

## **Python Programming Training**

### **Overview:**

This Python for beginners training course leads the students from the basics of writing and running Python scripts to more advanced features such as file operations, regular expressions, working with binary data, and using the extensive functionality of Python modules. Extra emphasis is placed on features unique to Python, such as tuples, array slices, and output formatting.

### **Course Objectives:**

Python has been named as ‘the next big thing’ to cause a stir in the tech world because its huge demand by many young as well as experienced developers and high income compared to all the other programming languages in the IT space. According to the 2018 Developer Survey conducted by Stack Overflow, Python has been voted as the most wanted technology of the year 2018. Python has also been placed at the seventh position in the list of most popular programming language in the world amongst software developers.

Participants of the best python course will learn from the basics to the advance level of programming. Students will get hands on python projects under the supervision of highly experienced trainer. After completing the course students will be master in coding, Socket programming, implementing and creating functions and many more.

### **Who should take up this course?**

- Any aspiring programmer can take up this bundle to master Python
- Any aspiring web developer student can take up this bundle to meet their training needs

### **What are the prerequisites for this course?**

- There are no such pre-requisites for learning python programming.
- Having Basic knowledge of computer would be sufficient.
- Understanding of concepts such as control statements, variable, loops would be a plus point.

### **What will you learn in Python Training?**

- Learn how to create web as well as desktop applications.
- In Python Programs, use Variables to Track Data
- Use Numbers in order to Create Functionality of “Behind-the-Scenes”
- Use Strings in order to Create Engaged, Customized User Experiences
- Use Loops in order to Maximize Productivity, Save Time, and Improve Efficiency
- Python key principles
- Execute knowledge absorbed in their live or commercial projects.
- Utilize the practical concept absorbed in real time.
- Create and implement Custom Functions
- Execute Python Debugging Strategies

### **Module 1: Introduction to Python- 2 hours**

Learning Objectives: You will get a brief idea of what Python is and touch on the basics.

#### **Topics:**

- Overview of Python
- The Companies using Python
- Different Applications where Python is used

- Discuss Python Scripts on UNIX/Windows
- Values, Types, Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the screen

**Hands On/Demo:**

- Creating “Hello World” code
- Variables
- Demonstrating Conditional Statements
- Demonstrating Loops

**Module 2: - Sequences and File Operations-3 hours**

Sequences and File Operations

**Learning Objectives:** Learn different types of sequence structures, related operations and their usage. Also learn diverse ways of opening, reading, and writing to files.

**Topics:**

- Python files I/O Functions
- Numbers
- Strings and related operations
- Tuples and related operations
- Lists and related operations
- Dictionaries and related operations

- Sets and related operations

**Hands On/Demo:**

- Tuple - properties, related operations, compared with a list
- List - properties, related operations
- Dictionary - properties, related operations
- Set - properties, related operations

**Skills:**

- File Operations using Python
- Working with data types of Python

**Module 3:- Deep Dive – Functions, OOPs, Modules, Errors and Exceptions-3 hours**

Learning Objectives: In this Module, you will learn how to create generic python scripts, how to address errors/exceptions in code and finally how to extract/filter content using regex.

**Topics:**

- Functions
- Function Parameters
- Global Variables
- Variable Scope and Returning Values
- Lambda Functions
- Object-Oriented Concepts
- Standard Libraries
- Modules Used in Python
- The Import Statements
- Module Search Path

- Package Installation Ways
- Errors and Exception Handling
- Handling Multiple Exceptions

### **Hands On/Demo:**

- Functions - Syntax, Arguments, Keyword Arguments, Return Values
- Lambda - Features, Syntax, Options, Compared with the Functions
- Sorting - Sequences, Dictionaries, Limitations of Sorting
- Errors and Exceptions - Types of Issues, Remediation
- Packages and Module - Modules, Import Options, sys Path

### **Skills:**

- Error and Exception management in Python
- Working with functions in Python

### **Module 4:- Introduction to NumPy, Pandas and Matplotlib-3 hours**

Learning Objectives: This Module helps you get familiar with basics of statistics, different types of measures and probability distributions, and the supporting libraries in Python that assist in these operations. Also, you will learn in detail about data visualization.

### **Topics:**

- NumPy - arrays
- Operations on arrays
- Indexing slicing and iterating
- Reading and writing arrays on files
- Pandas - data structures & index operations
- Reading and Writing data from Excel/CSV formats into Pandas

- matplotlib library
- Grids, axes, plots
- Markers, colours, fonts and styling
- Types of plots - bar graphs, pie charts, histograms
- Contour plots

### **Hands On/Demo:**

- NumPy library- Creating NumPy array, operations performed on NumPy array
- Pandas library- Creating series and data frames, Importing and exporting data
- Matplotlib - Using Scatterplot, histogram, bar graph, pie chart to show information, Styling of Plot

### **Skills:**

- Probability Distributions in Python
- Python for Data Visualization

### **Module 5: - Data Manipulation-4 hours**

Learning Objective: Through this Module, you will understand in detail about Data Manipulation

### **Topics:**

- Basic Functionalities of a data object
- Merging of Data objects
- Concatenation of data objects
- Types of Joins on data objects
- Exploring a Dataset
- Analysing a dataset

**Hands On/Demo:**

- Pandas Function- Ndim(), axes(), values(), head(), tail(), sum(), std(), iteritems(), iterrows(), itertuples()
- Group By operations
- Aggregation
- Concatenation
- Merging
- Joining

**Skills:**

Python in Data Manipulation

**Module 6:- Introduction to Machine Learning with Python-3 hours**

Learning Objectives: In this module, you will learn the concept of Machine Learning and its types.

