



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Third Year Bachelor of Engineering (CE/IT)
(In Effect From Academic Year 2019-20)

Subject Code: CT604E-N	Subject Title: Machine Learning
Pre-requisite	

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
03	00	02	05	04	03	70	30	20	30	150

Course Objective:

Machine learning concerns with designing and developing of algorithms that allow machines, essentially computers, to evolve realistic or human like behavior based on the empirical data available. This course aims to discuss the building blocks of Computer vision and Natural Language Processing problems and provide an overview of the machine learning and advance topics.

Outline Of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction	5
2	Linear Regression	6
3	Classification	8
4	Resampling Methods and Evaluation	6
5	Neural Network Representation and Learning	4
6	Ensemble method	3
7	Clustering	4
8	Dimensionality Reduction Graphical Model	8
9	Introduction Reinforcement Learning	2
10	Machine Learning Applications	2

Total hours (Theory): 48

Total hours (Lab): 32

Total hours: 80



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Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	Introduction: Introduction to Machine Learning, Statistical Learning, Supervise Learning, Unsupervised Learning, Reinforcement Learning, Linear Algebra basics, Probability Basics	5	10
2	Linear Regression: Simple Linear Regression, Multiple Linear Regression	6	13
3	Classification : Logistic Regression : Cost function, problem of overfitting, Regularization, Support vector machine : support vector, kernel, K-nearest Neighbor(KNN)	8	17
4	Resampling Methods and Evaluation: Cross-Validation, The Validation Set Approach, Leave-One-Out Cross-Validation, k-Fold Cross-Validation Bias-Variance Trade-Off for k-Fold Cross-Validation ,Cross-Validation on Classification Problems, The Bootstrap, ROC curve, confusion matrix, Precision, Recall, F-score	6	13
5	Neural Network Representation and Learning : Model Representation, cost function Backpropogation	4	8
6	Ensemble method : Decision Tree, Bagging, Boosting, Gradient Boosting, Stacking, Random Fores, AdaBoost	3	6
7	Clustering : K-means, Hierarchical clustering	4	8
8	Dimensionality Reduction : PCA, LDA	8	17
9	Graphical Model : Bayesian Networks : Naïve Bayes, Introduction, Parameter Learning, HMM	2	4
10	Reinforcement Learning : Introduction , RL Framework	2	4
11	Machine Learning Applications : Recommender System, Sentiment Analysis, Image Captioning, Object detection	5	10
	Total	48	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- in lectures.
- Experiments shall be performed in the laboratory related to course contents.



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Learning Outcome:

On successful completion of this course, the student should be able to:

- Mathematical modeling of real time problem.
- Students are expected to learn the fundamental problems of NLP and computer vision and algorithms to deal with. There by study various issues involved in machine learning.

e-Resources:

- <https://nptel.ac.in/courses/106106139/84>
- <https://www.coursera.org/learn/machine-learning>

Reference Books:

1. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.
2. An Introduction to Statistical Learning by Gareth James , Daniela Witten
3. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.

List of experiments

No	Name of Experiment
1	Hands on session in R Or Python learn following Data structure : List, Dictionary, Dataframe, Numpy/scipy package in Python.
2	Implement Linear Regression in R or Python
3	Implement Logistic Regression in R or Python
4	Implement SVM Classifier in R or python
5	Implement KNN Classifier in R or python
6	Study and Implement K-Fold cross validation and ROC
7	Implement BPNN Classifier in R or python
8	Study and Implement various Ensemble method of classifier : Bagging, Boosting, Stacking
9	Implement various Clustering algorithm in R and python
10	Study and Implement various Dimensionality technique like PCA and LDA
11	Course project on Recommender System, Sentiment Analysis, Image Captioning, Object detection