

Satyug Darshan Institute of Engineering and Technology

Lesson Plan / Teaching Plan / Lecture Plan with Progress: B Tech – 5<sup>th</sup> Semester: 2025-26

Course Name (Code) : Basics of Machine Learning (PEC-CS-D-501(I)) Faculty - Rachana Srivastava

| S No | Lecture No | Topic Description                                         | Teaching pedagogy | Reference material | Remark |
|------|------------|-----------------------------------------------------------|-------------------|--------------------|--------|
| 1.   | 1.         | Introduction to the syllabus                              | Board             | T1                 |        |
| 2.   | 2.         | Introduction to Machine Learning                          | Board             | T1                 |        |
| 3.   | 3.         | Types of Machine Learning                                 | Board             | T1                 |        |
| 4.   | 4.         | Basic methods: Distance-based methods                     | Board             | T1                 |        |
| 5.   | 5.         | Nearest-Neighbours,                                       | Board             | T1                 |        |
| 6.   | 6.         | Decision Trees,                                           |                   |                    |        |
| 7.   | 7.         | Naive Bayes                                               | Board             | T1                 |        |
| 8.   | 8.         | Linear models: Linear Regression,                         | Board             | T1                 |        |
| 9.   | 9.         | Logistic Regression,                                      | Board             | T1                 |        |
| 10   | 10.        | Generalized Linear Models                                 | Board             | T1                 |        |
| 11   | 11.        | Support Vector Machines                                   | Board             | T1                 |        |
| 12   | 12.        | Nonlinearity and Kernel Methods                           | Board             | T1                 |        |
| 13   | 13.        | Beyond Binary Classification                              | Board             | T1                 |        |
| 14   | 14.        | Multi-class/                                              | Board             | T1                 |        |
| 15   | 15.        | Structured Outputs,                                       | Board             | T1                 |        |
| 16   | 16.        | Ranking                                                   |                   |                    |        |
| 17   | 17.        | Clustering: K-means                                       | Board             | T1                 |        |
| 18   | 18.        | Kernel K-means                                            | Board             | T1                 |        |
| 19   | 19.        | Dimensionality Reduction                                  | Board             | T1                 |        |
| 20   | 20.        | PCA and                                                   | Board             | T1                 |        |
| 21   | 21.        | kernel PCA                                                | Board             | T1                 |        |
| 22   | 22.        | Matrix Factorization                                      | Board             | T1                 |        |
| 23   | 23.        | Matrix Completion                                         | Board             | T1                 |        |
| 24   | 24.        | Generative Models                                         | Board             | T1                 |        |
| 25   | 25.        | mixture models and                                        | Board             | T1                 |        |
| 26   | 26.        | Class test                                                | Board             | T1                 |        |
| 27   | 27.        | latent factor models                                      | Board             | T1                 |        |
| 28   | 28.        | Evaluating Machine Learning algorithms                    |                   |                    |        |
| 29   | 29.        | Model Selection,                                          |                   |                    |        |
| 30   | 30.        | Introduction to Statistical Learning Theory,              | Board             | T1                 |        |
| 31   | 31.        | Descriptive Statistics                                    | Board             | T1                 |        |
| 32   | 32.        | Inferential Statistics                                    | Board             | T1                 |        |
| 33   | 33.        | Different Techniques of Statistics                        | Board             | T1                 |        |
| 34   | 34.        | Difference between Descriptive and Inferential Statistics | Board             | T1                 |        |
| 35   | 35.        | Ensemble Methods                                          | Board             | T1                 |        |
| 36   | 36.        | Boosting,                                                 | Board             | T1                 |        |
| 37   | 37.        | Bagging,                                                  | Board             | T1                 |        |
| 38   | 38.        | Random Forests                                            | Board             | T1                 |        |
| 39   | 39.        | Sparse Modeling and Estimation                            | Board             | T1                 |        |
| 40   | 40.        | Modeling Sequence/Time-Series Data,                       | Board             | T1                 |        |
| 41   | 41.        | Deep Learning                                             | Board             | T1                 |        |

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|----|-----|---------------------------------------------------------------------------------------------|-------|----|--|
| 42 | 42. | Feature Representation Learning                                                             | Board | T1 |  |
| 43 | 43. | Scalable Machine Learning (Online and Distributed Learning)                                 | Board | T1 |  |
| 44 | 44. | Introduction to Bayesian Learning and Inference                                             | Board | T1 |  |
| 45 | 45. | Recent trends in various learning techniques of machine learning and classification methods | Board | T1 |  |
| 46 | 46. | Revision                                                                                    | Board | T1 |  |
| 47 | 47. | Revision                                                                                    | Board | T1 |  |
| 48 | 48. | Revision                                                                                    | Board | T1 |  |
| 49 | 49. | Revision                                                                                    | Board | T1 |  |

#### Study Material/ Reference Book

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|----|----------------------------------------------------------------------------------------------------------------------------------|
| T1 | Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012                                                     |
| R1 | Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online) |
| R2 | Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007                                                     |