Course Type	Course Code	Name of Course	L	T	p	Credit
DC	NMCC502	Fundamentals of Machine Learning	3	1	0	4

Course Objective
To provide exposure to theory application of Machine Learning Techniques.
Learning Outcomes
This course will provide the students an exposure about how to use machine learning techniques in Data Analytics.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1.	**Foundations:** Maximum likelihood estimation, maximum a posteriori, bias-variance trade-off, loss functions, evaluation metrics.	4L+1T	This unit will help students to understand basics for machine learning methods
2.	**Supervised Learning I**: Linear and non-linear regression methods, logistic regression, multiple regression, Ridge and Lasso regression, nearest neighbors, decision trees, support vector machines, kernel methods, Regularization	10L+3 T	This unit will help students to understand the supervised learning methods.
3.	**Supervised Learning II:** Naive Bayes, Ensemble methods: bagging, random forests, boosting, gradient boosting, XGBoost, stacking	8L+3T	This unit will help students to understand the advanced supervised learning methods.
4.	**Unsupervised Learning:** Clustering methods, Gaussian mixture models, Dimensionality reduction techniques, PCA, ICA and LDA.	8L+3T	This unit will help students to get the concepts of various unsupervised learning techniques.
5.	**Applications and Explainability:** Recommendation systems, Anomaly detection, Explainable machine learning, Global vs Local Explanations, LIME and SHAP methods.	8L+3T	Students will understand practical applications of machine learning and model explainability concepts.
6.	**Brief introduction to deep learning:** Perceptron rule, multi-layer perceptron, feed forward neural network, Back propagation.	4L+1T	This unit will help students to learn the basics of ANN.
Total		**42L+14T**	

Text Books:

1. James, Gareth, Witten, Daniela, Hastie, Trevor, Tibshirani, Robert, An introduction to statistical learning: with applications in R, New York: Springer, 2013.
2. Andreas C. Miiller and Sarah Guido, Introduction to Machine Learning with Python: A Guide for Data Scientists, 2016.

Reference Books:

1. Kevin Murphy, Machine Leaming: A Probabilistic Perspective (MLAPP), MIT Press, 2012
2. Christopher Bishop, Pattern Recognition and Machine Learning (PRML), Springer, 2007.