CETPA INFOTECH PVT. LTD.

CURRICULUM OF CORE & ADVANCED PYTHON AND DATA ANALYTICS

3 months

GETTING STARTED

- History & need of Python
- Application of Python
- Advantages of Python
- Disadvantages of Python
- Installing Python
- Program structure
- Interactive Shell
- Executable or script files.
- User Interface or IDE

PYTHON FUNDAMENTALS

- Working with Interactive mode
- Working with Script mode
- Python Character Set
- Python Tokens, Keywords, Identifiers, Literals, Operators
- Variables and Assignments
- Input and Output in Python

DATA HANDLING

- **Data Types**
  - Numbers
  - Strings
  - Lists
  - Tuples
  - Dictionary
  - Set
  - Frozenset
  - Bool
  - Mutable and Immutable

STRING MANIPULATION

- Introduction to Python String
- Accessing Individual Elements
- String Operators
- String Slices
- String Functions and Methods

LIST MANIPULATION

- Introduction to Python List
- Creating List
- Accessing List
- Joining List
- Replicating List
- List Slicing

TUPLES

- Introduction to Tuple
- Creating Tuples
- Accessing Tuples
- Joining Tuples
- Replicating Tuples
- Tuple Slicing

DICTIONARIES

- Introduction to Dictionary
- Accessing values in dictionaries
- Working with dictionaries
- Properties

SET AND FROZENSET

- Introduction to Set and Frozenset
- Creating Set and Frozenset
- Accessing and Joining
- Replicating and Slicing

OPERATORS

- Arithmetic Operators
- Relational Operators
- Logical Operators
- Membership Operators
- Identity Operators
- Bitwise Operators
- Assignment Operators
- Operators Precedence
- Evaluating Expression
- Type Casting

PROGRAM CONTROL FLOW

- **Conditional Statements**
  - The if Statement
  - The if-else Statement
  - The if-elif Statement
  - Nested if Statements
  - Python Indentation
- **Looping and Iteration**
  - The For Loop
  - The While Loop
  - Loop else Statement
  - Nested Loops
  - Break and Continue
- **The Range Function**
  - Introduction to range()
  - Types of range() function
  - Use of range() function

INTRODUCTION TO FUNCTIONS

- **Built-In Functions**
  - Introduction to Functions
  - Using a Functions
  - Python Function Types
  - Structure of Python Functions
  - E.g. - map, zip, reduce, filter, any, chr, ord, sorted, globals, locals, all, etc.
- **User Defined Functions**
  - Structure of a Python Program w.r.t. UDF
  - Types of Functions
  - Invoking UDF
  - Flow of Execution
  - Arguments and Parameters
  - Default Arguments, Named Arguments
  - Scope of Variables
  - Lambda function
- **Recursion Function**
  - Use of recursion function

MODULES AND PACKAGES

- **Built-in Modules**
  - Importing Modules in Python Programs
  - Working with Random Modules
  - E.g. - builtins, os, time, datetime, calendar, sys, etc.
- **User Defined Functions**
  - Structure of Python Modules

FILE OPERATIONS

- **Text and Bytes files**
  - Opening a file
  - Reading and Writing Files
  - Other File tools
- **MS Excel files**
  - Introduction to MS Excel files

CLASSES AND OBJECTS

- Classes as User Defined Data Type
- Objects as Instances of Classes
- Creating Class and Objects
- Creating Objects By Passing Values
- Variables & Methods in a Class

EXCEPTION HANDLING

- Default Exception and Errors
- Catching Exceptions
- Raise an exception
- Try.... except statement
- Raise, Assert, Finally blocks
- User defined exception

INTRODUCTION TO OOPS

- Procedural Vs Modular Programming
- The Object Oriented Programming
- Data Abstraction
- Data Hiding
- Encapsulation
- Modularity
- Inheritance
- Polymorphism

DATABASE

- Introduction to MySQL
- PYMYSQL Connections
- Executing queries
- Transactions
- Handling error

