

**Course Objective:** To equip with basic mathematical and statistical techniques commonly used in pattern recognition. Also provide with an adequate background on probability theory, statistics, and optimization theory to tackle a wide spectrum of engineering problems.

S. NO	Course Outcomes (CO)
CO1	Able to apply the knowledge of mathematics for obtaining solutions in pattern recognition domain
CO2	Able to apply various algorithms for pattern recognition
CO3	Able to map the pattern recognition concepts for solving real life problems

<b>CO4</b>	Able to carry out implementation of algorithms using different simulation tools
<b>CO5</b>	To effectively implement pattern recognition algorithms for specific applications

<b>S. NO</b>	<b>Contents</b>	<b>Contact Hours</b>
<b>UNIT 1</b>	Introduction to Pattern Recognition, Feature Detection, Classification, Review of Probability Theory, Conditional Probability and Bayes Rule, Random Vectors, Expectation, Correlation, Covariance, Review of Linear Algebra, Basics of Estimation theory, Decision Boundaries, Decision region / Metric spaces/ distances.	<b>10</b>
<b>UNIT 2</b>	Classification: Bayes decision rule, Error probability, Normal Distribution, Discriminant functions, Decision surfaces, K-NN Classifier, Single Layer Perceptron, Multi-Layer Perceptron, Training set, test set; standardization and normalization.	<b>8</b>
<b>UNIT 3</b>	Clustering: Basics of Clustering; similarity / dissimilarity measures; clustering criteria, Different distance functions and similarity measures, Minimum within cluster distance criterion, K-means algorithm, K-medoids, DBSCAN, Data sets Visualization; Unique Clustering, No existence of clusters.	<b>8</b>
<b>UNIT 4</b>	Feature selection: Problem statement and Uses; Algorithms - Branch and bound algorithm, sequential forward / backward selection algorithms, (l,r) algorithm; Probabilistic separability based criterion functions, interclass distance based criterion functions.	<b>8</b>
<b>UNIT 5</b>	Feature extraction: PCA, Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy techniques, and real-life examples.	<b>8</b>
	<b>TOTAL</b>	<b>42</b>

<b>REFERENCES</b>		
<b>S.No.</b>	<b>Name of Books/Authors/Publishers</b>	<b>Year of Publication / Reprint</b>
<b>1</b>	R. O. Duda, P. Hart, D. Stork, Pattern Classification, 2nd Ed. Wiley, ISBN: 978 0-471-05669-0.,2000	2000
<b>2</b>	Bishop, C. M., Pattern Recognition and Machine Learning. Springer, ISBN 978-0-387-31073-2,2007	2007
<b>3</b>	Bishop, C. M., Neural Networks for Pattern Recognition, Oxford University Press, ISBN-13: 978-0198538646,1995	1995
<b>4</b>	Theodoridis, S. and Koutroumbas, K., Pattern Recognition, 4th Ed. Academic Press, ISBN :9781597492720.,2008	2008

<b>B.Tech. Information Technology</b>		
<b>Course code: Course Title</b>	<b>Course Structure</b>	<b>Pre-Requisite</b>

Secure Coding	L	T	P	Basic knowledge of programming, operating systems & computer networks.
	3	1	0	