Data Science with Python Course Curriculum

Introduction to Python

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:

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

Sequences and File Operations

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:

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

Deep Dive – Functions, OOPs, Modules, Errors and Exceptions

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:

- 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

Introduction to NumPy, Pandas and Matplotlib

Topics:

- Data Analysis
- 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
- Metadata for imported Datasets
- Matplotlib library
- Grids, axes, plots
- Markers, colors, fonts, and styling
- Types of plots - bar graphs, pie charts, histograms
- Contour plots

Hands-On:

- 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, a pie chart to show information, Styling of Plot

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
- Analyzing a dataset

Hands-On:

- Pandas Function- Ndim(), axes(), values(), head(), tail(), sum(), std(), iteritems(), iterrows(), itertuples(), GroupBy operations, Aggregation, Concatenation, Merging and joining

Introduction to Machine Learning with Python

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

Hands-On:
- Linear Regression – Boston Dataset

Skills You will Learn:
- Machine Learning concepts
- Machine Learning types
- Linear Regression Implementation

Supervised Learning - I

Topics:

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

Hands-On:
- Implementation of Logistic regression, Decision tree, Random forest

Skills You will Learn:
- Supervised Learning concepts
- Implementing different types of Supervised Learning algorithms
- Evaluating model output

Dimensionality Reduction

Topics:

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

Hands-On:

- PCA
- Scaling

Skills You will Learn:

- Implementing Dimensionality Reduction Technique

Supervised Learning - II

Topics:

- What is Naïve Bayes?
- How Naïve Bayes works?
- Implementing Naïve Bayes Classifier
- What is a 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:

- Implementation of Naïve Bayes, SVM

Skills You will Learn:

- Supervised Learning concepts
- Implementing different types of Supervised Learning algorithms
- Evaluating model output

Unsupervised Learning

Topics:

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

Hands-On:

- Implementing K-means Clustering
- Implementing Hierarchical Clustering

Skills You will Learn:

- Unsupervised Learning
- Implementation of Clustering – various types

Association Rules Mining and Recommendation Systems

Topics:

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

Hands-On:

- Apriori Algorithm
- Market Basket Analysis

Skills You will Learn:

- Data Mining using python
- Recommender Systems using Python

Reinforcement Learning

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
- Values

Hands-On:

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

Skills You will Learn:

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

Time Series Analysis

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:

- Checking Stationarity
- Converting non-stationary data to stationary
- Implementing Dickey-Fuller Test
- Plot ACF and PACF

- Generating the ARIMA plot
- TSA Forecasting

Skills You will Learn:
- TSA in Python

Model Selection and Boosting

Topics:

- What is Model Selection?
- Need for Model Selection
- Cross – Validation
- What is Boosting?
- How do Boosting Algorithms work?
- Types of Boosting Algorithms
- Adaptive Boosting

Hands-On:
- Cross Validation
- AdaBoost

Skills You will Learn:
- Model Selection
- Boosting algorithm using python

Statistical Foundations (Self-Paced)

Topics:

- What is Exploratory Data Analysis?

- EDA Techniques
- EDA Classification
- Univariate Non-graphical EDA
- Univariate Graphical EDA
- Multivariate Non-graphical EDA
- Multivariate Graphical EDA
- Heat Maps

Advanced Visualizations (Self-Paced)

Topics:

- Trend lines
- Reference lines
- Forecasting
- Clustering
- Geographic Maps
- Using charts effectively
- Dashboards
- Story Points
- Visual best practices
- Publish to Tableau Online

Data Connection and Visualization in Tableau (Self-Paced)

Topics:

- Data Visualization
- Business Intelligence tools
- VizQL Technology
- Connect to data from the File
- Connect to data from the Database
- Basic Charts
- Chart Operations
- Combining Data
- Calculations

Data Science with Python Certification Projects

How will I execute practical's in Edureka's Data Science with Python Certification Course?

You will do your Assignments/Case Studies using Jupyter Notebook that is already installed on your Cloud Lab environment whose access details will be available on your LMS. You will be accessing your Cloud Lab environment from a browser. For any doubt, the 24*7 support team will promptly assist you.

What is CloudLab?

CloudLab is a cloud-based Jupyter Notebook which is pre-installed with Python packages on the cloud-lab environment. It is offered by Edureka as a part of Python Data Science Course where you can execute all the in-class demos and work on real-life projects in a fluent manner. You'll be able to access the CloudLab via your browser which requires minimal hardware configuration. In case, you get stuck in any step, our support ninja team is ready to assist 24x7.