Course Code	18CSE392T	Course Name	MACHINE LEARNING - I	Course Category	E	*Professional Elective*	L	T	P	C
							3	0	0	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*CSE*	Data Book / Codes/Standards		*Nil*	

Course Objective:	*The purpose of learning this course is to:*
1:	*To provide basic concepts of machine learning*
2:	*To provide deeper understanding of various tools and techniques for Machine learning Algorithms and outputs*
3:	*Understand and implement the major classification techniques*
4:	*Understand and implement the various Clustering Methods*
5:	*Learn and Understand the Tree based machine Learning Algorithms*

Course Outcomes (CO):	*At the end of this course, learners will be able to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CO-1:	*Understand the concepts of machine learning*	*2*	*80*	*85*
CO-2:	*Learn and understand machine tools and libraries of machine learning*	*3*	*80*	*85*
CO-3:	*Learn and understand the linear learning models and classification in machine learning*	*3*	*80*	*85*
CO-4:	*Understand the clustering techniques and their utilization in machine learning*	*3*	*75*	*80*
CO-5:	*Study the tree-based machine learning techniques and to appreciate their capability*	*3*	*80*	*85*

Program Outcomes (PO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
3	-	-	*1*	-	-	-	-	-	*3*	-	*3*	*1*	*2*	*2*
3	*1*	*1*	*1*	-	-	-	-	-	*3*	-	*3*	*1*	*2*	*2*
3	*3*	*2*	*1*	*2*	-	-	-	-	*3*	-	*3*	*1*	*2*	*2*
3	*3*	*2*	*1*	*2*	-	-	-	-	*3*	-	*3*	*1*	*2*	*2*
3	*3*	*3*	*1*	*2*	-	-	-	-	*3*	-	*3*	*1*	*2*	*2*

Duration (hour)		9	9	9	9	9
S-1	SLO-1	*Machine Learning: What and Why?*	*Platform for machine learning*	*Ridge Regression*	*Measuring (dis)similarity*	*Decision tree representation*
	SLO-2	*Types of Machine Learning*	*Machine learning python libraries*		*Evaluating output of clustering methods*	
S-2	SLO-1	*Supervised Learning*	*Scikit-learn*	*Maximum likeliwood estimation (least squares)*	*Spectral clustering*	*Basic decision tree learning algorithm*
	SLO-2	*Unsupervised Learning*	*training data – testing data – validation data*		*Hierarchical clustering*	
S-3	SLO-1	*Reinforcement learning*	*k-fold cross validation*	*principal component analysis*	*Agglomerative clustering*	*Inductive bias in decision tree*
	SLO-2	*The Curse of dimensionality*	*Features*		*Divisive clustering*	
S-4	SLO-1	*Over fitting and under fitting*	*Performance metrics*	*Bayesian classifier*	*Choosing the number of clusters*	*Decision tree construction*
	SLO-2	*linear regression*	*MSE, accuracy, confusion matrix, precision*		*Clustering datapoints and features*	
S-5	SLO-1	*Bias and Variance tradeoff*	*recall, F- score*	*Support vector machine*	*Bi-clustering*	*Issues in decision tree*
	SLO-2	*Testing – cross validation*				
S-6	SLO-1	*Regularization*	*Linear Regression with multiple variables*	*Support vector machine + kernels*	*Multi-view clustering*	*Classification and regression trees (CART)*
	SLO-2	*Learning Curve*				
S-7	SLO-1	*Classification*	*Logistic Regression*	*Multi class classification*	*K-Means clustering*	*Random Forest*
	SLO-2	*Error and noise*				*Random Forest with scikit-learn*
S-8	SLO-1	*Parametric vs. non-parametric models*	*spam filtering with logistic regression*	*K nearest neighbour classification*	*K-meloids clustering*	*Multivariate adaptive regression trees (MART)*
	SLO-2					*Introduction to Artificial Neural Networks*
S-9	SLO-1	*Linear Algebra for machine learning*	*Naive Bayes with scikit-learn*	*Application: face recognition with PCA*	*Application: image segmentation using K-means clustering*	*Perceptron learning*
	SLO-2					

Learning Resources	1. *Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012.* 2. *Ethem Alpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005* 3. *Tom Mitchell, "Machine Learning", McGraw-Hill, 1997.*	4. *Sebastian Raschka, Vahid Mirjilili,"Python Machine Learning and deep learning", 2nd edition, kindle book, 2018* 5. *Carol Quadros,"Machine Learning with python, scikit-learn and Tensorflow", Packet Publishing, 2018.* 6. *Gavin Hackeling," Machine Learning with scikit-learn", Packet publishing, O'Reily, 2018.*

Learning Assessment

Bloom's Level of Thinking		Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		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%*
Level 2	Understand	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*	*20%*
Level 3	Apply	*10%*	*10%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*	*15%*
Level 4	Analyze	-	-	-	-	-	-	-	-	-	-
Level 5	Evaluate	-	-	-	-	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-	-	-	-	-
Total		100 %		100 %		100 %		100 %		100 %	

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

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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