

## B.Tech III Year II Semester

## JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC64c- MACHINE LEARNING TECHNIQUES

(Professional Elective – II)

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**Course Objectives:** The objectives of the course are to make the students learn about

- To comprehend the basics of machine learning and learning systems.
- To introduce to different types of linear models and applications.
- To gain an understanding of constructing decision trees and probabilistic models.
- To analyze dimensionality reduction models and genetic algorithms
- To introduce to different types of graphical models and tracking methods.

**UNIT – I:**

**Introduction:** Learning, Types of Machine Learning, Supervised Learning, The Brain and the Neuron, Design a Learning System, Perspectives and Issues in Machine Learning , Concept Learning Task, Concept Learning as Search, Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination Algorithm, Linear Discriminants, Perceptron, Linear Separability, Linear Regression.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Appreciate the basic concepts of machine learning. L1
- Know about different types of learning systems. L1

**UNIT – II:**

**Linear Models:** Multi-layer Perceptron, Going Forwards, Going Backwards, Back Propagation Error, Multi-layer Perceptron in Practice, Examples of using the MLP, Overview, Deriving Back-Propagation, Radial Basis Functions and Splines, Concepts, RBF Network, Curse of Dimensionality, Interpolations and Basis Functions, Support Vector Machines.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand different types of linear models. L2
- Know different concepts of linear models and their applications. L1

**UNIT – III:**

**Tree and Probabilistic Models:** Learning with Trees, Decision Trees, Constructing Decision Trees, Classification and Regression Trees, Ensemble Learning, Boosting, Bagging, Different ways to Combine Classifiers, Probability and Learning, Data into Probabilities, Basic Statistics, Gaussian Mixture Models, Nearest Neighbor Methods, Unsupervised Learning, K means Algorithms, Vector Quantization, Self Organizing Feature Map.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn the construction of decision trees and their classification. L1
- Know the uses and applications of probabilistic models. L1

**UNIT – IV:**

**Dimensionality Reduction and Evolutionary Models:** Dimensionality Reduction, Linear Discriminant Analysis, Principal Component Analysis, Factor Analysis, Independent Component Analysis, Locally Linear Embedding, Isomap, Least Squares Optimization, Evolutionary Learning, Genetic algorithms, Genetic Offspring, Genetic Operators, Using Genetic Algorithms, Reinforcement Learning, Overview, Getting Lost Example, Markov Decision Process.



**Learning Outcomes:**

At the end of this unit, the student will be able to

- Analyze dimensionality reduction models.(L4) L1
- Understand evolutionary models and how to apply genetic algorithms. L2

**UNIT – V:**

**Graphical Models:** Markov Chain Monte Carlo Methods, Sampling, Proposal Distribution, Markov Chain Monte Carlo, Graphical Models, Bayesian Networks, Markov Random Fields, Hidden Markov Models, Tracking Methods.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Learn different types of graphical models. L1
- Understand different types tracking methods. L2

**Text Books:**

1. Stephen Marsland, “Machine Learning – An Algorithmic Perspective”, Second Edition,CRC Press, 2014.
2. Tom M Mitchell, “Machine Learning”, First Edition, McGraw Hill Education, 2013.

**Reference Books:**

1. Peter Flach, “Machine Learning: The Art and Science of Algorithms that Make Sense of Data”, First Edition, Cambridge University Press, 2012.
2. Jason Bell, “Machine learning – Hands on for Developers and Technical Professionals”, First Edition, Wiley, 2014
3. EthemAlpaydin, “Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)”, Third Edition, MIT Press, 2014

**Course Outcomes:**

At the end of this Course the student will be able to

- Learn the basics of machine learning and learning systems. L1
- Understand different types of linear models and applications. L2
- Gain an understanding of constructing decision trees and probabilistic models. L1
- Analyze dimensionality reduction models and genetic algorithms L4
- Compare and differentiate different types of graphical models and tracking methods. L2