GUI PROGRAMMING

- Introduction
- Tkinter programming
- Tkinter widgets
- Frame
- Button
- Label
- Entry

TURTLE PROGRAMMING

- Introduction to Turtle
- Controlling Turtle
- Animation Programming

MULTITHREADING

- Thread and Process
- Starting a thread
- Threading module
- Synchronizing threads
- Multithreaded Priority Queue

NETWORKING

- Socket Module
- Server-client-socket
- Connecting client server
- Client-server chatting program

REGULAR EXPRESSIONS

- Match function
- Search function
- Grouping
- Matching at Beginning or End
- Match Objects
- Flags

ADVANCED CONCEPTS*

- Decorators
- Generators
- Iterators
- Co-routines

CGI*

- Architecture
- CGI environment variable
- GET and POST methods
- Cookies
- File upload

Projects:

1. **Console Project**
2. **GUI Project**

Data Analytics Using Python

REVISITING PYTHON

- List and dictionary comprehension
- Programming assignment

INTRODUCTION TO DATA ANALYTICS

- Why Analytics?
- Traditional Data Management
- Analytical tools
- Types of Analytics
- Hind sight, ore sight and insight
- Dimensions and measures
- Why learn Python for data analysis?
- Using the IPython notebook

LIBRARIES FOR DATA ANALYTICS

- Anaconda
- Numpy
- Scipy
- Pandas
- Matplotlib
- Seaborn
- Scikit-learn

JUPYTER NOTEBOOK

- Create Documentation
- Code mode
- Markdown mode

STATISTICS:

- Mean, Median, Mode
- Z-scores
- Bias -variance dichotomy
- Sampling and t-tests
- Sample vs Population statistics
- Random Variables
- Probability distribution function
- Expected value
- Binomial Distributions
- Normal Distributions
- Central limit Theorem
- Hypothesis testing
- Z-Stats vs T-stats
- Type 1 type 2 error
- Chi Square test
- ANOVA test and F-stats

NUMPY:

- Creating NumPy arrays
- Indexing and slicing in NumPy
- Downloading and parsing data
- Creating multidimensional arrays
- NumPy Data types
- Array tributes
- Indexing and Slicing
- Creating array views copies
- Manipulating array shapes I/O

SCIPY:

- Introduction to SciPy
- Create function
- modules of SciPy

MATPLOTLIB:

- Scatter plot
- Bar charts, histogram
- Stack charts
- Legend title Style
- Figures and subplots
- Plotting function in pandas
- Labelling and arranging figures
- Save plots

PANDAS:

- Using multilevel series
- Series and Data Frames
- Grouping, aggregating
- Merge DataFrames
- Generate summary tables
- Group data into logical pieces
- Manipulate dates
- Creating metrics for analysis
- Data wrangling
- Merging and joining
- Analytics Vidhya dataset- Loan Prediction Problem
- Data Mugging using Pandas
- Building a Predictive Model

SEABORN:

- Style functions
- Color palettes
- Distribution plots
- Categorical plots
- Regression plots
- Axis grid objects

WEB SCRAPING:

- Scraping Webpages
- Beautifulsoup package
- Real time project

INTRODUCTION TO ML

- What is ML? And Why ML?
- Introduction to Supervised ML
- Introduction to Unsupervised ML
- Mathematical Background for ML- Matrix ops Probability Theory (Bayes' Theorem)
- ML Glossary- Variable types, k-fold
- CV, AUC, F1 score,
- Overfitting / Underfitting
- Data split & hyper parameter

SCIKIT-LEARN

Supervised learning –

- **Regression**
  - Different types of Regression-
  - Linear Regression
  - Logistic Regression
  - Decision tree Algorithms
- **Classification**
  - Naive- Bayes'
  - KNN Classification
  - Curse of Dimensionality-PCA
  - SVM Classification

Unsupervised learning –

- **Clustering**
  - k-means clustering

Random Forest

INTRODUCTION TO BIG DATA

- What is Hadoop?
- MapReduce
- File handling with Hadoopy
- Pig
- Pyspark

Projects:

3. **Real time projects**

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