COURSE TITLE	**MACHINE LEARNING FOR FINANCE**
COURSE CODE	**04CH0312**
COURSE CREDITS	**3**

Objective:

1 The objective of this course is to teach students the basic concepts of machine learning, supervised learning, unsupervised learning, and reinforcement learning

Course Outcomes: After completion of this course, student will be able to:

1 Basic Algorithms of Machine Learning
2 Supervised and Unsupervised Learning
3 Linear Regression, Classification, Tree, PCA, SVD, SVM
4 Resampling Methods and Optimization Techniques

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
1	0	4	50	50	0	0	0

Contents : Unit	Topics	Contact Hours
1	**Introduction** Learning systems, real world applications of machine learning, why machine learning, variable types and terminology, function approximation Types of machine learning: Supervised learning, unsupervised learning, reinforcement learning Important concepts of machine learning: Parametric vs non-parametric models, the trade-off between prediction accuracy and model interpretability, the curse of dimensionality, measuring the quality of fit, bias variance trade off, overfitting, model selection, no free lunch theorem.	9
2	**Linear Regression** Linear regression, estimating the coefficients, accessing the accuracy of coefficient estimates, accessing the accuracy of the model, multiple linear regression, qualitative predictors Classification: Logistic regression, estimating regression coefficients, making predictions, multiple logistic regressions, linear discriminant analysis, bayes' theorem of classification, LDA for p=1, LDA for p>1, quadratic discriminant analysis.	12

DR. MONICA VERMA
Digitally signed by (Name of HOD)

DR. SANJEET SINGH
Digitally signed by (Name of Dean/ Principal)

Contents : Unit	Topics	Contact Hours
3	**Resampling Methods, Model Selection and Regularization** Cross-validation, leave-one-out cross- validation, k-fold cross-validation, the bootstrap, subset selection, shrinkage methods, ridge and lasso regression, dimension reduction methods, principal components regression, partial least square.	12
4	**Tree Based Methods** Advantages and disadvantages of trees, regression Trees, classification trees, bagging, random forest, boosting.	12
Total Hours		**45**

Textbook :

1 Machine Learning , Tom M. Mitchell , McGraw Hill Education, 2021

References:

1 Pattern Recognition and Machine Learning (Information Science and Statistics) , Pattern Recognition and Machine Learning (Information Science and Statistics) , Christopher M. Bishop, Springer, 2011

2 The Elements of Statistical Learning: Data Mining, Inference, and Prediction , The Elements of Statistical Learning: Data Mining, Inference, and Prediction , Trevor Hastie, Robert Tibshirani, Jerome Friedman , Springer, 2017

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	25.00	25.00	20.00	10.00	10.00

Instructional Method:

1 Lecture & LAB

Supplementary Resources:

1 ---

DR. MONICA VERMA
Digitally signed by (Name of HOD)

DR. SANJEET SINGH
Digitally signed by (Name of Dean/ Principal)

Supplementary Resources:

2 https://www.geeksforgeeks.org/machine-learning/ml-linear-regression/
https://www.scribbr.com/statistics/simple-linear-regression/
https://www.geeksforgeeks.org/machine-learning/understanding-logistic-regression/
https://www.ibm.com/think/topics/logistic-regression
https://www.techtarget.com/searchbusinessanalytics/definition/logistic-regression
https://www.analyticsvidhya.com/blog/2021/08/a-brief-introduction-to-linear-discriminant-analysis/ https://www.ibm.com/think/topics/linear-discriminant-analysis

3 https://www.geeksforgeeks.org/machine-learning/ml-linear-regression/

4 https://www.scribbr.com/statistics/simple-linear-regression/

5 https://www.geeksforgeeks.org/machine-learning/understanding-logistic-regression/

6 https://www.ibm.com/think/topics/logistic-regression

7 https://www.techtarget.com/searchbusinessanalytics/definition/logistic-regression

8 https://www.analyticsvidhya.com/blog/2021/08/a-brief-introduction-to-linear-discriminant-analysis/

9 https://www.ibm.com/think/topics/linear-discriminant-analysis

DR. MONICA VERMA
Digitally signed by (Name of HOD)

DR. SANJEET SINGH
Digitally signed by (Name of Dean/ Principal)