# COURSE STRUCTURE

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| **Course Code** | **AID0PM08A** | | | | |
| **Course Category** | **Program Major** | | | | |
| **Course Title** | **Basics of Machine Learning** | | | | |
| **Teaching Scheme** | **Lectures** | **Tutorials** | **Laboratory / Practical** | **Project** | **Total** |
| **Weekly load hours** | **3** | **–** | **2** | **–** | **5** |
| **Credits** | **3** | **–** | **1** | **–** | **4** |
| **Assessment Schema Code** | **TL3** | | | | |

**Prerequisites:**

First Year pass / ATKT

**Course Objectives:**

1. Knowledge of Python Programming.
2. Knowledge of data science
3. Develop proficiency in data preprocessing.
4. Learn to evaluate machine learning models.

**Course Outcomes:**

After completion of this course students will be able to:

1. To understand concept of AI and ML
2. To learn and implement supervised algorithms.
3. To learn and implement unsupervised algorithms.
4. To work with feature selection.
5. To learn and implement ensemble techniques.

**Course Contents:**

**Unit-1 ML Introduction**

Getting Started with Machine Learning, An Introduction to Machine Learning
What is Machine Learning? , Introduction to Data in Machine Learning
Demystifying Machine Learning, ML – Applications
Best Python libraries for Machine Learning , Artificial Intelligence, An Introduction
Machine Learning and Artificial Intelligence ,Difference between Machine learning and Artificial Intelligence,Agents in Artificial Intelligence

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**Unit-2**

**Supervised learning**

Basic Concept of Classification, Types of Regression Techniques
Classification vs Regression , Types of Learning – Supervised Learning
Multiclass classification using scikit-learn. Gradient Descent :, linear regression and logistic regression decision tree , SVM ,random forest

**Unsupervised learning:**

Types of Learning – Unsupervised Learning
Supervised and Unsupervised learning, Clustering in Machine Learning
Different Types of Clustering Algorithm, K means Clustering – Introduction
Elbow Method for optimal value of k in KMeans , Random Initialization Trap in K-Means
Mini Batch K-means clustering algorithm.

**Unit-4 Dimensionality Reduction:**

Introduction to Dimensionality Reduction
Introduction to Kernel PCA ,Principal Component Analysis(PCA)
Principal Component Analysis with Python , Low-Rank Approximations
Overview of Linear Discriminant Analysis (LDA)
Feature Mapping , Feature Selection Techniques , Underfitting and Overfitting in Machine Learning

**Unit 5: Ensemble Techniques**

Introduction to Ensemble Classifiers
Concepts of Bagging , Concepts of Boosting
Concepts of Stacking ,
Voting Classifiers

**Laboratory Exercises / Practical: Detailed list of experiment. 1 to 12 (Every experiment consist of more than 3 subprograms)**

1. Extract the data from database using python.
2. Apply data preprocessing techniques to make data suitable for machine learning.
3. Develop Logistic Regression Model for a given dataset.
4. Train the system using data set obtained from UCI ML repository. Use a partition of the same data set as a test set to determine accuracy using Naïve Bayes
5. Train the system using data set obtained from UCI ML repository. Use a partition of the same data set as a test set to determine accuracy using Decision Tree.
6. Train the system using data set obtained from UCI ML repository. Use a partition of the same data set as a test set to determine accuracy using Random Forest.
7. Train the system using data set obtained from UCI ML repository. Use a partition of the same data set as a test set to determine accuracy using KNN classifier.
8. Train the system using data set obtained from UCI ML repository. Use a partition of the same data set as a test set to determine accuracy using Kmeans clustering



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9. Apply PCA on a data set obtained from UCI ML repository.
10. Implement Random Forest ensemble method on a given dataset.
11. Implement Boosting ensemble method on a given dataset.
12. Evaluate the performance metrics of supervised and unsupervised algorithms.

**Learning Resources:**

**Textbooks:**

1.T. Mitchell, — Machine Learning, McGraw-Hill, 1997.
2. Peter Flach: Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, Edition 2012

Reference Books:

Introduction to Machine Learning with Python - A Guide for Data Scientists Andreas C. Müller and Sarah Guido
EthemAlpaydin, "Introduction to Machine Learning", MIT press, 2004.
Jacek M. Zurada, —Introduction to Artificial neural System, JAICO publishing house,2002.
J. Gabriel, Artificial Intelligence: Artificial Intelligence for Humans (Artificial Intelligence, Machine Learning), Create Space Independent Publishing Platform, First edition , 2016

**Web Resources:**

**www.nptelvideos.in**
https://www.geeksforgeeks.org/machine-learning/
https://onlinecourses.nptel.ac.in/noc23_cs18/preview
https://www.coursera.org/learn/machine-learning

**Pedagogy: (You can add your own methods as applicable)**

- Co teaching
- Power point presentations
- Videos
- Demonstrations
- Systematic use of group work and project-based learning.



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