**** wherever DCS01 is a prerequisite, a course in Python at plus 2 level or a certified MOOC in Python from SWAYAM/NPTEL will be acceptable.**

Syllabi of Core Courses

This section gives the detailed syllabus of the core courses. Each course describes the course objective, learning outcomes, the units and the reading material. The reading material has 2 -3 components: main resource(/s), additional text material, and online resources. Main resources are kept to a minimum possible and no more than 3. Additional resources and the online material may be used to enhance the knowledge of the subject.

DSC 01: Programming using Python

Course Objective

This course is designed as the first course that introduces programming concepts using Python to Computer Science students. The course focuses on the development of Python programming to solve problems of different domains. It also introduces the concept of object- oriented programming.

Course Learning Outcomes

On successful completion of the course, students will be able to:

1. Understand the basics of programming language
2. Develop, document, and debug modular Python programs.
3. Apply suitable programming constructs and built-in data structures to solve a problem.
4. Use and apply various data objects in Python.
5. Use classes and objects in application programs and handle files.

Syllabus

Unit 1 Introduction to Programming: Problem solving strategies; Structure of a Python program; Syntax and semantics; Executing simple programs in Python.

Unit 2 Creating Python Programs: Identifiers and keywords; Literals, numbers, and strings; Operators; Expressions; Input/output statements; Defining functions; Control structures (conditional statements, loop control statements, break, continue and pass, exit function), default arguments.

Unit 3 Built-in data structures: Mutable and immutable objects; Strings, built-in functions for string, string traversal, string operators and operations; Lists creation, traversal, slicing and splitting operations, passing list to a function; Tuples, sets, dictionaries and their operations.

Unit 4 Object Oriented Programming: Introduction to classes, objects and methods; Standard libraries.

Unit 5 File and exception handling: File handling through libraries; Errors and exception handling.

References

1. Taneja, S., Kumar, N. *Python Programming- A modular Approach*. Pearson Education India, 2018
2. Balaguruswamy E. *Introduction to Computing and Problem Solving using Python,* 2nd edition, McGraw Hill Education, 2018

Additional References/Online References

1. Brown, Martin C. *Python: The Complete Reference*, 2nd edition, McGraw Hill Education, 2018.
2. Guttag, J.V. *Introduction to computation and programming using Python.* 2nd edition. MIT Press, 2016.
3. https://docs.python.org/3/
4. https://www.brianheinold.net/python/A_Practical_Introduction_to_Python_Programming_Heinold.pdf

Practical List

1. WAP to find the roots of a quadratic equation
2. WAP to accept a number ‘n’ and
    a. Check if ’n’ is prime
    b. Generate all prime numbers till ‘n’
    c. Generate first ‘n’ prime numbers

    This program may be done using functions
3. WAP to create a pyramid of the character ‘*’ and a reverse pyramid

```
    *
   ***
  *****
 *******
*********

*********
 *******
  *****
   ***
    *
```

4. WAP that accepts a character and performs the following:
    a. print whether the character is a letter or numeric digit or a special character
    b. if the character is a letter, print whether the letter is uppercase or lowercase
    c. if the character is a numeric digit, prints its name in text (e.g., if input is 9, output is NINE)
5. WAP to perform the following operations on a string
    a. Find the frequency of a character in a string.
    b. Replace a character by another character in a string.
    c. Remove the first occurrence of a character from a string.
    d. Remove all occurrences of a character from a string.
6. WAP to swap the first n characters of two strings.
7. Write a function that accepts two strings and returns the indices of all the occurrences of the second string in the first string as a list. If the second string is not present in the first string then it should return -1.
8. WAP to create a list of the cubes of only the even integers appearing in the input list (may have elements of other types also) using the following:

a. 'for' loop
b. list comprehension

9. WAP to read a file and
    a. Print the total number of characters, words and lines in the file.
    b. Calculate the frequency of each character in the file. Use a variable of dictionary type to maintain the count.
    c. Print the words in reverse order.
    d. Copy even lines of the file to a file named ‘File1’ and odd lines to another file named ‘File2’.
10. WAP to define a class Point with coordinates x and y as attributes. Create relevant methods and print the objects. Also define a method distance to calculate the distance between any two point objects.
11. Write a function that prints a dictionary where the keys are numbers between 1 and 5 and the values are cubes of the keys.
12. Consider a tuple t1=(1, 2, 5, 7, 9, 2, 4, 6, 8, 10). WAP to perform following operations:
    a) Print half the values of the tuple in one line and the other half in the next line.
    b) Print another tuple whose values are even numbers in the given tuple.
    c) Concatenate a tuple t2=(11,13,15) with t1.
    d) Return maximum and minimum value from this tuple
13. WAP to accept a name from a user. Raise and handle appropriate exception(s) if the text entered by the user contains digits and/or special characters.

DSC02: Computer System Architecture

Course Objective

This course introduces the students to the fundamental concepts of digital computer organization, design and architecture. It aims to develop a basic understanding of the building blocks of the computer system and highlights how these blocks are organized together to architect a digital computer system.