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Artificial Intelligence Learning Path Python
Programming & SQL Course Content

Module 1: Python Programming & SQL

Core Python Programming

- Introduction to Data Science using Python
- Python Basic Constructs
Assignment 1: Basic Python Programs
- Data Types in Python
Assignment 2: Data Types and Functions
- Conditional Statements
Assignment 3: Conditional Logic
- Iterative Statements
Assignment 4: Iterative Logic
- Functions in Python
Assignment 5: Miscellaneous
- Object-Oriented Programming (OOP) in Python
- File Handling & Exception Handling
Assignment 6: Classes and Objects

Python Scripting

- Basic Python Scripts
- GUI Applications
- PyGames Scripts





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- API Scripts
 - Image Processing Scripts
 - Automation Scripts
- Assignment 7: Python Scripts Programming

SQL & Database Integration

- Databases and SQL Fundamentals
- Project 1: Creating Databases and Operations
- Project 2: Handling Databases and CRUD Operations using Python

Module 2: Data Structures & Algorithms and Advanced Python

Data Structures & Algorithms

- Lists, Tuples, Sets, Frozen Sets, Strings, Dictionaries, Matrices, Byte Arrays
- Linked Lists, Stack, Queue, Priority Queue, Heap
- Binary Trees, Tree Traversal, Binary Search Trees
- Graphs and Graph Traversal
- Recursion, Dynamic Programming
- Searching and Sorting Algorithms

Assignment 1: Applying Data Structures & Algorithms

Advanced Python Concepts

- Recursive Functions, Iterators and Iterables, Generators
- Lambda Functions, Filter, Reduce, Map, Zip
- Decorators, Memoization





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- List Comprehensions, Currying Functions
- Regular Expressions (Basic and Advanced)
- Extended Keyword Arguments
- Testing with DocTest, unittest, and pytest
- Closures and Iterator Protocol
- Static and Class Methods
- Inheritance, Encapsulation, Operator Overloading
- Anonymous Functions, Python Packages

Assignment 2: Advanced Python Programming

Project: Flexible Project

Module 3: Statistics & Data Analysis

- Probability
Assignment 1: Probability Questions
- Descriptive Statistics
- Inferential Statistics
Assignment 2: Applying Statistics using SciPy
- Numerical Computing with NumPy
- Data Manipulation using Pandas
- Data Visualization with Matplotlib and Seaborn
- Data Preprocessing

Assignment 3: Data Visualization using Automobile or Titanic Dataset

Assignment 4: Data Analysis using Pandas, Matplotlib, and Seaborn (2 Datasets)





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- Introduction to Excel and Tableau
Assignment 5: Data Analysis and Visualization using Tableau Tool
- Web Scraping Using BeautifulSoup
Assignment 6: Create Dataset Using Web Scraping and Perform Data Analysis
- Project: End-to-End Project (Web Scraping, Data Preprocessing, Cleaning, EDA, and Visualization)

Module 4: Machine Learning

Supervised Learning

- Regression: Linear, Multiple, Polynomial, Regularization (Ridge and Lasso)
Assignment 1: Regression Analysis
- Classification: Logistic Regression, K-Nearest Neighbours, Decision Trees, Naïve Bayes, Support Vector Machines
- Ensemble Techniques: Random Forests, Gradient Boosting Machine
Assignment 2: Classification Analysis
Assignment 3: Image Classification

Unsupervised Learning

- Clustering
- Principal Component Analysis (PCA)
Assignment 4: Clustering
- Assignments: Regression, Classification (Binary and Multiclass), Image Classification, Clustering
- Project: Credit Card Fraud Detection





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Module 5: AI & Deep Learning

- Introduction to Deep Learning and Neural Networks
- Introduction to Linear Algebra
- Artificial Neural Networks (ANN)
Assignment 1: Image Classification using ANN and Regression using ANN
- Neurons, Layers, Activation Functions
- Convolutional Neural Networks (CNN): Convolution Operation, Pooling, Padding, Strides
Assignment 2: Image Classification (CIFAR-10)
Assignment 3: Image Classification (Cats & Dogs)
- Transfer Learning: LeNet-5, AlexNet, VGG16/19, ResNet, Inception V3
Assignment 4: Neural Style Transfer
- Recurrent Neural Networks (RNN), LSTM, GRU
Assignment 5: Text Preprocessing
Assignment 6: Movie Review Analysis, Sentiment Analysis
- Computer Vision and Natural Language Processing using CNN & RNN
- Assignments: Image Classification, Transfer Learning, Neural Style Transfer, Sentiment Analysis
- Projects:
 1. COVID Detection using X-Ray Images
 2. Flexible Project





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Module 6: R Programming for Data Science

- Introduction to Data Science using R
- Installation and Introduction to R Studio
- Variables and Data Types in R
- Operators, Statements, and Expressions
- Conditional and Iterative Statements
- Functions
- Data Manipulation using dplyr
- Data Visualization using ggplot
- Time Series Forecasting
- Assignment: R Programming
- Project: Wine Quality Prediction

Module 7: Tableau and Power BI

Tableau

- Introduction and Architecture
- Connecting to Different Data Sources
- Data Modeling
- Tableau Calculations
- Various Charts
- Reports and Dashboards





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Power BI

- Introduction and Components
- Power BI Architecture
- Connecting to Different Data Sources
- Data Modeling
- Reports and Charts
- DAX (Data Analysis Expressions)
- Dashboards
- Projects: Two Flexible Problem Statements (Tableau & Power BI)

Capstone Projects (Industry Specific)

1. COVID-19 Detection (Healthcare)
2. Real-Time Face Detection & Recognition System (Transportation)
3. Sentiment Analysis (E-Commerce)
4. Flexible Project

Generative AI

- Content to be shared soon (aligned with ongoing industry research and hiring trends)





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Final Doubts and Revision Session

Additional Topics

- Linear Algebra
- Web Scraping
- Advanced Excel
- Frameworks
- Deployment Interfaces

Complementary Perks

- AI Customized Career Guidance
- Unique and Social Good Projects
- AI Feedback Mock Sessions
- Interview Preparation Tips
- Resume Review and Optimization
- LinkedIn and GitHub Profile Optimization

