

## Foundation Course in Machine Learning using Python

<b>Course Name</b>	Foundation Course in Machine Learning using Python
<b>Course Code</b>	2022/EHW/NIELIT/05323
<b>Starting Date of Course</b>	25/09/2023
<b>Last Date to Apply</b>	15/09/2023
<b>Course Coordinator</b>	Mr. Bhargav Deshmukh, Mob.9049565944

### Course Preface

In the last few years, machine learning (ML) and artificial intelligence have seen a new wave of publicity fueled by the huge and ever-increasing amount of data and computational power as well as the discovery of improved learning algorithms.

Machine learning brings together computer science and statistics to harness that predictive power. It's a must-have skill for all aspiring data analysts and data scientists, or anyone else who wants to wrestle all that raw data into refined trends and predictions.

This course is intended to teach learners end-to-end process of investigating data through a machine learning lens. It will make participant capable to extract and identify useful features that best represent your data, a few of the most important machine learning algorithms, and how to evaluate the performance of your machine learning algorithms.

### Course Objective

The objective of this course is to enabling the student with basic knowledge on the techniques to build an intellectual machine for making decisions behalf of humans. This course covers the techniques on how to make learning by a model, how it can be evaluated, what are all different algorithms to construct a learning model.

### Course Outcome

- ✓ Implement and analyze existing learning algorithms, including methods for classification, regression, structured prediction, clustering, and representation learning.
- ✓ Integrate multiple aspects of practical implementation of machine learning: Data preprocessing, Regularization, and Model selections.
- ✓ Compare different paradigms for learning (Supervised, Unsupervised, etc.). Design experiments to evaluate and compare different machine learning techniques on real-world problems.

- ✓ Employ probability, statistics, calculus, linear algebra, and optimization in order to develop new predictive models or learning method.

### Course Structure:

Sr. No.	Module Name	Duration		
		Theory	Practical	Total
1	Basic and Python Ecosystem	2 Hrs	2 Hrs	4 Hrs
2	Data Loading for ML Projects	3 Hrs	3 Hrs	6 Hrs
3	Understanding Data with Statistics	3 Hrs	3 Hrs	6 Hrs
4	Understanding Data with Visualization	3 Hrs	3 Hrs	6 Hrs
5	Preparing Data	3 Hrs	3 Hrs	6 Hrs
6	Data Feature Selection	6 Hrs	6 Hrs	6 Hrs
7	Machine Learning Algorithms	15 Hrs	15 Hrs	30 Hrs
8	Machine Learning with Pipelines	2 Hrs	2 Hrs	4 Hrs
9	Improving Performance of ML Model	5 Hrs	3 Hrs	6 Hrs
10	Improving Performance of ML Models	3 Hrs	3 Hrs	6 Hrs
11	Mini Project	-	10 Hrs	10 Hrs

### Course Content:

#### Basic and Python Ecosystem(4 Hours)

- Python Overview –Data Types, data structures, if statements, looping and loop control statements, Functions and Modules.

#### Data Loading for ML Projects (6 Hours)

- Introduction to Pandas library, built in functions, read\_csv, head(), describe(), memory\_usage(), astype(), loc[:], value\_counts(), drop\_duplicates(), groupby(), fillna() , dropna(), etc.
- Introduction to Numpy library, numpy built in functions, add(), multiply(), divide(), floor(), mod(), sin(), radians(), log(),ceil(), sqrt(), etc.

## **Understanding Data with Statistics (6 Hours)**

- Descriptive And Inferential statistics
- Measures of Central Tendencies
- Mean, Mode, Median, Standard Deviation
- Z-Score, Outliers, Normal Distribution
- Correlation, Covariance and Regression Theory

## **Understanding Data with Visualization (6 Hours)**

- Introduction to Matplotlib, built in functions to plot graph, bar, barh, figure, plot, pie, subplot, etc.
- **Introduction to seaborn, visualize using different plots using seaborn** built in functions Barplot, Countplot, distplot, Heatmap, Scatterplot, Pairplot, Boxplot

## **Preparing Data (6 Hours)**

- Scaling
- Normalization
- Handling Missing Data
- Encoding Categorical Data
- Handling Outliers.

## **Data Feature Selection(6 Hours)**

- Introduction to Features Engineering
- Feature Selection methods
- Backward elimination technique
- Forward selection technique
- Feature importance from ML modeling

## **Machine Learning Algorithms (30 Hours)**

- Supervised Machine Learning Algorithms: Linear Regression, Logistic Regression, K Nearest Neighbor, Decision Tree, Naïve Bayes, Bagging, Boosting, SVM
- Unsupervised Machine Learning Algorithms: K- Means Clustering, Principle Component Analysis (PCA)

## **Machine Learning with Pipelines (4 Hours)**

- Learn to improve accuracy by building different models

## **Improving Performance of ML Models (6 Hours)**

- K-Fold Cross Validation
- Grid And Randomized Search Cv In Sklearn
- Imbalanced Data Set : Smote Technique

## **Mini Project (10 Hours)**

## **Course Fees**

- Nil for SC/ST
- 4500/- for others

### **Pre-requisite:**

- **Basic programming Knowledge**

### **Eligibility**

- 2nd Year Polytechnic Diploma in Computer Science/ IT/ Electronics /Electrical/ Instrumentation/  
or
- Final year BCA/B.Sc.(Electronics/CS/IT)  
or
- Pursuing MCA/MSC(CS/IT) /PGDCA  
or
- Pursuing B.E/B.Tech in any domain  
or
- NIELIT O Level(IT)

### **Important Dates**

- Last date for submitting application : 15/09/2023
- Start Date: 25/09/2023

**Note: Admission will be on first come basis**