UNIVERSITY OF MADRAS
B.Sc. DEGREE PROGRAMME IN COMPUTER SCIENCE
SYLLABUS WITH EFFECT FROM 2023-2024

Year: I   **Semester:I**

Core-I: Python Programming (Common to B.Sc.-CS with AI, CS with DS, Software Appl.& BCA)	**125C1A**

Credits 5	**Lecture Hours:5 per week**

Learning Objectives: (for teachers: what they have to do in the class/lab/field)
- Describe the core syntax and semantics of Python programming language.
- Discover the need for working with the strings and functions.
- Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- Understand the usage of packages and Dictionaries

Course Outcomes: (for students: To know what they are going to learn)

CO1: Develop and execute simple Python programs

CO2: Write simple Python programs using conditionals and looping for solving problems

CO3: Decompose a Python program into functions

CO4: Represent compound data using Python lists, tuples, dictionaries etc.

CO5: Read and write data from/to files in Python programs

UNITS	CONTENTS
I	Introduction: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers - Operators - Expressions and Data types, Input / output.
II	Control Structures: Boolean Expressions - Selection Control - If Statement-Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of python programs,Understanding and using ranges.
III	Functions: Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non-Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions.
IV	Objects and their use: Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Exception Handling.
V	Dictionaries and Sets: Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Python packages: Simple programs using the built-in functions of packages matplotlib, NumPy, pandas etc.

Learning Resources:

Recommended Texts

1. Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem-solving Focus", Wiley India Edition, 2015.

2. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016

Reference Books

1. Mark Lutz, "Learning Python Powerful Object Oriented Programming", O'reilly Media 2018, 5th   Edition.

2. Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1 st   Edition.

3. John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course   Technology Cengage Learning Publications, 2013, ISBN 978-1590282410

4. Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Learning Publications, 2013, ISBN 978-143545500

Web resources

1. https://onlinecourses.swayam2.ac.in/cec22_cs20/preview