Course: Problem Solving using Python

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General Guidelines and Expectations

- Notebook Usage
- Phone Policy
- Attendance Requirement
- Platform - Code
- Internal Assessments (PATs)
- Final Assessment (FATs)
- Discipline

- **Course Name:** Problem Solving Using Python
- **Course Code:** BACSE101
- **Credits (L:T:P:J:C):** 0:0:4:0:2.0
- **Class Number 1:** CH2025260103001 **Slot:** L31 + L32 + L49 + L50
- **Class Number 2:** CH2025260103052 **Slot:** L3 + L4 + L9 + L10

Module 1: Introduction to Problem Solving and Python Fundamentals

- Problem Analysis Chart, Robust and Boundary Test Cases
- Algorithm, Flowchart, Pseudocode
- Data Types: Numeric, Boolean, Strings
- Regular Expression, Operators, Expressions
- Built-in Functions

Objectives

```
- Understand basic problem-solving techniques.
- Learn fundamental Python data types and expressions.
- Apply built-in functions in simple programs.
```

Module 2: Problem Solving Approaches and Program Flow

- Problem Solving Approaches: Top-down, Bottom-up, Divide Conquer, Backtracking
- Conditional Statements and Branching
- Looping: for, while
- Loop Controls: break, continue, pass

Objectives

```
- Apply different algorithmic approaches to problems.
- Develop decision-making constructs in Python.
- Use iteration and control flow effectively.
```

Module 3: Data Organization and Collections

- Lists, Tuples, Dictionaries, Sets
- Data Comprehension, Iterators, Data Selection
- Data Modification, Grouping, Categorization
- Searching: Linear, Binary
- Sorting: Bubble, Selection, Insertion, Quick, Merge

Objectives

```
- Handle data using Python's collection types.
- Organize and modify data efficiently.
- Implement searching and sorting algorithms.
```

Module 4: Modular Programming

- Functions: Definition, Call, Return Value
- Parameters: Positional, Keyword, Default, Arbitrary
- Scope: Local and Global
- Lambda Functions, Decorators, Recursive Functions
- Menu-driven programs: Stacks, Queues

Objectives

```
- Create modular code using functions.
- Understand parameter passing and scope.
- Apply recursion and data structures in applications.
```

Module 5: Data Processing using NumPy and Pandas

- NumPy: Array Operations, Mathematical Functions
- Pandas:
  - Handling Files, Creating DataFrames
  - Data Cleaning, Filtering, Selection
  - Grouping, Sorting, Aggregation, Merging

Objectives

```
- Perform efficient numerical operations using NumPy.
- Analyze structured data with Pandas.
- Manipulate, clean, and summarize datasets.
```

Module 6: Contemporary Issues

- Understanding current trends and issues in computing and software development

Objectives

```
- Gain awareness of modern software and technology trends.
- Reflect on the societal impact of Python and programming.
```

Text Books and Reference Books

Text Books

- John V. Guttag (2021). *Introduction to Computation and Programming using Python* (3rd ed.). The MIT Press
- Eric Matthes (2022). *Python Crash Course* (3rd ed.). A Hands-On, Project-Based Introduction to Programming

Reference Books

- Luciano Ramalho (2022). *Fluent Python* (2nd ed.). O'Reilly Media, Inc.
- Charles R. Severance (2024). *Python for Everybody* (1st ed.). Shroff Publishers

Course Materials Repository

All the updated course materials, including:

- Lecture notes and slides
- Jupyter notebooks
- Practice problems and solutions
- Assignments and project guidelines

will be continuously updated at the following repository:

Click here: GitHub - BACSE101 Problem Solving Using Python

Please bookmark the link and check regularly for updates.

Placement Preparation and Skill Development

To prepare effectively for placements and build your technical profile, explore the following resources:

Coding Practice and Problem Solving

- GeeksforGeeks Practice – DS Algo, Interview Experiences
- LeetCode – Company-wise coding problems
- HackerRank Skills Directory – Certifications and practice
- Codeforces – Competitive programming contests

Aptitude and Reasoning Practice

- IndiaBix – Quant, logical reasoning, verbal ability, puzzles

Recommended Video Learning Resources

In addition to lectures, the following curated video resources will help you build strong Python fundamentals, project experience, and practical industry skills:

1. Python for Everybody (University Course) Watch: Python for Everybody – Dr. Charles Severance

2. Complete Machine Learning Playlist – Krish Naik Watch: ML Projects Concepts – Krish Naik

3. Python for DevOps – TechWorld with Nana Watch: Python for Automation and DevOps

4. Python Programming Tutorials – Telusko Watch: Python Beginner to Advanced – Telusko