Course Code	CSE342/CSE542
Course Name	Statistical Machine Learning
Credits	4
Course Offered to	UG/PG
Course Description	This course will introduce students to salient topics in machine learning and pattern classification. Fundamentals and advanced theoretical and mathematical concepts related to classification techniques and learning paradigms will be discussed. The programming assignments will provide hands-on experience of implementing some of these techniques. The project component of this course will test the student's ability to design, apply, and evaluate classifiers on appropriate datasets. The application domain for the projects will be from diverse areas such as object recognition, handwritten character recognition, and emotion recognition.

Pre-requisites

Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)
MTH201 Probability & Statistics		
CSE101 Intro to Programming		

*Please insert more rows if required

Post Conditions*(For suggestions on verbs please refer the second sheet)

CO1	CO2	CO3	CO4	CO5
Students will be able to understand the various key paradigms for machine learning and pattern classification	Students will be able to apply suitable feature extraction and classification technique to solve a given pattern classification problem	Students will be able to design a complete machine learning/pattern classification algorithm and evaluate the performance		

Weekly Lecture Plan

Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
1	Mathematical review, Introduction to Pattern Recognition and Evaluation Metrics	C03	Assignment
2,3,4	Bayesian Decision Theory	C01	Back of the book problems and paper review
5	Parameter Estimation	C01	Back of the book problems
6	Discriminant Analysis: PCA, LDA, ICA	C01	Coding assignment and problems
7	Parameter Estimation: MLE, MAP, EM	C01, C02, C03	Coding assignment and problems
8	Non-parametric Estimation - Voronoi, Parzen Windows	C01, C02, C03	Coding assignment and problems
9	Hidden Markov Models	C01, C02, C03	Coding assignment and problems
10,11	Neural Networks	C01, C02, C03	Coding assignment and problems
12	Ensembles: Bagging, Boosting, Consistency of classifiers	C01, C02, C03	Coding assignment and problems
13	Unsupervised Learning, Non-parametric Regression	C01, C02, C03	Coding assignment and problems

*Please insert more rows if required

Weekly Lab Plan

Week Number	Laboratory Exercise	COs Met	Platform (Hardware/Software)
Course does not have a designated lab component			

*Please insert more rows if required

Assessment Plan

Type of Evaluation	% Contribution in Grade
Quiz	10
Assignment	25
Mid-sem	15
Project	30
End-sem	20

*Please insert more row for other type of Evaluation

Resource Material

Type	Title
Textbook	Pattern Classification by David G. Stork, Perter E. Hart and Richard O. Duda
Reference	Pattern Recognition and Machine Learning by Christopher Bishop