**Topics:**

- Python Revision (numpy, Pandas, scikit learn, matplotlib)
- What is Machine Learning?
- Machine Learning Use-Cases
- Machine Learning Process Flow
- Machine Learning Categories
- Linear regression
- Gradient descent

**Hands On/Demo:**

- Linear Regression – Boston Dataset

**Skills:**

- Machine Learning concepts
- Machine Learning types
- Linear Regression Implementation

**Module 7:- Supervised Learning – I-3 hours**

Learning Objectives: In this module, you will learn Supervised Learning Techniques and their implementation, for example, Decision Trees, Random Forest Classifier etc.

**Topics:**

- What are Classification and its use cases?
- What is Decision Tree?
- Algorithm for Decision Tree Induction
- Creating a Perfect Decision Tree
- Confusion Matrix
- What is Random Forest?

**Hands On/Demo:**

- Implementation of Logistic regression
- Decision tree
- Random forest

**Skills:**

- Supervised Learning concepts
- Implementing different types of Supervised Learning algorithms



### **Module 8: - Dimensionality Reduction-3 hours**

Learning Objectives: In this module, you will learn about the impact of dimensions within data. You will be taught to perform factor analysis using PCA and compress dimensions. Also, you will be developing LDA model.

#### **Topics:**

- Introduction to Dimensionality
- Why Dimensionality Reduction
- PCA
- Factor Analysis
- Scaling dimensional model
- LDA

#### **Hands-On/Demo:**

- PCA
- Scaling

#### **Skills:**

- Implementing Dimensionality Reduction Technique

### **Module 9:- Supervised Learning – II-3 hours**

Learning Objectives: In this module, you will learn Supervised Learning Techniques and their implementation, for example, Decision Trees, Random Forest Classifier etc.

#### **Topics:**

- What is Naïve Bayes?
- How Naïve Bayes works?

- Implementing Naïve Bayes Classifier
- What is Support Vector Machine?
- Illustrate how Support Vector Machine works?
- Hyperparameter Optimization
- Grid Search vs Random Search
- Implementation of Support Vector Machine for Classification

**Hands-On/Demo:**

- Implementation of Naïve Bayes, SVM

**Skills:**

- Supervised Learning concepts
- Implementing different types of Supervised Learning algorithms

**Module 10:- Unsupervised Learning-3 hours**

Learning Objectives: In this module, you will learn about Unsupervised Learning and the various types of clustering that can be used to analyse the data.

Topics:

- What is Clustering & its Use Cases?
- What is K-means Clustering?
- How does K-means algorithm work?
- How to do optimal clustering
- What is C-means Clustering?
- What is Hierarchical Clustering?
- How Hierarchical Clustering works?

**Hands-On/Demo:**

- Implementing K-means Clustering
- Implementing Hierarchical Clustering

**Skills:**

- Unsupervised Learning
- Implementation of Clustering – various types

**Module 11:- Association Rules Mining and Recommendation Systems-3 hours**

Learning Objectives: In this module, you will learn Association rules and their extension towards recommendation engines with Apriori algorithm.

**Topics:**

- What are Association Rules?
- Association Rule Parameters
- Calculating Association Rule Parameters
- Recommendation Engines
- How does Recommendation Engines work?
- Collaborative Filtering
- Content-Based Filtering

**Hands-On/Demo:**

- Apriori Algorithm
- Market Basket Analysis

**Skills:**

- Data Mining using python
- Recommender Systems using python

## **Module 12:- Reinforcement Learning-2 hours**

Learning Objectives: In this module, you will learn about developing a smart learning algorithm such that the learning becomes more and more accurate as time passes by. You will be able to define an optimal solution for an agent based on agent-environment interaction.

### **Topics:**

- What is Reinforcement Learning
- Why Reinforcement Learning
- Elements of Reinforcement Learning
- Exploration vs Exploitation dilemma
- Epsilon Greedy Algorithm
- Markov Decision Process (MDP)
- Q values and V values
- Q – Learning
- $\alpha$  values

### **Hands-On/Demo:**

- Calculating Reward
- Discounted Reward
- Calculating Optimal quantities
- Implementing Q Learning
- Setting up an Optimal Action

### **Skills:**

- Implement Reinforcement Learning using python
- Developing Q Learning model in python

### **Module 13:- Time Series Analysis-3 hours**

Learning Objectives: In this module, you will learn about Time Series Analysis to forecast dependent variables based on time. You will be taught different models for time series modelling such that you analyse a real time-dependent data for forecasting.

#### **Topics:**

- What is Time Series Analysis?
- Importance of TSA
- Components of TSA
- White Noise
- AR model
- MA model
- ARMA model
- ARIMA model
- Stationarity
- ACF & PACF

#### **Hands on/Demo:**

- Checking Stationarity
- Converting a non-stationary data to stationary
- Implementing Dickey-Fuller Test
- Plot ACF and PACF
- Generating the ARIMA plot
- TSA Forecasting

#### **Skills:**

- TSA in Python

### **Module 14:- Model Selection and Boosting-2 hours**

Learning Objectives: In this module, you will learn about selecting one model over another. Also, you will learn about Boosting and its importance in Machine Learning. You will learn on how to convert weaker algorithms into stronger ones.

#### **Topics:**

- What is Model Selection?
- The need for Model Selection
- Cross-Validation
- What is Boosting?
- How Boosting Algorithms work?
- Types of Boosting Algorithms
- Adaptive Boosting

#### **Hands on/Demo:**

- Cross-Validation
- AdaBoost

#### **Skills:**

- Model Selection
- Boosting algorithm using python