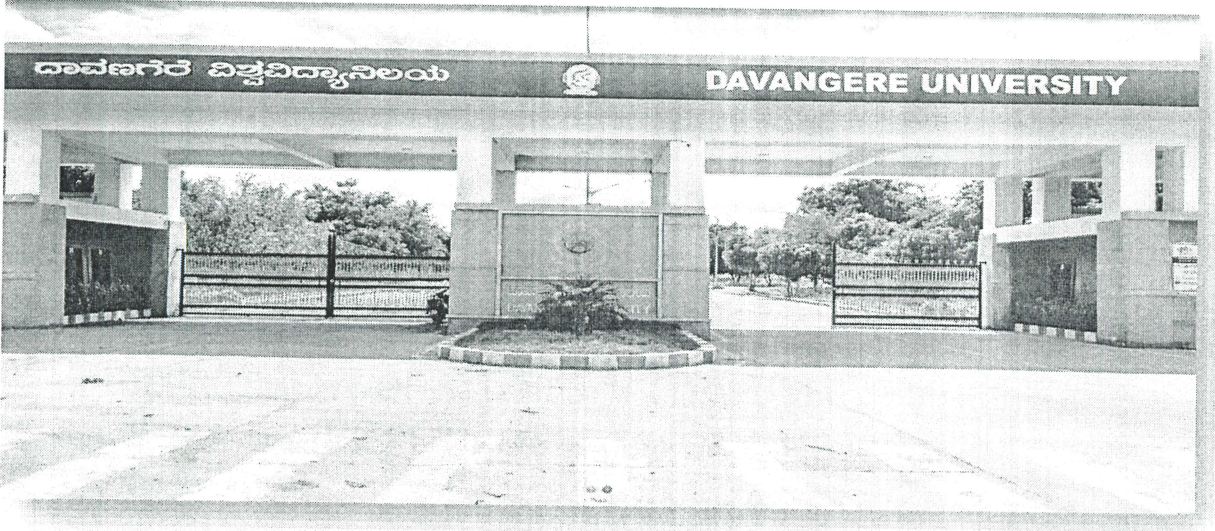


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DAVANGERE UNIVERSITY



DEPARTMENT OF STUDIES IN COMPUTER SCIENCE,
DAVANGERE UNIVERSITY, DAVANGERE




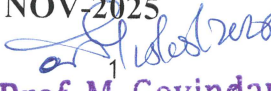
Syllabus for Bachelor of Science, BSc - Data Science

(I & II Semester)

[According to SEP (State Education Policy): 2024-25]

W.E.F 2026-27 and onwards


BGS Chairman
Dept. of Computer Science
Davangere University
Shivagangotri, Davangere

NOV-2025

Prof. M. Govindappa
Dean-Science & Technology
Davangere University
Shivagangotri, Davangere-577007


Registrar
Davangere University
Shivagangotri, Davangere



DAVANGERE UNIVERSITY

Bachelor of Science (BSc-Data Science) Semester Scheme Curriculum Structure for Undergraduate Programme for I-IV Semester

Sl. No.	Course/ Paper Code	Title of the paper	L:T:P	Teaching Hours/ Week	Semester End Exam	Internal Assessment	Total Marks	Credits	Examination Duration
Semester-1									
1.	DSC-1	C Programming and Data Structures	4:0:0	4	80	20	100	3	3 hrs
2.	DSC- Practical-1	Data Structures Lab	0:0:2	4	40	10	50	2	3 hrs
Semester-2									
1.	DSC-2	Python Programming	4:0:0	4	80	20	100	3	3 hrs
2.	DSC- Practical-2	Python Programming Lab	0:0:2	4	40	10	50	2	3 hrs
Semester-3									
1.	DSC-3	Data Base Management System	4:0:0	4	80	20	100	3	3 hrs
2.	DSC- Practical-3	DBMS Lab	0:0:2	4	40	10	50	2	3 hrs
3.	DSE- Elective-1	Foundations of Data Science	2:0:0	2	40	10	50	2	2 hrs
4.	DSE- Elective-2	Cyber security	2:0:0	2	40	10	50	2	2 hrs
Semester-4									
1.	DSC-4	Statistical computing and R Programming	4:0:0	4	80	20	100	3	3 hrs
2.	DSC- Practical-4	R Programming Lab	0:0:2	4	40	10	50	2	3 hrs
3.	DSE- Elective-3	Bioinformatics	2:0:0	2	40	10	50	2	2 hrs

