

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	Integrated B.Tech.(CSE)-MBA
Course Code:	CSI0702
Course Title:	Machine Learning
Course Type:	Core
Year of Introduction:	2021-22

Credit Scheme

L	T	Practical Component				C
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Course Learning Outcomes (CLO):

At the end of the course, students will be able to –

1. comprehend statistical methods as basis of machine learning domain
2. apply variety of learning algorithms for appropriate applications
3. implement machine learning techniques to solve problems in applicable domains
4. evaluate and compare algorithms based on different metrics and parameters.

Syllabus:

Total Teaching hours: 20

Unit	Syllabus	Teaching hours
Unit-I	Introduction: Motivation and Applications, Visualization, Basics of Supervised and Unsupervised Learning	02
Unit-II	Regression Techniques: Basic concepts and applications of Regression, Simple Linear Regression – Gradient Descent and Normal Equation Method, Multiple Linear Regression, Linear Regression with Regularization, Hyperparameters tuning, Loss Functions. Evaluation Measures for Regression Techniques	07
Unit-III	Classification Techniques: Naïve Bayes Classification, Fitting Multivariate Bernoulli Distribution, Gaussian Distribution and Multinomial Distribution, K Nearest Neighbours, Decision trees. Support Vector Machines: Hard Margin and Soft Margin, Kernels and Kernel Trick. Evaluation Measures for Classification Techniques	09
Unit-V	Advanced Concepts: Introduction to SVM, ANN, Basics of Semi-Supervised and Reinforcement Learning, introduction to deep learning.	02

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

Suggested Readings:

1. Tom Mitchell, Machine Learning, TMH
2. C. Bishop, Pattern Recognition and Machine Learning, Springer
3. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification and Scene Analysis, Wiley



4. Kishan Mehrotra, Chilukuri Mohan and Sanjay Ranka, Elements of Artificial Neural Networks, Penram International
5. Rajjan Shinghal, Pattern Recognition, Techniques and Applications, OXFORD
6. Ethem alpaydin, Introduction to Machine Learning, PHI

Suggested List of Experiments:	Sr. No.	Title	Hours
	1	Introduction to Python and Numpy.	02
	2	Introduction to Pandas, Matplotlib and Sklearn.	02
	3	Simple and multiple linear regression using Gradient Descent without regularization. (Without using sklearn or equivalent library for both)	02
	4	Simple and Multiple linear regression using Gradient Descent and Normal equation with regularization.	02
	5	K-nearest Neighbours classifications.	02
	6	Naïve bayes classification using Multivariate Bernoulli and Multinomial distribution.	02
	7	Naïve bayes classification using Gaussian distribution.	02
	8	Decision Tree classification.	02
	9	Implementation of Support Vector Machine for linearly separable data.	02
	10	Implementation of Support Vector Machine for non-linearly separable data.	02

Suggested Case List: -NA-