PYTHON PROGRAMMING

CORE PYTHON PROGRAMMING:

- ➢ **PYTHON Programming Introduction**
- ➢ **History of Python**
- ➢ **Python is Derived from?**
- ➢ **Python Features**
- ➢ **Python Applications**
- ➢ **Why Python is Becoming Popular Now a Day?**
- ➢ **Existing Programming Vs Python Programming**
- ➢ **Writing Programs in Python**
- ➢ **Top Companies Using Python**
- ➢ **Python Programming Modes**
  - o Interactive Mode Programming
  - o Scripting Mode Programming
- ➢ **Flavors in Python, Python Versions**
- ➢ **Download & Install the Python in Windows & Linux**
- ➢ **How to set Python Environment in the System?**
- ➢ **Anaconda - Data Science Distributor**
- ➢ **Downloading and Installing Anaconda, Jupyter Notebook & Spyder**
- ➢ **Python IDE - Jupyter Notebook Environment**
- ➢ **Python IDE – Spyder Environment**
- ➢ **Python Identifiers(Literals), Reserved Keywords**
- ➢ **Variables, Comments**
- ➢ **Lines and Indentations, Quotations**
- ➢ **Assigning Values to Variables**
- ➢ **Data Types in Python**
- ➢ **Mutable Vs Immutable**
- ➢ **Fundamental Data Types: int, float, complex, bool, str**
- ➢ **Number Data Types: Decimal, Binary, Octal, Hexa Decimal & Number Conversions**

- ➤ **Inbuilt Functions in Python**
- ➤ **Data Type Conversions**
- ➤ **Priorities of Data Types in Python**
- ➤ **Python Operators**
  - o Arithmetic Operators
  - o Comparison (Relational) Operators
  - o Assignment Operators
  - o Logical Operators
  - o Bitwise Operators
  - o Membership Operators
  - o Identity Operators
- ➤ **Slicing & Indexing**
  - o Forward Direction Slicing with +ve Step
  - o Backward Direction Slicing with -ve Step
- ➤ **Decision Making Statements**
  - o if Statement
  - o if-else Statement
  - o elif Statement
- ➤ **Looping Statements**
  - o Why we use Loops in python?
  - o Advantages of Loops
  - o for Loop
  - o Nested for Loop
  - o Using else Statement with for Loop
  - o while Loop
  - o Infinite while Loop
  - o Using else with Python while Loop
- ➤ **Conditional Statements**
  - o break Statement
  - o continue Statement
  - o Pass Statement

ADVANCED PYTHON PROGRAMMING:

- ➤ **Advanced Data Types: List, Tuple, Set, Frozenset, Dictionary, Range, Bytes & Bytearray, None**
- ➤ **List Data Structure**
  - o List indexing and splitting
  - o Updating List values
  - o List Operations
  - o Iterating a List

- Adding Elements to the List
- Removing Elements from the List
- List Built-in Functions
- List Built-in Methods

➢ **Tuple Data Structure**
- Tuple Indexing and Splitting
- Tuple Operations
- Tuple Inbuilt Functions
- Where use Tuple
- List Vs Tuple
- Nesting List and Tuple

➢ **Set Data Structure**
- Creating a Set
- Set Operations
- Adding Items to the Set
- Removing Items from the Set
- Difference Between discard() and remove()
- Union of Two Sets
- Intersection of Two Sets
- Difference of Two Sets
- Set Comparisons

➢ **Frozenset Data Structure**
➢ **Dictionary Data Structure**
- Creating the Dictionary
- Accessing the Dictionary Values
- Updating Dictionary Values
- Deleting Elements Using del Keyword
- Iterating Dictionary
- Properties of Dictionary Keys
- Built-in Dictionary Functions
- Built-in Dictionary Methods

➢ **List Vs Tuple Vs Set Vs Frozenset Vs Dictionary**
➢ **Range, Bytes, Bytearray & None**
➢ **Python Functions**
- Advantage of Functions in Python
- Creating a Function
- Function Calling
- Parameters in Function
- Call by Reference in Python
- Types of Arguments

- Required Arguments
- Keyword Arguments
- Default Arguments
- Variable-Length Arguments

