

Course Code	PCS21E04J	Course Name	ADVANCED MACHINE LEARNING	Course Category	D	Discipline Elective Course	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Machine Learning	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science	Data Book / Codes/Standards			

Course Learning Rationale (CLR):		The purpose of learning this course is to:		
CLR-1 :	To gain knowledge in the areas of Machine Learning.			
CLR-2 :	To understand algorithms for analyzing data			
CLR-3 :	To learn advanced algorithms for analytics			
CLR-4 :	To discover patterns in the user data			
CLR-5 :	To make predictions and intricate patterns			

Learning		
1	2	3
Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
3	80	70
3	85	75
3	75	70
3	85	80
3	85	75

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO 1	PSO 2	PSO 3
L	H	-	H	L	-	-	-					-	-	-
M	H	L	M	L	-	-	-					-	-	-
M	H	M	H	L	-	-	-					-	-	-
M	H	M	H	L	-	-	-					-	-	-
H	H	M	H	L	-	-	-					-	-	-

Course Learning Outcomes (CLO):		At the end of this course, learners will be able to:		
CLO-1 :	Understand Machine Learning and concept learning			
CLO-2 :	Develop a Learning System			
CLO-3 :	Understand and Apply Machine Learning inreal time problem			
CLO-4 :	Learn the basics of data collection			
CLO-5 :	Knowledge about analysis and inference			

Duration (Hour)	15	15	15	15	15
S-1	SLO-1	Introduction to Machine Learning	Support vector machine	Euclidean Distance	Role of Distance Measures
	SLO-2	Types of learning	K-Nearest Neighbors	Hamming Distance	Information Retrieval and Extraction
S-2	SLO-1	Supervised learning	Classification accuracy	Manhattan Distance	Categorization
	SLO-2	Unsupervised learning	Introduction to Decision trees	Minkowski Distance	Clustering
S-3	SLO-1	Issues in Machine Learning	Splitting approaches in decision tree	Similarity Functions	Border increment text mining algorithm
	SLO-2	Perspectives	Gini Impurity	Error measures	compare the various distance calculation methods
S4-5	SLO-1	Laboratory 1: Concept Learning task	Laboratory 4: Extract the data from database	Laboratory 7: Implement decision tree algorithm	Laboratory10: compare the various distance calculation methods by implementing any one classification algorithm
	SLO-2				Laboratory13: Implement Text Mining
S-6	SLO-1	Concept Learning as a search	Information Gain	K-Means algorithm	Implement K-Means Algorithm
	SLO-2	Issues regarding classification	Chi-square	Fuzzy C Means algorithm	Hierarchical Clustering
S-7	SLO-1	Issues regarding Prediction	Classification by decision tree induction	Expectation approach	Extended decision trees
	SLO-2	Various types of classifications	Tree pruning methods	Maximization approach	Linear Regression
S-8	SLO-1	Bayesian Classification	Cost complexity pruning	Probabilistic clustering algorithms	Logistic Regression
					Generative Models

Duration (Hour)		15	15	15	15	15
	SLO-2	Classification by back propagation	Implementation of learning models for real time problem	Introduction to text analytics	Naive Bayes	Model Interpretation
S9-10	SLO-1	Laboratory2: Design a Learning System	Laboratory 5: Implement Bayesian classification	Laboratory 8: Learn Waikato Environment for Knowledge Analysis tool to pre-process the data	Laboratory 11: Implement K-Means Algorithm	Laboratory 14: Implement various operations of text analytics
	SLO-2					
S-11	SLO-1	Reinforcement Learning	Implement k-nearest neighbours classification	Chi square pruning	Implement various operations of text analytics	Convolutional Neural Networks
	SLO-2	Classification based on concepts from association rule mining	Issues in decision trees	AI in text mining	Implement NLP	Benefits of CNN
S-12	SLO-1	Goals and applications of machine learning	Extended Decision Trees	Pre-processing techniques	Explore NLP	Recurrent Neural Networks
	SLO-2	Logistic Regression	Fuzzy decision trees	Feature selection using dimensionality reduction	Over fitting	Overview of RNN
S-13	SLO-1	Overview of classification	Hierarchical clustering algorithm	Summarization	validation dataset	Benefits of RNN
	SLO-2	setup	Mixture of Gaussian algorithm	Foundations of NLP	training, test	Drawbacks of RNN
S 14-15	SLO-1	Laboratory 3: Implementation of learning models for real time problem	Laboratory 6: Implement k-nearest neighbours classification	Laboratory 9: Implement weka tool for Hospital management	Laboratory 12:Implement any one clustering algorithm	Laboratory 15:Implement NLP
	SLO-2					

Learning Resources	<ol style="list-style-type: none"> 1. EthemAlpaydin, Introduction to Machine Learning, Third edition, The MIT Press Cambridge. 2. Tom M Mitchell, Machine Learning, McGraw Hill Education 3. Jiawei Han and Micheline Kamber, —Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, 3rd ed, 2010. 4. LiorRokach and OdedMaimon, —Data Mining and Knowledge Discovery Handbook, Springer, 2nd edition, 2010. 5. Ronen Feldman and James Sanger, — The Text Mining Handbook: Advanced Approaches in Analyzing Unstructured Datall, Cambridge University Press, 2006.
---------------------------	--

Learning Assessment											
Bloom's Level of Thinking		Continuous Learning Assessment(50% Weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4# (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100%	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. S. Karthik, Assistant Consultant, Tata Consultancy Services	Dr. S. Sasikala, Associate Professor and Head, Dept. of Computer Science, University of Madras	Dr. Arul Leena Rose Dr. S. P. Angelin Claret