learning : https://nptel.ac.in/courses/106106139 3. Machine Learning : https://nptel.ac.in/courses/106106202 4. Machine Learning by StatQuest with Josh Starmer https://www.youtube.com/user/joshstarmer 5. Machine Learning Lectures by Nando de Freitas (University of Oxford) https://www.youtube.com/user/ProfNandoDF