➢ **Scope of Variables**
➢ **Python Built-in Functions**
➢ **Python Lambda Functions**
➢ **String with Functions**
  - Strings Indexing and Splitting
  - String Operators
  - Python Formatting Operator
  - Built-in String Functions

➢ **Python File Handling**
  - Opening a File
  - Reading the File
  - Read Lines of the File
  - Looping through the File
  - Writing the File
  - Creating a New File
  - Using with Statement with Files
  - File Pointer Positions
  - Modifying File Pointer Position
  - Renaming the File & Removing the File
  - Writing Python Output to the Files
  - File Related Methods

➢ **Python Exceptions**
  - Common Exceptions
  - Problem without Handling Exceptions
  - except Statement with no Exception
  - Declaring Multiple Exceptions
  - Finally Block
  - Raising Exceptions
  - Custom Exception

➢ **Python Packages**
  - Python Libraries
  - Python Modules
    - Collection Module
    - Math Module
    - OS Module
    - Random Module

- Statistics Module
- Sys Module
- Date & Time Module
  - Loading the Module in our Python Code
    - import Statement
    - from-import Statement
  - Renaming a Module
- **Regular Expressions**
- **Command Line Arguments**
- **Object Oriented Programming (OOPs)**
  - Object-oriented vs Procedure-oriented Programming languages
  - Object
  - Class
  - Method
  - Inheritance
  - Polymorphism
  - Data Abstraction
  - Encapsulation
- **Python Class and Objects**
  - Creating Classes in Python
  - Creating an Instance of the Class
- **Python Constructor**
  - Creating the Constructor in Python
  - Parameterized Constructor
  - Non-Parameterized Constructor
  - In-built Class Functions
  - In-built Class Attributes
- **Python Inheritance**
  - Python Multi-Level Inheritance
  - Python Multiple Inheritance
  - Method Overriding
  - Data Abstraction in Python
- **Graphical User Interface (GUI) Programming**
- **Python TKinter**
  - Tkinter Geometry
    - pack() Method
    - grid() Method
    - place() Method
  - Tkinter Widgets

Data Analysis with Python NUMPY:

- ➢ **NumPy Introduction**
  - o What is NumPy
  - o The Need of NumPy
- ➢ **NumPy Environment Setup**
- ➢ **N-Dimensional Array (Ndarray)**
  - o Creating a Ndarray Object
  - o Finding the Dimensions of the Array
  - o Finding the Size of Each Array Element
  - o Finding the Data Type of Each Array Item
  - o Finding the Shape and Size of the Array
  - o Reshaping the Array Objects
  - o Slicing in the Array
  - o Finding the Maximum, Minimum, and Sum of the Array Elements
  - o NumPy Array Axis
  - o Finding Square Root and Standard Deviation
  - o Arithmetic Operations on the Array
  - o Array Concatenation
- ➢ **NumPy Datatypes**
  - o NumPy dtype
  - o Creating a Structured Data Type
- ➢ **Numpy Array Creation**
  - o Numpy.empty
  - o Numpy.Zeros
  - o NumPy.ones
- ➢ **Numpy Array from Existing Data**
  - o Numpy.asarray
- ➢ **Numpy Arrays within the Numerical Range**
  - o Numpy.arrange
  - o NumPy.linspace
  - o Numpy.logspace
- ➢ **NumPy Broadcasting**
  - o Broadcasting Rules
- ➢ **NumPy Array Iteration**
  - o Order of Iteration
    - ▪ F-Style Order
    - ▪ C-Style Order
  - o Array Values Modification
- ➢ **NumPy String Functions**
- ➢ **NumPy Mathematical Functions**

- o Trigonometric Functions
- o Rounding Functions
- ➢ **NumPy Statistical functions**
  - o Finding the Min and Max Elements from the Array
  - o Calculating Median, Mean, and Average of Array Items
- ➢ **NumPy Sorting and Searching**
- ➢ **NumPy Copies and Views**
- ➢ **NumPy Matrix Library**
- ➢ **NumPy Linear Algebra**
- ➢ **NumPy Matrix Multiplication in Python**

Data Analysis with Python PANDAS:

