

(Applicable to the batch of students admitted in the academic year 2025-2026)

B.Sc.(Data Science) (CBCS)

FACULTY OF SCIENCE, IIMC

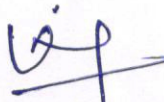
B.Sc.(DATA SCIENCE)
Syllabus (CBCS)
(w.e.f. 2025-26)

Semester I - VI



FACULTY OF SCIENCE
Department of Computer Science
INDIAN INSTITUTE OF
MANAGEMENT & COMMERCE
Autonomous College (UG & PG)

6-1-91, Khairatabad, Hyd- 500 004, T.S


Chairman

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Dept. of Computer Science


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Department of Computer Science & Engineering
University College of Engineering (A)
Osmania University,
Hyderabad-500 007.


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Indian Institute of Management and Commerce
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B.SC. (CBCS) DATA SCIENCE SYLLABUS

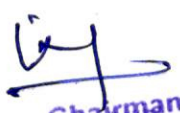
(With Mathematics & Statistics Combination)

With effect from the Academic Year: 2025-26

Year	Sem	Paper code	Theory/ Practical	Paper Title	Credits	Work Load (Hours / Week)	Total Marks
I	I	BSDS-101-T	Paper-I	Problem solving and Python Programming	4	4	50+30
		BSDS-101-P	Practical -I	Problem solving and Python Programming	1	2	20
	II	BSDS-202-T	Paper-II	Data Structures and Algorithms	4	4	50+30
		BSDS-202-P	Practical -II	Data Structures and Algorithms Lab	1	2	20
II	III	BSDS-303-T	Paper-III	Data Engineering with Python	4	4	50+30
		BSDS-303-P	Practical-III	Data Engineering with Python (Lab)	1	2	20
	IV	BSDS-404-T	Paper-IV	Programming in Java	4	4	50+30
		BSDS-404-P	Practical-IV	Programming in Java Lab	1	2	20
III	V	BSDS-505-T	Paper-V	Machine Learning	4	4	50+30
		BS-505-P	Practical-5	Machine Learning (Lab)	1	2	20
		BS-501-SEC	SEC-1	Skill Enhancement Course -1 (University Specified)	2	2	50
		BS-502-SEC	SEC-2	Skill Enhancement Course -2 (Subject Specified: Information Technology)	2	2	50
		BS-501-MDC	MDC	Statistical Analysis	4	4	70+30
		BS-505-VAC	VAC	Value Added Course-1	3	3	70
	VI	BS-606-T	Paper-VI	Deep Learning	4	4	50+30
		BS-606-P	Paper-VI	Deep Learning Lab	1	2	20
		BS-603-SEC	SEC-3	Skill Enhancement Course -3 (University Specified)	2	2	50
		BS-604-SEC	SEC-4	Skill Enhancement Course -4 (Subject Specified: Web Technology)	2	2	50
		BS-602-VAC	VAC	Value Added Course-2	3	3	70
		BS-606-O	Optional	Data Science Project	4	4	100

Note:

- No of credits = No of theory hours for teaching = twice the no. of credits for practical teaching.
- Skill Enhancement Courses (SEC) are offered for Statistics students in Sem-V & VI with continuation (offered for who are willing improve the practical skills in conducting of election forecasts / exit poll surveys.
- Multi-disciplinary course and Value-added courses are offered in Final year.
- Optional paper course is offered if statistics students are willing to opt.
- The practical examination is of duration two hours and answering any two out of four.


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DATA SCIENCE SYLLABUS
B.SC. (Data Science) I-YEAR I-SEMESTER
Paper-I (Theory): Problem Solving and Python Programming
[4 HPW :: 4 Credits :: 100 Marks (External:50, Practical:20, Mid Sem Internal Assessment:30)]

Course Objectives:

The main objective is to teach Computational thinking using Python.

- To know the basics of Programming for solving a problem with writing an algorithm and flow charts.
- To convert an algorithm into a Python program
- To construct Python programs with control structures.
- To structure a Python Program as a set of functions
- To use Python data structures-lists, tuples, dictionaries.
- To do input/output with files in Python.
- To construct Python programs as a set of objects.

UNIT-I

Introduction to Computing and Problem Solving: Fundamentals of Computing – Computing Devices – Identification of Computational Problems – Pseudo Code and Flowcharts – Instructions – Algorithms – Building Blocks of Algorithms.