Signature

BCS Chairman
Dept. of Computer Science
Davangere University
Shivagangotri, Davangere

Signature

Prof. M. Govindappa
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Shivagangotri, Davangere

Course Structure of 1st and 2nd Semester

Sl. No.	Course/ Paper Code	Title of the paper	L:T:P	Teaching Hours / Week	Semester End Exam	Internal Assessment	Total Marks	Credits	Examination Duration
Semester-1									
1.	DSC-1	C Programming and Data Structures	4:0:0	4	80	20	100	3	3 hrs
2.	DSC- Practical-1	Data Structures Lab	0:0:2	4	40	10	50	2	3 hrs
Semester-2									
1.	DSC-2	Programming in Python	4:0:0	4	80	20	100	3	3 hrs
2.	DSC- Practical-2	Programming in Python Lab	0:0:2	4	40	10	50	2	3 hrs


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Semester I B.Sc Data Science

Program Name	B.Sc.	Semester	I
Course Title	C Programming and Data Structures (Theory)		
Course Code:	DSC1	No. of Credits	03
Contact hours	56 Hours	Duration of Exam	3 hours
Formative Assessment Marks	20	Summative Assessment Marks	80

COURSE CONTENT		56 Hrs
Unit 1	<p>Computer Fundamentals: Introduction, Software – Definition, Types of Software, Relationship between Hardware & Software, Classification of programming languages, Algorithms and flow charts.</p> <p>C Programming: Introduction, structure of C program, Tokens, data types, Operators and types, precedence and associativity of operators.</p> <p>Branching and Looping statements: Types of if statements, for, while and do-while looping statements.</p> <p>Arrays and Strings: Introduction to Arrays, declaration and initialization of arrays, one and multi-dimensional arrays. String: Definition, declaration and string handling functions.</p> <p>Function: Definition, parts of the function, categories of functions. Recursion,</p> <p>Pointers and files: Introduction to pointers, declaration and accessing. Definition and file handling operations (read and write).</p>	16
Unit 2	<p>Introduction to Data Structures: Definition, Applications, Classification of data structures: primitive and non-primitive, Operations on data structures.</p> <p>Dynamic memory allocation: Static and dynamic memory allocation. Memory allocation functions: malloc(), calloc(),realloc() and free().</p> <p>Sorting and Searching: Introduction, Bubble sort, Merge sort, quick sort, Selection sort, Insertion sort, Linear Search, Binary search.</p>	14
Unit 3	<p>Stack: Definition, Implementation of stack (using arrays) and operations on stack, Applications of stacks: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix.</p> <p>Queue: Definition, Types of queue: Simple queue, circular queue, double ended queue, priority queue, Array Implementations of queue and operations on all types of queues.</p>	12
Unit 4	<p>Linked List: Definition, Representation of linked list, Advantages and disadvantages of linked list, Types of linked list: singly linked list, doubly linked list, Circular linked list.</p> <p>Tree: Definition, Tree terminologies, Binary tree, complete binary tree, and Binary search tree, Traversal of Binary tree: Preorder, In order and post order.</p>	14

Text Books:

1. Fundamentals of computers : E Balagurusamy
2. A M Padma Reddy: Data Structures using C

3. Yashavant P Kanetkar: Data Structures through C
4. Langsam, Augenstein and Tenenbaum, Data structures Using C and C++, Prentice Hall of India, 2nd Edition.
5. Kamthane :Introduction to Data structures in C Pearson Education.

References Books

1. Weiss Data structures and Algorithm Analysis in C II Edition , Pearson Education.
2. LipschutzSchaum's outline series Data structures Tata MgGraw-Hill.