- ➢ **Pandas Introduction & Pandas Environment Setup**
  - o Key Features of Pandas
  - o Benefits of Pandas
  - o Python Pandas Data Structure
    - ▪ Series
    - ▪ DataFrame
    - ▪ Panel
- ➢ **Pandas Series**
  - o Creating a Series
    - ▪ Create an Empty Series
    - ▪ Create a Series using Inputs
  - o Accessing Data from Series with Position
  - o Series Object Attributes
  - o Retrieving Index Array and Data Array of a Series Object
  - o Retrieving Types (dtype) and Size of Type (itemsize)
  - o Retrieving Shape
  - o Retrieving Dimension, Size and Number of Bytes
  - o Checking Emptiness and Presence of NaNs
  - o Series Functions
- ➢ **Pandas DataFrame**
  - o Create a DataFrame
    - ▪ Create an Empty DataFrame
    - ▪ Create a DataFrame using Inputs
- ➢ **Column Selection, Addition & Deletion**
- ➢ **Row Selection, Addition & Deletion**
- ➢ **DataFrame Functions**
- ➢ **Merging, Joining & Combining DataFrames**
- ➢ **Pandas Concatenation**

- **Pandas Time Series**
  - Datetime
  - Time Offset
  - Time Periods
  - Convert String to Date
- **Viewing/Inspecting Data (loc & iloc)**
- **Data Cleaning**
- **Filter, Sort, and Groupby**
- **Statistics on DataFrame**
- **Pandas Vs NumPy**
- **DataFrame Plotting**
  - Line: Line Plot (Default)
  - Bar: Vertical Bar Plot
  - Barh: Horizontal Bar Plot
  - Hist: Histogram Plot
  - Box: Box Plot
  - Pie: Pie Chart
  - Scatter: Scatter Plot

DBMS - Structured Query Language:

- **Introduction & Models of DBMS**
- **SQL & Sub Language of SQL**
- **Data Definition Language (DDL)**
- **Data Manipulation Language (DML)**
- **Data Query/Retrieval Language (DQL/DRL)**
- **Transaction Control Language (TCL)**
- **Data Control Language (DCL)**
- **Installation of MySQL & Database Normalization**
- **Sub Queries & Key Constraints**
- **Aggregative Functions, Clauses & Views**

Importing & Exporting Data:

- **Data Extraction from CSV (pd.read_csv)**
- **Data Extraction from TEXT File (pd.read_table)**
- **Data Extraction from CLIPBOARD (pd.read_clipboard)**
- **Data Extraction from EXCEL (pd.read_excel)**
- **Data Extraction from URL (pd.read_html)**
- **Writing into CSV (df.to_csv)**
- **Writing into EXCEL (df.to_excel)**
- **Data Extraction from DATABASES**

- o Python MySQL Database Connection
  - Import mysql.connector Module
  - Create the Connection Object
  - Create the Cursor Object
  - Execute the Query

Data Visualization with Python MATPLOTLIB:

- ➢ **Data Visualization Introduction**
- ➢ **Tasks of Data Visualization**
- ➢ **Benefit of Data Visualization**
- ➢ **Plots for Data Visualization**
- ➢ **Matplotlib Architecture**
- ➢ **General Concept of Matplotlib**
- ➢ **MatPlotLib Environment Setup**
- ➢ **Verify the MatPlotLib Installation**
- ➢ **Working with PyPlot**
- ➢ **Formatting the Style of the Plot**
- ➢ **Plotting with Categorical Variables**
- ➢ **Multi-Plots with Subplot Function**
- ➢ **Line Graph**
- ➢ **Bar Graph**
- ➢ **Histogram**
- ➢ **Scatter Plot**
- ➢ **Pie Plot**
- ➢ **3D Graph Plot with mpl_toolkits**
- ➢ **Functions of MatPlotLib**
- ➢ **Contour Plot, Quiver Plot & Violin Plot**
- ➢ **3D Contour Plot, 3D Wireframe Plot & 3D Surface Plot**
- ➢ **Box Plot**
  - o What is a Boxplot?
  - o Mean, Median, Quartiles
  - o Outliers & Whiskers
  - o Inter Quartile Range (IQR)
  - o Data Distribution Analysis
  - o Boxplot on a Normal Distribution
  - o Probability Density Function
  - o 68–95–99.7 Rule (Empirical rule)

Data Analysis Project using Python Programming