



## Faculty of Computer Studies (FoCS)

**Course Name:** Machine Learning Algorithms

**(UG/PG):** PG

**Number of Credits:** 04

**Level:** 4

**Learning Objectives:** By the end of the course, students should be able to:  
Develop an appreciation for what is involved in learning models from data.  
Understand a wide variety of learning algorithms.  
Understand how to evaluate models generated from data.  
Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

### Pre-learning:

Programming  
Mathematics with linear algebra, statistics

### Pedagogy:

Lectures  
Class work discussion

### Course Outline:

Sr. No.	Topic	Hours
1	Machine Learning: Ability to learn from data and its types. Supervised learning(generative/discriminative learning, parametric/non-parametric learning, neural networks, and support vector machines); Unsupervised Learning(clustering, dimensionality reduction, kernel methods) Reinforcement Learning( Learning Tasks, Q-Learning, Non-deterministic Rewards and Actions Machine Learning and Big Data	10
2	Elements in Machine Learning : Multiclass Strategies-One-vs-all One-vs-one, Learnability-Underfitting and Overfitting ,Error Measures, and PAC learning, Statistical Learning Approaches-Map learning, Maximum-likelihood learning Elements of Information Theory	13
3	Regression: Linear-Linear Models, Ridge ,Lasso, Robust and polynomial regression Logistics-Linear Classification, Logistic regression, Implementation and optimization, Stochastic Gradient descent algorithms,	12

	Classification metrics.	
4	Support Vector Machines: Linear Classification, Kernel Based Classification-Radial Basis function, Polynomial kernel, Sigmoid kernel and Custom kernel	6
5	Clustering Fundamentals and its types: K-Means, DBSCAN, Random Forest, K-Nearest Neighbors, Hierarchical Clustering, and Agglomerative Clustering	9
6	Tools and Techniques	10
	<b>Total</b>	<b>60</b>

### Text Books:

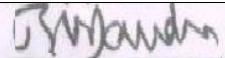
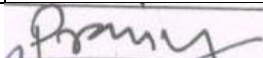
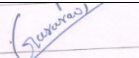
1. Machine Learning Algorithms by Guiseppe Bonaccorso
2. Python Machine Learning By Sebastian Raschka
3. Machine Learning; Tomm. Mitchell, McGraw Hill,2013
4. Introduction to Machine Learning By Ethem Alpaydin, MIT Press, Cambridge, 2010

### Suggested Evaluation Methods:

On line Test  
Lab Examination  
Viva  
Assignments

### Parallel/Similar courses the existing curriculum:

S.No.	Name of the course	Institute where it was offered
1.	Machine Learning	University of Southeren California
2.	Machine Learning for Data Science	Columbia University
3.	Machine Learning and Computing	Indian Institute of Space Science and Technology.

Name of Members	Dr.B.V.Dhandra	Dr.PravinMetkewar	Dr.M.Gururaj		
Designation	Professor	Professor	Asst.Professorr		
Org/Inst	SICSR	SICSR	SICSR		
Signature					

Name of the Expert:

Signature:

Date:

