

**ITE6010 Machine Learning****LTPJC  
3 0 044****Pre-requisite:** Nil**Objectives:**

- This course gives an overview of many concepts, techniques, and algorithms in machine learning.
- The course would provide students the basic ideas and intuition of modern machine learning techniques.

**Expected Outcome :**

On completion of this course, student should be able to

- Demonstrate a wide variety of learning algorithms and how to apply learning algorithms to data.
- Realize how to perform evaluation of learning algorithms and model selection
- Justify why a given model is appropriate for the situation or why it is not appropriate.

Module	Topics	L Hrs	SLO
1	<b>Basics:</b> Introduction to machine learning - different forms of learning; Basics of probability theory, linear algebra and optimization	6	1
2	<b>Regression Analysis:</b> Linear regression, Ridge regression, Lasso, Bayesian regression, Regression with Basis functions.	6	1
3	<b>Classification Methods:</b> Linear Discriminant Analysis, Logistic regression, Perceptrons, Large margin classification, Kernel methods, Support Vector Machines. Classification and Regression Trees, Multi-layer Perceptrons and Back propagation	8	2
4	<b>Graphical Models:</b> Bayesian Belief Networks, Markov Random Fields, Hidden Markov Models, Exact inference methods, Approximate inference methods.	6	7
5	<b>Ensemble Methods:</b> Boosting - Adaboost, Gradient Boosting; Bagging - Simple methods, Random Forest.	6	7
6	<b>Computational Learning Theory:</b> PAC Learning, VC Dimension, Bias/Variance Tradeoff.	5	2
7	<b>Unsupervised Learning:</b> Clustering - k-means, EM-Mixture of Gaussians, Factor Analysis, PCA, ICA, LDA	5	7
8	<b>Deep Learning in Neural Network – Guest Lecture</b>	3	2,7
<b>Total Lecture Hours</b>			<b>45</b>
<b># Mode:</b> Flipped Class Room, [Lecture to be videotaped], Use of physical and computer models to lecture, Visit to Industry, Min of 2 lectures by industry experts			
<b>Text Books</b> <ol style="list-style-type: none"> <li>1. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2013.</li> </ol> <b>Reference Books</b> <ol style="list-style-type: none"> <li>1. T. Hastie, R. Tibshirani, and J. H. Friedman. The Elements of Statistical Learning: Data Mining, Inference and Prediction. 2<sup>nd</sup> Edition, Springer, 2008.</li> <li>2. Mitchell, Tom. Machine Learning. McGraw-Hill, 2013.</li> </ol>			
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