INDIAN INSTITUTE OF INFORMATION TECHNOLOGY
DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

Course Code			Course Title	Applied Machine Learning			
Dept./Faculty proposing the course	Dr Rahul Raman, CSE		Structure (LTPC)	L	T	P	C
				3	0	2	4
To be offered for	DD, PG, Ph.D		Type	Core ☐		Elective ■	
			Status	New ☐		Modification ■	
Pre-requisite	Programming, Data Structures		Submitted for approval				
Learning Objectives	Equip students with the ability to apply machine learning techniques to solve real-world problems by analyzing large datasets, understanding system behavior, and predicting outcomes, with applications in image classification, data mining, autonomous navigation, bioinformatics, speech recognition, and text/web data processing.						
Learning Outcomes	In this course, students will be exposed to various machine learning algorithms with case studies. Machine learning course will help students learn and do projects in other related areas such as Data Mining, Image Processing, Speech Processing, Computer Vision etc. At the end of the course, students will be able to design and implement Machine Learning algorithms to solve real world problems						
Contents of the course *(With approximate break-up of hours for L/T/P)*	Introduction to Machine Learning, Supervised Learning-linear regression, logistic regression, Perceptron. Exponential family, generalized linear models. (L8) Generative learning algorithms. Gaussian discriminant analysis. Naïve Bayes. Support vector machines. Bias/variance tradeoff Model selection and feature selection. Evaluating and debugging learning algorithms, Decision Trees, Random Forest.(L10) Introduction to deep learning–Convolution Neural Network.(L4) Unsupervised learning-clustering - K-means, EM, Mixture of Gaussians, Factor Analysis. Dimensionality reduction - ICA. (L8) Reinforcement learning -MDPs, Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR), Q-learning. Value function approximation. (L12) **Practice Component** Assess model performance using cross-validation and debug issues like underfitting/overfitting by analyzing learning curves with Python, scikit-learn, matplotlib. Measure model accuracy, precision, recall, and F1-score; visualize SVM decision boundaries and support vectors with Jupyter notebooks, datasets from UCI repository, Kaggle.Evaluate CNN performance with accuracy and loss curves; assess clustering quality and dimensionality reduction with PyTorch/TensorFlow. Measure RL agent performance (e.g., cumulative reward, convergence rate) and random forest accuracy, analyzing feature importance and model robustness with tools like Python, OpenAI Gym, scikit-learn, NumPy. [P28]						
Text Books	Christopher Bishop, Pattern Recognition and Machine Learning.Springer,6th edition, 2011, ISBN 9780387310732						
Reference Books	1. T.Hastie, R.Tibshirani, J.Friedman, The Elements of Statistical Learning, Springer, 2017, 9780387848570 2. Tom M. Mitchell, Machine Learning, McgrawHill, 2017, 9781259096952						