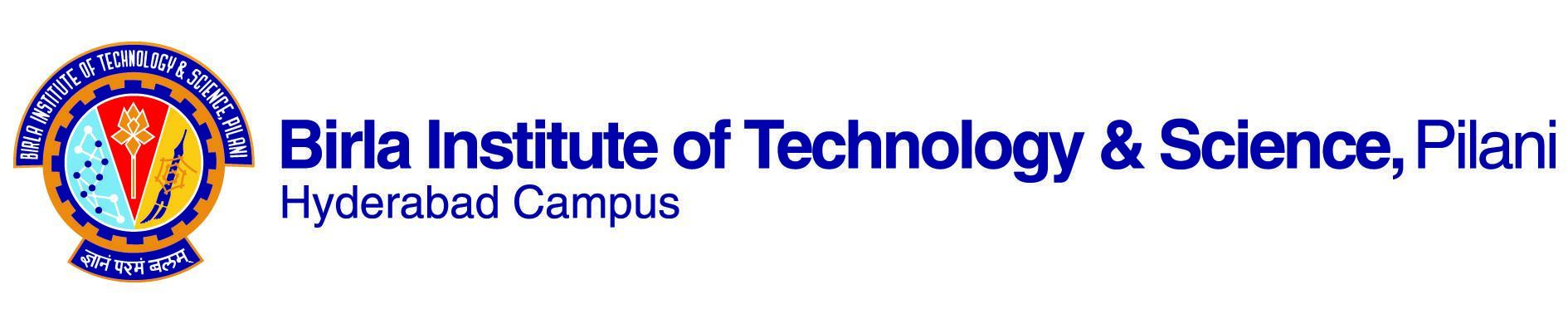
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**FIRST SEMESTER 2023-2024**

# Course Handout Part II

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Date: 11/08/2023

**Course No. :** BITS F464

**Course Title :** Machine Learning

**Instructor In Charge** **: Manik Gupta**

**Scope and Objectives of the course:**

Machine Learning addresses the problem of identifying patterns in data. The major goal of machine learning is to allow computers to learn (potentially complex) patterns from data, and then make decisions based on these patterns. The course covers design, implementation and applications of many supervised and unsupervised machine learning algorithms. The classification algorithms, namely, Perceptron, Logistic Regression, Support Vector Machines, Artificial Neural Networks, Decision Trees, Ensembles will be studied in details.

The objectives of the course are to

* Learn theoretical and practical aspects of linear models for regression and classification
* Understand probabilistic discriminative and generative models for classification
* Learn theoretical and practical aspects of SVM and ANN
* Understand decision tree learning and ensemble methods

**3. TEXT BOOK :**

**T1. Christopher Bishop**: Pattern Recognition and Machine Learning, Springer International Edition

**T2. Tom M. Mitchell:** Machine Learning, The McGraw-Hill Companies, Inc..

**COURSE PLAN:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Lecture No.** | **Learning objectives** | **Topics to be covered** | **Chapter in the Text Book** |
| 1 – 2 | To introduce the course | Course Introduction & Motivation | Lecture Slides |
| 3 - 6 | To understand linear models for classification | Linear Regression, Polynomial regression | T1 – Ch. 1.1  T1 – Ch. 3.1 |
| 7 – 13 | To understand linear models for classification | Discriminant functions, Least squares for classification, perceptron algorithm | T1 – Ch. 4.1 |
| 14 - 20 | To understand probabilistic generative and discriminative models | Probabilistic generative models – Maximum likelihood solution, Naïve Bayes classifier, probabilistic discriminative models – Logistic Regression | T1 – Ch.4.2  T1 – Ch. 4.3  T2 – Ch 6 |
| 21 – 26 | To understand ANN | Feed forward Neural Networks, Backpropagation | T1 – Ch. 5.1, 5.2, 5.3  T2 – Ch. 4 |
| 27 – 32 | To understand SVM | Maximum margin classifiers | T1 – Ch. 7.1 |
| 33 - 34 | To understand unsupervised learning | Clustering and Expectation Maximization | T1 – Ch. 9.1, 9.2 |
| 35 – 36 | To understand decision tree learning | Decision Tree Learning | T2 – Ch. 3 |
| 37 – 40 | To understand ensemble methods | Bias Variance tradeoff, Bagging and Boosting | T1 – Ch.14.2, 14.3 |

**EVALUATION SCHEME:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **Duration** | **Date & Time** | **Weightage** | **Nature of Component** |
| **Mid Sem Exam** | **90 mins** | 09/10 - 11.30 - 1.00PM | **30%** | **Closed Book** |
| **Assignments** |  | **To be announced later** | **30%** | **Open Book** |
| **Comprehensive Exam** | **3 Hrs** | 06/12 AN | **40%** | **Closed Book** |

**7. Office Hours:** Monday 1200Hrs – 1300Hrs @H126

**8. Make-up:**

1. No Make-up requests for project submissions will be catered to.
2. Prior permission of the Instructor-in-Charge is required to get make-up for the mid-semester exam. Only on producing documentary proof of absence minimum one day prior to the exam, proving that student would be physically unable to appear for the exam, the decision of granting the make-up will be taken. The recommendation from chief warden is necessary to request for a make-up.
3. Prior permission of Dean, AUGSD is required to get make-up for the comprehensive exam.
4. Instructor-in-charge’s decision in the matter of granting make-up would be final.

**9. Notices:** All notices about the course will be put on CMS/Google Classroom.

**10**. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-charge**

**BITS F464**