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CS011903 ***Computing with Python*** **L-T-P-Cr: 3-0-2-3**

Pre-requisites: Basic understanding of computer science concepts and familiarity with operating systems basics

Objectives/Overview:

1. To master fundamental programming concepts in Python.
2. To gain proficiency in data manipulation and analysis using essential Python libraries.
3. To explore object-oriented programming principles and leverage APIs and web scraping techniques for data acquisition.
4. To develop problem-solving skills through practical programming exercises and gain experience in working with files and exception handling.

Course Outcomes:

At the end of the course, a student should:

Outcome	Mapping to POs
CO1: Demonstrate proficiency in fundamental programming concepts using Python	PO1, PO5
CO2: Utilize Python syntax effectively to create basic programs using input/output statements, conditional statements, and loops.	PO5
CO3: Apply appropriate data structures and string manipulation techniques to solve various programming tasks.	PO2, PO3
CO4: Design and utilize functions with arguments, parameters, and return values to modularize code and improve reusability.	PO1, PO5
CO5: Explain and apply object-oriented programming principles to design simple programs.	PO1, PO5
CO6: Employ essential data analysis libraries for data manipulation, exploration, and visualization.	PO5
CO7: Implement mechanisms for file manipulation, handling exceptions and errors in Python programs.	PO1, PO5
CO7: Utilize web scraping techniques and APIs to extract and interact with data from web sources.	PO3, PO2

Unit 1: Introduction to Python **Lectures: 5**

- Introduction to programming concepts: variables, data types, operators, expressions, logic
- Setting up the Python environment (installation, IDEs)
- Basic syntax and program structure (input/output, control flow statements)
- Debugging techniques

Unit 2: Working with Data Structures **Lectures: 5**

- Lists, tuples, dictionaries, sets (operations, methods, common use cases)
- String manipulation (slicing, indexing, string methods)
- Choosing the right data structure for different tasks

Unit 3: Functions and Modules **Lectures: 5**

- Defining and calling functions
- Arguments, parameters, and return values
- Modular programming concepts (importing modules, creating modules)
- Namespaces and scope

Unit 4: Conditional Statements and Loops **Lectures: 5**

- Conditional statements (if/else, elif)
- Looping constructs (for, while)
- Nested statements and control flow
- Problem-solving using loops and conditionals

Unit 5: Object-Oriented Programming **Lectures: 5**

- Introduction to OOP concepts (classes, objects, attributes, methods)
- Creating and using classes
- Inheritance and polymorphism (basic understanding)
- Encapsulation and data abstraction

Unit 6: Data Analysis with Python **Lectures: 6**

- Introduction to NumPy and Pandas libraries
- Data manipulation and exploration
- Data cleaning and preprocessing
- Visualizing data with Matplotlib or Seaborn libraries

Unit 7: Exception Handling and File I/O **Lectures: 5**

- Exceptions and error handling mechanisms
- Reading and writing data from files
- File operations and error handling

Unit 8: Introduction to Web Scraping and APIs **Lectures: 6**

- Introduction to web scraping concepts and ethical considerations
- Using libraries like Beautiful Soup and requests for data extraction
- Working with APIs and fetching data from web services

Text/Reference Books:

1. Python for Everybody. Author: Charles R. Severance. Publisher: Shroff Publishers. ISBN: 9789352136278
2. Downey, Allen, et al. "How to think like a computer scientist: learning with python 3." (2016).