

## Module 1: ML & DL Foundations (Weeks 1-4)

### Week 1: Python for AI + Math Refresher

- Day 1: Python essentials, NumPy
- Day 2: Pandas for data handling
- Day 3: Data visualization (Matplotlib, Seaborn)
- Day 4: Statistics: mean, median, std, distributions
- Day 5: Linear algebra (vectors, matrices, dot product)
- Day 6: Case study: Titanic data EDA

### Week 2: Core ML Algorithms

- Day 1: Supervised vs Unsupervised + Linear Regression
- Day 2: Logistic Regression with evaluation
- Day 3: KNN classifier + use case
- Day 4: Decision Trees & Overfitting
- Day 5: Naive Bayes classifier
- Day 6: Project: Titanic Survival Predictor

### Week 3: Ensemble & Tuning

- Day 1: Random Forest & Feature Importance
- Day 2: Gradient Boosting, XGBoost
- Day 3: Cross-validation & model pipeline
- Day 4: Hyperparameter tuning with GridSearchCV
- Day 5: Evaluation metrics in depth (ROC, AUC)
- Day 6: Project: Customer Churn Classifier

### Week 4: Deep Learning Basics

- Day 1: What is a neural network?
- Day 2: Forward pass, backpropagation
- Day 3: Keras/TensorFlow basics
- Day 4: ANN for MNIST digits
- Day 5: Activation, Loss & Optimizer
- Day 6: Project: Handwritten Digit Classifier

## **Module 2: OOP + NLP + Generative AI (Weeks 5-8)**

### **Week 5: Python OOPs for ML Engineers**

- Day 1: Classes, objects, init, attributes
- Day 2: Inheritance and Polymorphism
- Day 3: Encapsulation, Abstraction
- Day 4: File operations, Exception handling
- Day 5: Creating reusable ML classes
- Day 6: Project: OOP-based ML Trainer Framework

### **Week 6: Traditional NLP**

- Day 1: Intro to NLP, tokenization, stopwords
- Day 2: Stemming, Lemmatization
- Day 3: BoW, TF-IDF vectorization
- Day 4: Sentiment Analysis with sklearn
- Day 5: Text classification project
- Day 6: Project: SMS Spam Detector

### **Week 7: Deep NLP & Transformers**

- Day 1: Word embeddings: Word2Vec, GloVe
- Day 2: Intro to Transformers and BERT
- Day 3: Fine-tuning BERT for text classification
- Day 4: Hugging Face Transformers & datasets
- Day 5: Named Entity Recognition
- Day 6: Project: News Topic Classifier with BERT

### **Week 8: Generative AI with Gemini**

- Day 1: What is GenAI? Overview of LLMs (Gemini, Claude, GPT)
- Day 2: Prompt engineering for Gemini
- Day 3: Text generation using Gemini API
- Day 4: Image generation with Imagen or Gemini Vision
- Day 5: Build a chatbot using Gemini + Streamlit
- Day 6: Capstone Project: AI Assistant using Gemini

**Any queries, write to us: [info@staunchcuil.com](mailto:info@staunchcuil.com)**