Comprehensive Python Programming

Duration:

- 5 days

Course Objectives:

- Introduce participants to the fundamentals of Python programming, ensuring they have a solid foundation to build upon.
- Familiarize participants with essential data structures (lists, tuples, sets, dictionaries) and their usage to store and manipulate data efficiently.
- Teach participants how to handle errors gracefully using exceptions and work with files for input and output.
- Introduce participants to the principles of object-oriented programming, including classes, objects, inheritance, and encapsulation.
- Cover multithreading concepts and demonstrate how to handle databases in Python applications, focusing on practical implementation.

Detailed outline:

- **Day 1:** Python Basics
  - Introduction to Python
  - Setting up Python environment (Python installation)
  - Writing and executing Python scripts
  - Variables and data types
  - Basic input and output
  - Control structures (if, for, while)
  - Functions and modules
- **Day 2:** Data Structures
  - Lists
    - Creating and manipulating lists
    - List comprehensions
    - Slicing and indexing
  - Tuples
    - Creating and using tuples
    - Immutability of tuples
  - Sets
    - Creating and using sets
    - Set operations (union, intersection, difference)
  - Dictionaries
    - Creating and using dictionaries
    - Dictionary methods and operations
- **Day 3:** Exceptions and File Handling
  - Exception handling with try-except blocks

    - Handling multiple exceptions
    - The `finally` block
    - Raising custom exceptions
    - File handling in Python
        - Opening, reading, and writing files
        - Working with text and binary files
        - Using the `with` statement for context management
- **Day 4:** Object-Oriented Programming (OOP)
    - Introduction to OOP
    - Classes and objects
        - Defining classes and creating objects
        - Instance variables and methods
    - Inheritance and polymorphism
        - Creating subclasses
        - Method overriding
    - Encapsulation and abstraction
        - Private and protected attributes
        - Abstract classes and interfaces
    - Class constructors and destructors
- **Day 5:** Multithreading and Database Handling
    - Introduction to multithreading
        - Creating and managing threads
        - Thread synchronization
    - Multithreading vs. multiprocessing
    - Working with databases in Python
        - Connecting to databases (e.g., SQLite)
        - Executing SQL queries
        - Fetching and manipulating data
    - Closing database connections
    - Best practices for database access in multithreaded applications

Software Setup:

Participants should have the following software installed on their laptops before the course starts:

1. **Python:** Download and install Python 3.x from python.org.
2. **Code Editor/IDE:** PyCharm.
3. **Libraries:** No additional libraries are required for this course based on your requirements.
4. **Optional:** Set up a virtual environment for the course to manage dependencies if desired.