

Branch Name:	Artificial Intelligence and Data Science
Program Code:	ET108
Semester / Year:	Semester VII /Fourth Year
Course Name:	Open Elective - III: Pattern Recognition
Course Code:	1ET1080706
Pre-requisite Course:	Basics Knowledge of Linear algebra, probability, statistics, programming.

Course Objectives:

- The goal of this course is with the increased availability of data from varied sources there has been increasing attention paid to the various data driven disciplines such as analytics and machine learning.
- In this course we intend to introduce some of the basic concepts and techniques of pattern recognition and machine learning.

Teaching and Examination Scheme:

Teaching Scheme Hours per week				Evaluation Scheme (Marks)				
				Theory (Marks)		Practical (Marks)		Total (Marks)
L	T	P	Credit	University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	2	4	70	30	30	20	150

Subject Contents

Sr. No	Topic	Total Hours	Weight (%)
1	Introduction: Pattern recognition, classification, clustering, machine learning	02	05
2	Representation: Data Structures for Pattern Representation, Distance Measure, Weighted Distance Measure, Non-Metric Similarity Function, Normalization of Data, Abstractions of the Data Set, Feature Extraction, evaluation of classifiers and clustering	05	13
3	Nearest Neighbor Based Classifiers: Nearest Neighbor Algorithm, Variants of the NN Algorithm, Minimal Distance Classifier (MDC)	07	18
4	Bayes Classifier: Bayes Theorem, Minimum Error Rate Classifier, Estimation of Probabilities, Comparison with the NNC, Naive Bayes Classifier	06	16
5	Support Vector Machine: Linear Discriminant Functions, Learning the Linear Discriminant Function, Learning the Weight Vector, Neural Networks, SVM for Classification	08	22
6	Clustering: Important of clustering, Hierarchical Algorithms, Partitional Clustering, clustering large data-sets	07	18
7	An application: Handwritten Digit Recognition	03	08

List of Reference Books:

1. “Murty, M.N. Pattern Recognition: An Algorithmic Approach”, Devi V.S.; Universities Press, Springer
2. “Introduction to Pattern Recognition and Machine Learning”, Devi V.S.; Murty, M.N. World Scientific
3. “Pattern Recognition and Machine Learning”, Christopher M. Bishop, Springer, 2006

List of Experiments:

1. Generating features for two classes and analyzing them.
2. Building classifiers for two classes using Bay’s rule.
3. Building classifiers for multiple classes using Bay’s rule.
4. Building classifiers for two classes using linear classifier.
5. Building classifiers for two classes using SVM
6. Implementation of clustering of patterns

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom’s Taxonomy Level
CLO1	Understand basics Classification and clustering	1 Remembering 2 Understanding
CLO2	Learn representation of patterns and classes and the proximity measures	2 Understanding 5. Evaluate
CLO3	Learn dimensionality reduction	4 Analyze
CLO4	Learn supervised and unsupervised learning	3 Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1					L	M						H	H	M	L	
CLO2	H		M	M	L					L		H		M	L	
CLO3		M	H		L									H		L
CLO4	H	M			L			L					L		M	H

H: High, M: Medium, L: Low