Machine Learning Training and Internship Program Syllabus

15 Days (Introduction to Machine Learning)

Objective:

- Understand the fundamentals of machine learning and build a basic model.

Syllabus:

1. **Day 1-3:** Introduction to ML
   a. What is ML? Types (Supervised, Unsupervised, Reinforcement Learning).
   b. Basic Python for ML: NumPy, pandas, and matplotlib.
2. **Day 4-6:** Data Preprocessing
   a. Handling missing data, encoding categorical data, scaling features.
   b. Introduction to data visualization with seaborn.
3. **Day 7-9:** Linear Regression
   a. Simple linear regression.
   b. Implementing linear regression with Python (scikit-learn).
4. **Day 10-12:** Classification Basics
   a. Logistic regression.
   b. Evaluating models with accuracy, precision, recall, and F1-score.
5. **Day 13-15:** Hands-On Mini Project
   a. Predict house prices using linear regression.
   b. Classification of Iris dataset.

30 Days (Beginner-Level ML)

Objective:

- Develop foundational ML models and understand essential concepts.

Syllabus:

1. **Week 1:** Python and Statistics for ML
   a. Advanced Python libraries for ML (scikit-learn, pandas).
   b. Descriptive and inferential statistics for data analysis.
2. **Week 2:** Supervised Learning Models
   a. Decision trees and random forests.

b. Support vector machines (SVM).
3. **Week 3:** Unsupervised Learning Models
    a. Clustering with K-means and hierarchical clustering.
    b. Dimensionality reduction using PCA.
4. **Week 4:** Mini Project
    a. Customer segmentation using clustering techniques.

45 Days (Intermediate-Level ML)

Objective:

- Work on intermediate ML concepts, hyperparameter tuning, and model evaluation.

Syllabus:

1. **Week 1:** Advanced Regression Techniques
    a. Polynomial regression.
    b. Ridge and Lasso regression.
2. **Week 2:** Advanced Classification Techniques
    a. K-Nearest Neighbors (KNN).
    b. Naive Bayes and ensemble techniques (Bagging, Boosting).
3. **Week 3:** Model Evaluation and Tuning
    a. Cross-validation techniques.
    b. Hyperparameter tuning (GridSearchCV, RandomizedSearchCV).
4. **Week 4-5:** Hands-On Project
    a. Fraud detection using classification algorithms.

60 Days (Advanced ML Development)

Objective:

- Dive into advanced ML techniques, including neural networks and real-world applications.

Syllabus:

1. **Week 1-2:** Neural Networks Basics
    a. Understanding perceptrons and multilayer perceptrons (MLPs).
    b. Implementing basic neural networks with TensorFlow/Keras.
2. **Week 3:** Time Series Analysis

     a. Introduction to time series data.

     b. Forecasting using ARIMA and LSTMs.

3. **Week 4:** Natural Language Processing (NLP)

     a. Text preprocessing techniques (stemming, lemmatization, tokenization).

     b. Sentiment analysis using NLP libraries (NLTK, spaCy).

4. **Week 5-6:** Advanced Project

     a. Predicting stock prices using LSTMs.

     b. Build a sentiment analysis model for product reviews.