**MACHINE LEARNING**

**Objectives**

Machine Learning is a growing field in the area of pattern recognition, natural language processing, speech processing, image processing and vision. This course provides requisite introduction to machine learning and deep learning architectures. The objectives include: 1. Formulate machine learning problems related to different applications and develop algorithms to solve them. 2. Read current research papers and understand the issues:

**Pre-requisites**

* Linear Algebra
* Probability, random variables, estimation theory
* Optimization techniques.
* **T**ools – MATLAB (beginner level)
* Languages – Python/R/Julia (any of these)

**Eligibility: CPI equal to or greater than 8.0**

**Course Contents:**

Supervised Vs Unsupervised learning, Linear and Polynomial regessions, [ convex/non convex functions, constrained/unconstrained minimization, Least squares (LS) estimation, Maximum likelihood (ML) and Maximum a posteriori (MAP) estimations,] LDA, QDA, bias and variance, overfitting and regularization, cross validation, entropy, cross entropy, KL divergence, logistic regression, soft max for multiclass classification, Support vector machine (Soft margin and Hard margin classifiers), K means clustering, Principal component Analysis, ICA

Neural networks, Multilayer perceptron (MLP), deep networks, backpropagation, , Generative Advesarial Network (GAN)

**Expected Outcomes**

After studying this course, students will be able to understand a variety of machine learning architectures, use them to solve problems in object classification, segmentation (clustering). The course will be helpful for the students to come up with new research ideas in various application areas of machine learning.

This course has both Theory and Lab.