PYTHON

AI / ML

🚀 Phase 1: Python for AI/ML (Recap)

Duration: 1 week

Python Basics (syntax, data types, loops, functions)

List Comprehensions File Handling OOP in Python

(classes, inheritance, init methods)

📊 Phase 2: Data Handling & Visualization

Duration: 1–2 weeks

📌 NumPy

Array creation, slicing, indexing

Mathematical operations, statistics

Broadcasting

📌 Pandas

DataFrames, Series

Filtering, merging, grouping

Handling missing values

📌 Visualization

Matplotlib (line, bar, pie)

Seaborn (pairplot, heatmap, violin)

🧹 Phase 3: Data Preprocessing

Duration: 1 week

Handling Nulls & Outliers

Label Encoding / OneHotEncoding

Feature Scaling (StandardScaler, MinMaxScaler)

Train-Test Split

🤖 Phase 4: Machine Learning Core

Duration: 2–3 weeks

Supervised Learning

Linear & Logistic Regression

Decision Tree, Random Forest

K-Nearest Neighbors (KNN)

Support Vector Machines (SVM)

Unsupervised Learning

K-Means Clustering

Hierarchical Clustering

DBSCAN

PCA (Dimensionality Reduction)

📈 Phase 5: Model Evaluation & Tuning

Duration: 1 week

Accuracy, Precision, Recall, F1 Score

Confusion Matrix

ROC Curve

Cross-Validation

Hyperparameter Tuning (GridSearchCV / RandomizedSearchCV)

🧰 Phase 6: Scikit-learn Practice

Duration: 1 week

Datasets from sklearn

Full Pipeline (Preprocess → Train → Predict → Evaluate)

Model Saving (pickle/joblib)

🧪 Phase 7: Feature Engineering

Duration: 1 week

Feature Selection Techniques

Feature Creation

Working with Categorical Data

🔬 Phase 8: Deep Learning Basics

Duration: 2 weeks

What is Deep Learning?

TensorFlow vs Keras

Your First Neural Network

Activation Functions (ReLU, Softmax, Sigmoid)

Overfitting vs Underfitting

✍️ Phase 9: NLP Basics

Duration: 1 week

Text Cleaning, Tokenization

Stopwords, Lemmatization

Bag of Words & TF-IDF

Sentiment Analysis Project

🛠️ Phase 10: End-to-End Projects

Duration: 2–4 weeks

Loan Prediction

House Price Prediction

Fake News Detection

Sentiment Analyzer (NLP)

Image Classifier (Basic CNN in Keras)

💡 Bonus (Phase 11)

Advanced Topics for Mastery

Flask/Django for ML App Deployment

Streamlit for Data Science Dashboards

Model Monitoring (Basic ML Ops)