# 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** |
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| **Credits 5** | **Lecture Hours:4 per week** |
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**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