Introduction to Python Programming: Python Interpreter and Interactive Mode– Variables and Identifiers – Arithmetic Operators – Values and Types – Statements, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: The if, The if...else, The if...elif...else Decision Control Statements, Nested if Statement, The while Loop, The for Loop, The continue and break Statements.

UNIT-II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

UNIT-III

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; **Tuples:** tuple assignment, tuple as return value; **Dictionaries:** operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

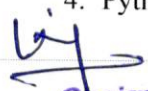
UNIT-IV

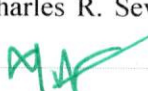
Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, Polymorphism.

Functional Programming: Lambda. Iterators, Generators, List Comprehensions

References:

1. Introduction to Python Programming. Gowrishankar S., Veena A. CRC Press, Taylor & Francis Group, 2019
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/think-python/>)
3. Learning To Program With Python. Richard L. Halterman. Copyright © 2011
4. Python for Everybody, Exploring Data Using Python 3. Dr. Charles R. Severance. 2016.


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Course Outcomes:

- The main objective of this is to put into practice in computer lab with computational thinking and able to write, compile, run and debug Python programs with perfect usage of variables, conditionals statements, control structures, functions (both recursive and iterative), basic data types as well as compound data structures such as strings, lists, sets, tuples, dictionaries. object-oriented programming.
- able to develop algorithmic solutions to simple computational problems.
- able to Develop and execute simple Python programs.
- Structure a Python program into functions.
- Represent compound data using Python lists, tuples, dictionaries.
- Read and write data from/to files in Python Programs.

B.SC. (Data Science) I-YEAR I-SEMESTER

Paper-I (Practical): Problem Solving and Python Programming (Lab)

[2 HPW :: 1 Credit :: 20 Marks]

List of Practical's:

I. Programs to demonstrate the usage of operators and conditional statements

1. Write a program that takes two integers as command line arguments and prints the sum of two integers.
2. Program to display the information: Your name, Full Address, Mobile Number, College Name, Course Subjects
3. Program to find the largest number among 'n' given numbers.
4. Program that reads the URL of a website as input and displays contents of a webpage.

II. Programs to demonstrate usage of control structures

5. Program to find the sum of all prime numbers between 1 and 1000.
6. Program that reads set of integers and displays first and second largest numbers.
7. Program to print the sum of first 'n' natural numbers.
8. Program to find the product of two matrices.
9. Program to find the roots of a quadratic equation.

III. Programs to demonstrate the usage of Functions and Recursion

10. Write both recursive and non-recursive functions for the following:
 - a. To find GCD of two integers
 - b. To find the factorial of positive integer
 - c. To print Fibonacci Sequence up to given number 'n'
 - d. To convert decimal number to Binary equivalent
11. Program with a function that accepts two arguments: a list and a number 'n'. It should display all the numbers in the list that are greater than the given number 'n'.
12. Program with a function to find how many numbers are divisible by 2, 3, 4, 5, 6 and 7 between 1 to 1000.

IV. Programs to demonstrate the usage of String functions

13. Program that accept a string as an argument and return the number of vowels and consonants the string contains.


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14. Program that accepts two strings S1, S2, and finds whether they are equal or not.
15. Program to count the number of occurrences of characters in a given string.
16. Program to find whether a given string is palindrome or not.

V. Programs to demonstrate the usage of lists, sets, dictionaries, tuples and files.

17. Program with a function that takes two lists L_1 and L_2 containing integer numbers as parameters. The return value is a single list containing the pair wise sums of the numbers in L_1 and L_2 .
18. Program to read the lists of numbers as L_1 , print the lists in reverse order without using reverse function.
19. Write a program that combine lists L_1 and L_2 into a dictionary.
20. Program to find mean, median, mode for the given set of numbers in a list.
21. Program to find all duplicates in the list.
22. Program to find all the unique elements of a list.
23. Program to find max and min of a given tuple of integers.
24. Program to find union, intersection, difference, symmetric difference of given two sets.
25. Program to display a list of all unique words in a text file
26. Program to read the content of a text file and display it on the screen line wise with a line number followed by a colon
27. Program to analyse the two text files using set operations
28. Write a program to print each line of a file in reverse order.

VI. Programs to demonstrate the usage of Object-Oriented Programming

29. Program to implement the inheritance
30. Program to implement the polymorphism.

VII. Programs to search and sort the numbers

31. Programs to implement Linear search and Binary search
32. Programs to implement Selection sort, Insertion sort


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