

AI Engineering Professional

Course Overview

An advanced hands-on program covering Python programming, statistics, machine learning, deep learning, LLM engineering, and AI deployment. The course emphasizes practical labs and real-world AI engineering projects.

Duration

Recommended: 80 Hours (10 Days)

Prerequisites

- Basic programming knowledge
- High school mathematics
- Python basics (recommended)
- Basic SQL and Git knowledge (recommended)
- No prior AI or Machine Learning experience required

Target Audience

- AI Engineers
- Machine Learning Engineers
- Data Scientists
- Software Developers
- Python Developers
- Solution Architects
- Students transitioning into AI

Module 1 – Python Programming & Statistical Foundations

- Python Fundamentals
- Scientific Python (NumPy, Pandas, Matplotlib)
- Probability & Statistics
- Hypothesis Testing
- Hands-on Labs

Module 2 – Data Understanding & Preparation

- Data Collection
- Data Cleaning
- Missing Values
- Feature Engineering
- Exploratory Data Analysis (EDA)
- Hands-on Labs

Module 3 – Classical Machine Learning

- ML Workflow
- Regression
- Classification
- Clustering
- Dimensionality Reduction
- Hands-on Labs

Module 4 – Ensemble Learning & Model Optimization

- Random Forest
- Boosting
- XGBoost
- Feature Selection
- Hyperparameter Tuning
- Model Optimization

Module 5 – Generalization & Model Robustness

- Overfitting vs Underfitting
- Cross Validation
- Regularization
- Explainable AI (SHAP & LIME)

Module 6 – Deep Learning Foundations

- Neural Networks
- Backpropagation
- Optimization
- CNN
- RNN
- LSTM
- Hands-on Labs

Module 7 – Specialized AI Domains

- Computer Vision
- Natural Language Processing
- Reinforcement Learning
- GANs
- Hands-on Labs

Module 8 – Foundation Models & LLM Engineering

- Transformers
- Embeddings
- Vector Databases

- Prompt Engineering
- RAG
- LoRA & QLoRA
- Fine-tuning Demo

Module 9 – Model Evaluation & Validation

- Regression Metrics
- Classification Metrics
- Benchmarking
- Error Analysis
- AI Safety

Module 10 – AI Deployment & Operationalization

- FastAPI
- Docker
- Kubernetes
- MLOps
- Cloud Deployment
- Model Monitoring

Final Capstone Project

- End-to-End AI Project
- Data Preparation
- Model Development
- LLM Integration
- Deployment