

Guidelines of B.Sc. (H) Computer Science Semester I (DSC01)
/ BA(Program) Discipline A1/ Discipline Specific Elective Semester III /
Generic Elective
(NEP UGCF 2022)
Object Oriented Programming using Python
(Effective from Academic Year 2025-26)

S. No.	Unit Name	Chapters	References	Weeks
1.	Unit 1 Introduction to Programming	1 (1.5)	[4]	1
2.	Unit 2 Creating Python Programs	1, 2, 3 (Up to pg. 32), 5 (Up to pg. 61, pg. 64(keyboard input - 66), 6 (up to pg. 77, pg. 80 [Boolean Functions only]), 7 (up to pg. 98)	[1]	2-4
3.	Unit 3 Built-in data structures	7(7.1-7.8,7.10), 8(till 8.3 up to program 8.10), 9 (9.1 till the <i>values</i> method, 9.2 till program 9.3)	[4]	5-9
4.	Unit 4 Object Oriented Programming	10,11 (till 11.2)	[4]	10-13
5.	Unit 5 File and exception handling	7(7.3), 9(9.1)	[2]	14-15

Essential Readings

1. Allen B. Downey, Think Python: How to Think Like a Computer Scientist, O'Reilly Media, 2024.
2. J.V. Guttag, Introduction to Computation and Programming Using Python: With Application to Understanding Data, MIT Press, 2016.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Interdisciplinary Approach, Addison-Wesley Professional, 2015

4. Tony Gaddis, Starting out with Python, Pearson, 2021.

Additional References

- i. Brown, Martin C. Python: The Complete Reference, 2nd edition, McGraw-Hill Education, 2018. Suggested Practical List

Practical List

1. Write a program to find the roots of a quadratic equation.
2. Write a program to accept a number 'n' and
 - a. Check if 'n' is prime
 - b. Generate all prime numbers till 'n'
 - c. Generate first 'n' prime numbersThis program may be done using functions.
3. Write a program to create a pyramid of the character '*' and a reverse pyramid
4. Write a program 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. Write a program 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. Write a program 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. Write a program 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. Write a program 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. Write a function that prints a dictionary where the keys are numbers between 1 and 5 and the values are cubes of the keys.
11. Consider a tuple t1=(1, 2, 5, 7, 9, 2, 4, 6, 8, 10). Write a program 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
12. Define a class Employee that stores information about employees in the company. The class should contain the following:
 - (i) data members- count (to keep a record of all the objects being created for this class) and for every employee: an employee number, Name, Dept, Basic, DA and HRA.
 - (ii) function members:
 - a. `__init__` method to initialize and/or update the members. Add statements to ensure that the program is terminated if any of Basic, DA and HRA is set to a negative value.
 - b. function salary, that returns salary as the sum of Basic, DA and HRA.
 - c. `__del__` function to decrease the number of objects created for the class.
 - d. `__str__` function to display the details of an employee along with the salary of an employee in a proper format.
13. Write a program to define a class "2DPoint" 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.
14. Inherit the above class to create a "3Dpoint" with additional attribute z. Override the method defined in "2DPoint" class , to calculate distance between two points of the "3DPoint" class.
15. Write a program 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.