Gujarat Technological University

Government Engineering College, Modasa

M.E. – Computer Engineering (Semester – I)

3710216 – Machine Learning

SYLLABUS

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

PREREQUISITE: Data Structures, Basics of Probability and Statistics

RATIONALE: Machine learning is a method of data analysis that automates analytical model building. It is a branch of artificial intelligence based on the idea that systems can learn from data, identify patterns and make decisions with minimal human intervention. This subject will help students to learn patterns and concepts from data without being explicitly programmed in various IOT nodes and also motivates them to design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances

Course Outcome:

#	CO Statement
CO1	Extract features that can be used for a particular machine learning approach in various IOT applications.
CO2	To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
CO3	To mathematically analyse various machine learning approaches and paradigms.

#	Description	#Lect	Wetg
1	**Supervised Learning (Regression/Classification):** Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear Models Support Vector Machines, Nonlinearity and Kernel Methods Beyond Binary Classification: Multi-class/Structured Outputs, Ranking	10	15 %
2	**Unsupervised Learning:** Clustering: K-means/Kernel K-means Dimensionality Reduction: PCA and kernel PCA Matrix Factorization and Matrix Completion Generative Models (mixture models and latent factor models)	7	15 %
3	Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)	6	20 %
4	Sparse Modelling and Estimation, Modelling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning	9	20 %
5	Scalable Machine Learning (Online and Distributed Learning) A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference	9	20 %
6	Recent trends in various learning techniques of machine learning and classification methods for IOT applications. Various models for IOT applications.	5	10 %