


AI & Data Science - 8 Month Course Outline

Duration: 8 Months

Phase 1: Python for Data Science (4 Weeks)

- Python Syntax, Variables, Data Types
- Lists, Tuples, Dictionaries, Sets
- Loops, Functions, Conditional Logic
- File Handling, Exception Handling
- Object-Oriented Programming

 **Assignment:** Core Python challenges

 **Test:** Python logic + functions + file tasks

Phase 2: NumPy & Pandas (4 Weeks)

- NumPy Arrays, Indexing, Broadcasting
- Pandas DataFrames & Series
- Data Cleaning, Filtering, Grouping
- Handling Missing Data & Duplicates

 **Project 1:** Data analysis on real-world dataset

 **Test:** Data wrangling task

Phase 3: Data Visualization (2.5 Weeks)


- Matplotlib: Line, Bar, Pie, Scatter
- Seaborn: Heatmaps, Pairplots, Histograms
- Time-based Data Visualization


 **Assignment:** Visualization dashboard

 **Test:** Code-based & interpretative test

Phase 4: Machine Learning (Core Essentials Only – 3 Weeks)


- ML Concepts: Supervised vs Unsupervised
- Linear & Logistic Regression
- Decision Tree (only one non-linear model)
- Model Evaluation Metrics (Accuracy, Precision, F1)

 **Project 2:** Binary classifier or regressor

 **Test:** End-to-end ML workflow


Phase 5: Natural Language Processing (2 Weeks)

- Text Preprocessing (Cleaning, Tokenizing)
- Bag of Words, TF-IDF
- Sentiment Analysis

 **Project 3:** Tweet or review classification

Phase 6: Deep Learning with Keras/TensorFlow (4 Weeks)

- Neural Network Fundamentals
- Keras Sequential API
- CNN for Image Classification
- Intro to RNN and LSTM

 **Project 4:** DL model for image/text task


Phase 7: Generative AI (GenAI) (3 Weeks)

- LLMs, Prompt Engineering
- Text Generation using OpenAI API
- Diffusion & Image Generation (Intro only)

 **Project:** AI Assistant / GenAI Demo App


Phase 8: Agentic AI (2 Weeks)

- What is Agentic AI?
- Introduction to LangChain
- Task-driven AI Agents
- Multi-agent workflows

 **Mini Project:** Agent-based PDF Reader or Planner


Phase 9: Django for AI Projects (3 Weeks)

- Django Basics (Models, Views, Templates)
- Django ORM
- Admin Panel, Forms, URL Routing
- Structuring ML/DS Web Projects

 **Project:** Build a web interface for DS output

Phase 10: FAST API for Model Deployment (2.5 Weeks)

- Intro to FAST API: Async API Framework
- Creating API Endpoints for ML Models
- Input/Output Schemas with Pydantic
- Deploy ML Model as Web Service

 **Project:** Deploy a classifier with FAST API

Phase 11: Career Preparation + GitHub Portfolio (1 Week)

- Git & GitHub Basics
- Creating Portfolio with Projects
- Resume + LinkedIn for DS Roles
- Career Roles in AI, DS, ML, GenAI