Course: 301: **Machine Learning**
(Elective)

Course Code	301
Course Title	**Machine Learning (ML)**
Credit	4
Teaching per Week	4 Hrs.
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Review / Revision	June 2021
Purpose of Course	This course is an introduction for students to ML. The course also gives students an idea about various methods and algorithms of Machine Learning and application development of ML.
Course Objective	The objective of the course is – 1. To make student understand ML 2. To understand the various Machine Learning method 3. To explain various algorithms used in Machine learning 4. To introduce students with Programming in ML
Course Outcome	CO1 : Explain to the students the fundamental know how like the types of machine learning algorithms, applications and various required libraries, model selection etc. required to implement machine learning algorithms. CO2 : Train students with can utilize various data wrangling techniques, data cleaning, data transformation, data reduction, data discretization, feature selection, and data visualization CO3 : Train students who can implement supervised learning algorithms utilizing regression and classification algorithm on the real world dataset. CO4 : Train student to have understanding of Artificial Neural Network and its working. Also, to make them capable of implementing ANN for solving real world problems using it. CO5 : Explain to the students to use clustering and association rules as unsupervised learning method to solve complex problems. CO6 : Train students to use machine learning techniques to solve real life complex problems.
Mapping between COs with PSOs	
Pre-requisite	Basics of Linear Algebra, Statistics and Mathematics, Python Programming
Course Content	**Unit 1 : Introduction** 1.1. Definition of Machine Learning 1.2 Types of Machine Learning : Supervised , Unsupervised and Semi-supervised 1.3 Applications and tools of Machine Learning (Scikit learn library) 1.4 Data Pre-processing, Selecting a model and training a model 1.5 Evaluating a performance of model and improving performance **Unit 2 : Data Wrangling** 2.1 Definition and goal of Data Wrangling 2.2 Importance of Data Wrangling 2.3 Data Pre-processing and Data Cleaning

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							■
CO2	■	■	■			■	■	
CO3	■	■	■			■	■	
CO4	■	■	■			■	■	
CO5		■	■			■	■	
CO6		■	■	■	■	■	■	■

	2.3.1 Data Cleaning 2.3.2 Data Transformation 2.3.3 Data Reduction 2.3.4 Data Discretization 2.3.5 Feature Selection 2.4 Data Visualization **Unit 3 : Supervised Learning** 3.1 Supervised Learning : Classification and Regression 3.2 Regression 3.2.1 Simple and Multiple Regression 3.2.2 Linear Regression 3.2.3 Gradient Decent 3.2.4 Logistic Regression 3.3 Classification Algorithms : 3.3.1 K-nearest Neighbour 3.3.2 Support Vector Machines 3.3.3 Decision Trees 3.3.4 Naïve Bayes Classifier 3.4 Introduction to Support Vector Machine **Unit 4 : Neural Network** 4.1 Introduction to Neural Network 4.2 Architecture of Neural Network 4.3 Feedforward network and Backpropagation with example 4.4 Applications of Neural Network **Unit 5 : Unsupervised Learning** 5.1 Introduction to Unsupervised learning 5.2 Clustering 5.2.1 Selection of Clusters 5.2.2 Algorithms : 5.2.2.1 K – means clustering 5.2.2.2 Hierarchical Clustering 5.3 Association Rule Learning 5.3.1 Algorithms : 5.3.1.1 FP- Growth 5.3.1.2 Apriori Algorithm
Reference Books	1. “Machine Learning” by Tom M. Mitchell, McGraw Hill 2. “Understanding Machine Learning” by Shai Shalev-Shwartz, Shai Ben-David 3. “Machine Learning” by Anuradha Srinivasaraghavan, Vincy Joseph 4. “Machine Learning using Python” by U Dinesh Kumar Manaranjan Pradhan 5. “Real-World Machine Learning” by Henrik Brink, Joseph Richards, Mark Fetherolf 6. “Python Machine Learning” by Sebastian Raschka and Vahid Mirjalili 7. “Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems” by Aurelien Geron 8. “Machine Learning in Action” by Peter Harrington 9. “Introduction to Machine Learning with Python : A Guide for Data Scientists” by Andreas C. Muller, Sarah Guido
Teaching Methodology	Class work, Discussion, Self-Study, Seminars and/or Assignment
Evaluation Method	30% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 70% assessment is based on semester end University External examination