AI USING PYTHON

24-Week Course Outline

Module 1: Python Programming Foundations

Week 1: Introduction to Python

- Python setup & IDEs
- Basic syntax, variables, data types
- Input/output, simple programs

Week 2: Control Structures & Functions

- Conditional statements (if/else)
- Loops (for, while)
- Functions, parameters, return values

Week 3: Data Structures in Python

- Lists, tuples, dictionaries, sets
- String manipulation
- File handling basics

Module 2: Essential Mathematics for AI

Week 4: Linear Algebra & Calculus Basics

- Vectors, matrices, operations
- Linear equations
- Introduction to calculus concepts

Week 5: Probability, Statistics, and Data Handling

- Probability basics, mean, median, mode
- Standard deviation, distributions
- Data visualization with Matplotlib

Module 3: Python for Data Science

Week 6: Data Handling with Pandas & Numpy

- Introduction to Numpy
- Introduction to Pandas
- Data cleaning and manipulation

Week 7: Data Visualization & Exploration

- Advanced visualization (Seaborn, Matplotlib)
- Exploratory data analysis (EDA)
- Mini project: Data analysis

Module 4: Introduction to Machine Learning

Week 8: ML Concepts & Workflow

- Supervised vs. unsupervised learning
- Model selection, training/testing
- Scikit-learn basics

Week 9: Regression & Classification

- Linear regression
- Logistic regression
- KNN, SVM, Decision Trees

Week 10: Model Evaluation & Tuning

- Train/test split, cross-validation
- Metrics: accuracy, precision, recall, F1
- Hyperparameter tuning

Module 5: Deep Learning Foundations

Week 11: Neural Networks & Deep Learning Basics

- Neural network concepts
- Activation functions, layers, loss functions

Week 12: Building Neural Networks with TensorFlow/Keras

- Introduction to TensorFlow/Keras
- Building and training a simple neural network

Week 13: Convolutional Neural Networks (CNNs)

- CNN architecture, applications in vision
- Image classification mini project

Week 14: Natural Language Processing (NLP) Basics

- Text preprocessing
- Basic NLP tasks with Python (tokenization, stemming, sentiment analysis)

Module 6: AI in the Real World

Week 15: Working with Real Datasets

- Downloading datasets
- Preprocessing & feature engineering

Week 16: Project 1 – AI for Image Recognition

- Image dataset, labeling, and training
- Evaluating image models

Week 17: Project 2 – AI for Text Analysis

- Text dataset, NLP pipeline
- Sentiment analysis or spam detection

Week 18: Deployment & APIs

- Saving and deploying models
- Using Flask/FastAPI to create APIs

Module 7: Advanced AI Topics & Applications

Week 19: Unsupervised Learning & Clustering

- K-means, hierarchical clustering
- Dimensionality reduction (PCA)

Week 20: Recommendation Systems

- Collaborative filtering

- Building a simple recommender

Week 21: AI Ethics & Responsible AI

- Bias, fairness, privacy
- Real-world case studies

Week 22: Introduction to Generative AI

- Overview of GANs, transformers (high-level)
- Demos and applications

Module 8: Capstone Project & Course Wrap-Up

Week 23: Capstone Project Work

- Project planning, proposal, and initial development
- Progress presentations

Week 24: Project Completion & Presentation

- Finalize, test, and deploy projects
- Presentations & feedback
- Certificate distribution and next steps