

SEMESTER	4
Paper Number	MCMS 4413
Paper Title	Machine Learning and Data Mining
No. of credits	6
Theory / Composite	Composite
No. of periods assigned	Th: 4 Pr: 4
Name of faculty member(s)	
Course description / objectives	<p>On the completion of this course, the students will be able to:</p> <ol style="list-style-type: none"> 1. have a good understanding of the usefulness and applications of different data mining strategies 2. recognize the fundamental concepts and issues of machine learning 3. appreciate the relation between data mining and machine learning 3. realize the underlying mathematics in the development of different data mining and machine learning strategies 4. compare and analyse popular machine learning algorithms including supervised and unsupervised learnings 5. apply different data mining and machine learning algorithms to tackle different real-world problems
Syllabus	<p>Theory – 60 marks</p> <p>Introduction to Data Mining: Architecture of a Data Mining System; KDD Vs Data Mining; Applications of Data Mining. Data Preprocessing: Overview; Data cleaning; Data Integration; Data Reduction. Mining Frequent Patterns and Association: Frequent itemsets, Closed itemsets, Association rules; Apriori algorithm, Hash based technique. Introduction to Machine Learning: Definitions, types of learning, hypothesis space and inductive bias, evaluation, cross-validation Regression: Linear regression; Logistic regression; Polynomial regression; Applications. Classification: Supervised learning; Support Vector Machine, Decision Tree, Random Forest, Naive Bayes classifier; Rule based classification, Model evaluation and selection, Confusion matrix, Accuracy, Recall, Precision, F1 score, ROC, AUC. Clustering: Unsupervised learning, Partitioning methods; Hierarchical methods; Density based methods. Neural Network: Introduction and Features, Least Mean Square algorithm, Perceptron, Backpropagation, Multilayer network, Introduction to Deep Learning.</p> <p>Lab – 40 marks</p>
Reading/Reference Lists	<ol style="list-style-type: none"> 1. “Data Mining: Concepts and techniques”, J Han and M Kamber, Third Edition, Elsevier. 2. “The Top Ten algorithms in Data Mining”, CRC Press. 3. Ethem Alpaydin, "Introduction to Machine Learning" 2nd Edition, The MIT Press, 2009. 4. Tom M. Mitchell, "Machine Learning", First Edition by Tata McGraw-Hill Education, 2013.
Evaluation	<p>Total – 100 (Theory – 60, Practical – 40) Theory – CIA – 10 Semester Examination – 50</p>