COURSE TITLE	**MACHINE LEARNING ESSENTIALS**
COURSE CODE	**01AI0405**
COURSE CREDITS	**4**

Objective:

1. Learning basic concepts of various machine learning methods is primary objective of this course. This course specifically make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.
2. Learning basic concepts of various machine learning methods is primary objective of this course. This course specifically make student able to learn mathematical concepts, and algorithms used in machine learning techniques for solving real world problems and developing new applications based on machine learning.

Course Outcomes: After completion of this course, student will be able to:

1. Apply machine learning techniques on real world problem or to develop AI based application.
2. Analyze and Implement Regression techniques.
3. Solve and Implement solution of Classification problem.
4. Understand and implement Unsupervised learning algorithms

Pre-requisite of course: Basics of computer science including algorithms, data structure, Basic Linear algebra and Probability theory.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Introduction to Linear Algebra for Machine Learning** Basic introduction to linear algebra and Mathematics equations for Machine learning,, Matrices, Vectors in linear algebra.	8
2	**Introduction to Machine Learning** What is Machine Learning,, Basic Terminologies of Machine Learning, Applications of ML, Difference between Data Mining and Predictive Analysis,, Tools and Techniques of Machine Learning	8
3	**Types of Machine Learning** Supervised Learning, Unsupervised Learning, Reinforcement Learning, Machine Learning Lifecycle	8

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Contents : Unit	Topics	Contact Hours
4	**Supervised Learning : Classification and Regression** Classification: K-Nearest Neighbour, Decision Trees, Naïve Bayes, Support Vector Machines, Regression: Model Representation, Linear Regression, Non-Linear Regression	10
5	**Unsupervised and Reinforcement Learning** Clustering: K-Means Clustering, Hierarchical clustering, Density-Based Clustering, Genetic Algorithm	10
6	**Python for Machine Learning** Basics of Python for ML, Python Libraries of ML, Dataset, Apply Algorithms on datasets,, Result Analysis from dataset,, Future Scope of ML	4
Total Hours		**48**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical 1** Statistical Analysis of any dataset using WEKA tool.	2
2	**Practical 2** Analysis on various tools for machine learning and explore it.	2
3	**Practical 3** Study most useful packages for machine learning and How to install packages in python.	2
4	**Practical 4** Study how to download and load any datasets.	2
5	**Practical 5** Study how to divide dataset into training set and testing set.	2
6	**Practical 6** Create your own linear regression model in python.	2
7	**Practical 7** Implement K-means Algorithm in any suitable dataset.	2
8	**Practical 8** Implement Linear Regression Algorithm in any suitable dataset.	2
Total Hours		**16**

Textbook :

1 Machine Learning – A Probabilistic Perspective, Kevin P. Murphy, -, -

2 "Machine Learning using Python, U Dinesh Kumar, Manaranjan Pradhan, -

References:

1 Machine Learning – A Probabilistic Perspective, Machine Learning – A Probabilistic Perspective, Kevin P. Murphy, Apress, 2010

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Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	25.00	25.00	15.00	10.00	5.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room
3. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
4. Students will use resources like online videos, NPTEL course videos, e□courses, Virtual Laboratory

Supplementary Resources:

1. https://www.deeplearning.ai/
2. https://www.coursera.org/learn/machine-learning

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