

Nirma University
School of Technology, Institute of Technology
B. Tech (Instrumentation and Control Engineering)
Semester V

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Course Code	2IC503
Course Title	Machine Learning

Course Learning Outcome:

At the end of the course, students will be able to –

- comprehend supervised and unsupervised machine learning algorithm and study the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
- evaluate mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised, unsupervised and reinforcement learning
- design and implement various machine learning algorithms to solve real-world applications problems

Syllabus

Teaching Hours

UNIT 1: Introduction

02

Motivation and applications, Basics of supervised and unsupervised learning

UNIT 2: Regression Techniques

Basic concepts and applications of Regression, Simple Linear & Multiple Regression, Gradient Descent, Hyper-parameters tuning, Evaluation Measures for Regression Techniques

05

UNIT 3: Classification Techniques

Naïve Bayes Classification, K-Nearest Neighbors, Classification Trees, Support Vector Machines, Evaluation Measures for Classification Techniques

06

UNIT 4: Artificial Neural Networks

Biological Neurons and Biological Neural Networks, Perceptron Learning, Activation Functions, Multilayer Perceptron, Back-propagation Neural Networks.

08

UNIT 5: Dimensionality Reduction & Clustering

PCA, k-means Clustering

03

UNIT 6: Reinforcement Learning

Basics concepts of reinforcement learning, convolution Neural Network, Deep Learning **03**

UNIT 7: Applications & Case Studies

Industrial applications of machine learning, patterns classification, case studies. **03**

Self Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

References:

1. Tom Mitchell, Machine Learning, TMH Publications.
2. C. Bishop, Pattern Recognition and Machine Learning, Springer Publications.
3. R. O. Duda, P. E. Hart and D. G. Stork, Pattern Classification and Scene Analysis, Wiley Publications.
4. Simon Rogers, Mark Girolami, First Course in Machine Learning, CRC Press.
5. Kishan Mehrotra, Chilukuri Mohan and Sanjay Ranka, Elements of Artificial Neural Networks, Penram International Publishers.
6. Rajjan Shinghal, Pattern Recognition, Techniques and Applications, OXFORD Publications.
7. Athem Ealpaydin, Introduction to Machine Learning, PHI Publications.
8. Andries P. Engelbrecht, Computational Intelligence - An Introduction, Wiley Publication
9. Applied Statistics and Probability for Engineers, Douglas C. Montgomery and George C. Runger, Wiley Publications.
10. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, The MIT Press Publications.