VIDYAXCEL
LIASIONING EXCELLENCE
ISO 9001:2015

Comprehensive Python with AI & ML

Price: INR 7999/-

Python 3

1. Introduction to Python:

- History and features of Python
- Setting up the development environment
- Running Python code
- Basic Python syntax and structure
- Writing and running simple Python scripts

2. Variables, Data Types, and Operators:

- Variables and data types in Python
- Numeric and string data types
- Type conversion
- Operators in Python
- Mathematical and logical operators
- Bitwise operators
- Operator precedence

3. Control Structures:

- Conditional statements: if, else, and elif statements
- Loops: for and while loops
- Loop control statements: break, continue, and pass
- Iterators and generators

4. Functions and Modules:

- Functions in Python
- Function arguments and parameters

- Lambda functions
- Recursion
- Modules and packages
- Importing and using modules
- Creating and using your own modules

5. Strings, Lists, and Dictionaries:

- Working with strings
- String methods and operations
- Lists in Python
- List methods and operations
- Dictionaries in Python
- Dictionary methods and operations

6. Input and Output:

- Reading and writing text files
- Reading and writing binary files
- Standard input and output
- Formatting output using print() function
- Command-line arguments

7. Object-Oriented Programming:

- Introduction to Object-Oriented Programming (OOP)
- Classes and objects
- Attributes and methods
- Encapsulation, inheritance, and polymorphism
- Overriding methods and operators

8. Exception Handling:

- Error handling in Python
- Types of errors
- Handling exceptions with try/except/finally blocks
- Raising exceptions

9. Regular Expressions:

- Introduction to regular expressions

- Regex syntax and patterns
- Matching and searching with regex
- Replacing and splitting with regex

10. Standout features of Python:

- List Comprehensions
- Decorators
- Lambda Functions
- Generators
- Context Managers
- Metaclasses

11. Memory Management

- Managing Private Heap – Dynamic Memory Allocation
- Garbage Collection
- Memory Profiling
- Memory Optimization
- Memory Views

12. Python Essential for AI ML

- Numpy
- Pandas
- Matplotlib

AI ML – What will be imparted in the Class:

Supervised Learning Algorithms

- Introduction to supervised learning
- Linear regression – Gradient Descent Algorithm
- Logistic regression
- k-Nearest Neighbours (k-NN)
- Decision trees and random forests
- Support Vector Machines (SVM)
- Evaluation metrics for classification and regression models

Unsupervised Learning Algorithms

- Introduction to unsupervised learning
- Clustering algorithms (k-means, hierarchical clustering)
- Dimensionality reduction techniques (Principal Component Analysis (PCA), t-SNE)
- Association rule learning (Apriori algorithm)
- Anomaly detection

Model Evaluation and Selection

- Train-test split and cross-validation
- Bias-variance tradeoff
- Hyperparameter tuning
- Model selection techniques (GridSearchCV, RandomizedSearchCV)

Artificial Neural Networks and Deep Learning

- Introduction to neural networks
- Perceptrons and activation functions
- Multilayer Perceptrons (MLPs)
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)
- Transfer learning
- Introduction to TensorFlow

Reinforcement Learning

- Introduction to reinforcement learning
- Markov Decision Processes (MDPs)
- Q-learning
- Deep Q-networks (DQNs)
- Policy gradients
- Deploying ML Models

Serialization and deserialization of models

Building a simple web API using Django and deploying ML modules

We will incorporate practical hands-on exercises using the right Python libraries and projects throughout the syllabus to reinforce theoretical concepts. Discussing best practices, ethics, and considerations for responsible AI would also be emphasized.