GANPAT UNIVERSITY									
FACULTY OF ENGINEERING AND TECHNOLOGY									
Programme	Bachelor of Technology					Branch/Spec.	Computer Science & Engineering (BDA/CBA/CSE)		
Semester	VII					Version	1.1.0.2		
Effective from Academic Year			2025-26			Effective for the batch Admitted in			June 2022
Subject code	2CSE702		Subject Name			MACHINE LEARNING			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	1	0	3	Theory	40	60	100
Hours	2	0	2	0	4	Practical	30	20	50

Pre-requisites:

Probability theory and Bayesian Concept Learning, Statistics and data science, Algorithm analysis and design, Data Mining.

Learning Outcome:

After successful completion of the course, students will be able to

- Learn various machine learning approaches
- Learn different dimensionality reduction techniques
- Apply theoretical foundations of decision trees to identify best split and Bayesian classifier to label data points.
- Apply various classifier models like SVM, Neural Networks and identify classifier models for typical machine learning applications.

Theory syllabus

Unit	Content	Hrs
1	**Introduction:** Machine Learning Foundations: Design of a Learning system - Types of machine learning, Applications of machine learning.	1
2	**Supervised Learning:** Regression algorithms, Classification algorithms **Unsupervised Learning:** Clustering algorithms	9
3	**Dimensionality Reduction** Introduction, Feature Selection and Feature Extraction, Principal Component Analysis, Decision Tree algorithms, Ensemble methods	5
4	**Neural Network:** Neural Networks - Introduction, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Bayesian Estimation.	5

5	**Convolutional Neural Networks (CNN):** Introduction, Convolutional Neural Network (ConvNet/CNN), Evolution and Convolution Operation in CNN, Architecture of CNN, Convolution Layer, Activation Function (ReLU), Pooling Layer, Fully Connected Layer, Dropout	**5**
6	**Sequential Networks:** Sequence modeling using RNNs, Backpropagation through time, Long Short-Term Memory (LSTM), Bidirectional LSTMs	**5**

Self-Study:

LeNet-5, AlexNet, ZFNet, VGGNet, GoogleNet, ResNet.

Practical contents

Practicals shall be based on supervised, unsupervised learning and deep learning

Mooc Course

Course Name: Introduction to Machine Learning
Link:
https://www.edx.org/course/machine-learning-with-python-a-practical-introduct
https://www.coursera.org/learn/machine-learning-with-python

Text Books

1	Christopher Bishop, “Pattern Recognition and Machine Learning” Springer.
2	Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, MIT Press.

Reference Books

1	EthemAlpaydin, “Introduction to Machine Learning”, MIT Press.
2	Tom Mitchell, "Machine Learning", McGraw-Hill.
3	Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer.
4	Stephen Marsland, “Machine Learning - An Algorithmic Perspective”, Chapman and Hall/CRC Press.

Course Outcomes:

COs	**Description**
CO1	Learn various machine learning approaches
CO2	Learn different dimensionality reduction techniques
CO3	Apply theoretical foundations of decision trees to identify best split and Bayesian classifier to label data points.
CO4	Apply various classifier models like SVM, Neural Networks and identify classifier models for typical machine learning applications.

Mapping of CO and PO:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	2	1	1	2	1	1	2	2	0	0	0	1
CO2	2	2	1	3	3	2	1	1	1	1	1	2
CO3	2	2	1	3	3	2	2	1	1	1	2	2
CO4	2	2	1	2	3	2	2	1	2	1	2	1