Python Course Content

Introduction to Python

- Python language characteristics
- The Python execution model

Lists

- Introduction, Accessing list
- Operations, Working with lists
- Function and Methods

Tuple

- Accessing tuples
- Operations, Working
- Functions and Methods

Dictionaries

- Accessing values in dictionaries
- Working with dictionaries, Properties

Functions

- Functions, Defining a function
- Calling a function, Types of functions
- Function Arguments, Anonymous functions
- Global and local variables

Leveraging Python Built-in Types
Manipulating string and numeric literals

- Declaring and initializing variables
- Performing arithmetic calculations
- Making decisions and performing iterations
- Formatting and slicing strings

Aggregating related data

- Accessing positional information in lists
- Representing ordered data with tuples
- Consistently handling data collections with iterators

Organizing and Structuring Code
Defining and calling functions

- Positional, keyword, and default arguments
- Implementing variable-length argument lists
- Iterating with generator functions

Grouping code into modules

- Importing and packages
- Referencing functions from modules by qualification
- Accessing the Standard Library

Manipulating the File System
Managing files

- Reading and writing text and binary files
- Importing the OS module for directory management

Increasing program robustness through handling exceptions

- Maintaining program control with error handlers
- Detecting errors and raising exceptions

Interfacing with Relational Databases
Establishing communication

- Creating a SQL database connection
- Instantiating cursors to access a database
- Executing SQL statements within a Python program
- Retrieving desired data sets
- Updating the database with action statements

R Programming Language Course Content

Introduction to R

- Overview of R and its applications
- Installing R and RStudio
- Basic syntax, variables, and data types
- Basic operations and arithmetic in R

Data Structures in R

- Vectors, matrices, and arrays
- Lists and data frames
- Factors and data types conversion
- Indexing and subsetting data

Control Structures

- Conditional statements (if-else)
- Loops (for, while)
- Functions and user-defined functions

Data Import and Export

- Reading and writing data in various formats (CSV, Excel, JSON, etc.)
- Data cleaning and preprocessing techniques

Data Manipulation with dplyr

- Introduction to the dplyr package
- Filtering, arranging, and selecting data
- Grouping and summarizing data

Data Visualization with ggplot2

- Introduction to ggplot2 package
- Creating various types of plots (scatter plots, bar plots, histograms, etc.)
- Customizing plots and adding aesthetics

Statistical Analysis in R

- Descriptive statistics and summary measures
- Hypothesis testing and confidence intervals
- Linear regression and basic modeling

Working with Time Series Data

- Introduction to time series data
- Manipulating and visualizing time series data
- Time series forecasting techniques

Machine Learning with R

- Overview of machine learning algorithms in R
- Implementation of basic ML models (e.g, regression, classification)
- Model evaluation and validation techniques

Shiny Web Applications

- Building interactive web applications with Shiny
- Integrating R code with web interfaces

R Markdown and Reproducible Reports

- Creating dynamic reports with R Markdown
- Embedding R code, visualizations, and text in reports

Version Control and Collaboration

- Using Git and GitHub for version control
- Collaborative workflows and project management with R