Program Name	B.Sc.		Semester	I
Course Title	Data Structures Lab (Practical)		Practical Credits	02
Course Code	DSC 1-Lab		Contact Hours	04 Hours
Formative Assessment	10 Marks	Summative Assessment	40 Marks	
Practical Content				
PART-A				
<ol style="list-style-type: none"> 1. WAP to find the biggest of two numbers using if-else. 2. WAP to implement arithmetic operations using switch. 3. WAP to find the grade of a student using nested if-else. 4. WAP to print the sum of N natural numbers using for loop. 5. WAP to find whether the given number is palindrome or not using while loop. 6. WAP to find the sum of digits of a number using do-while. 7. WAP to sort elements in an array using Bubble sort. 8. WAP to search an element in a given list of integers using linear search. 9. WAP to find the factorial of a number using recursion. 10. WAP to swap two numbers using pointers. 				
PART-B				
<ol style="list-style-type: none"> 1. WAP to search an element in a given list of integers using binary search. 2. WAP to implement a linked list to insert and delete an element at begin of the list and display the list. 3. WAP to implement a stack operations (push, pop, display) using array. 4. WAP to implement a stack(push, pop, display) using linked list. 5. WAP to evaluate a postfix expression using stack. 6. WAP to implement a queue operations (Qinsert, Qdelete, Qdisplay) using array. 7. WAP to traverse a tree in preorder, postorder, and inorder. 8. WAP to sort elements in an array using Quick sort. 9. WAP to sort elements in an array using Selection sort. 10. WAP to sort elements in an array using Insertion sort. 				

Program Name	B.Sc.	Semester	II
Course Title	Programming in Python (Theory)		
Course Code:	DSC 2	No. of Credits	03
Contact hours	56 Hours	Duration of SEA/Exam	3 hours
Formative Assessment Marks	20	Summative Assessment Marks	80

COURSE CONTENT		56 Hrs
Unit 1	<p>Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program.</p> <p>Python Basics: Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples.</p> <p>Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit() functions.</p> <p>Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally.</p>	14
Unit 2	<p>Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Life time of Variables in Functions.</p> <p>Strings: Creating and Storing Strings; Accessing String Characters; the str() function;</p> <p>Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape Sequences; Raw and Unicode Strings; Python String Methods.</p> <p>Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists.</p> <p>Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.</p> <p>Tuples and Sets: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.</p>	14
Unit 3	<p>File Handling: File Types; Operations on Files—Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator.</p> <p>Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism- Definition, Operator Overloading.</p>	14

Unit 4	<p>GU Interface: The Tkinter Module; Window and Widgets; Layout Management-pack, grid and place.</p> <p>Data Analysis: NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and Data Frames, Creating Data Frames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on Data Frames.</p> <p>Data Visualisation: Introduction to Data Visualisation; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart.</p>	14
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Text Books:

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016
2. Mark Lutz, Programming Python, O'Reilly, 4th Edition, 2010
3. **Think Python How to Think Like a Computer Scientist**, Allen Downey et al., 2nd Edition, 2015, Green Tea Press. Freely available online @ <https://www.greenteapress.com/thinkpython/thinkCSpy.pdf>
4. **Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language**, Fabio Nelli, 2015, Apress®

References Books

1. **Introduction to Python Programming**, Gowri Shankar Set al.,2019,CRC Press
2. **Advance Core Python Programming**, Meenu Kohli,2021,BPB Publications
3. **Core PYTHON Applications Programming**, WesleyJ. Chun,3rd Edition,2012,Prentice Hall

Program Name	B.Sc.	Semester	II
Course Title	R Programming Lab		
Course Code:	DSC 2 Lab	No. of Credits	02
Contact hours	04 Hours per week	Duration of SEA/Exam	3 hours
Formative Assessment Marks	10	Summative Assessment Marks	40

Practical Content

PART A

1. Write a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
2. Develop a program to find biggest of three numbers(using nested if).
3. Write a program to check whether the given number is palindrome or not(using while).
4. Write a program using user defined exception class that will ask the user to enter a number until he guesses a stored number correctly. To help them figure it out, a hint is provided whether their guess is greater than or less than the stored number using user defined exceptions.
5. Write a program to find GCD of two numbers using functions.
6. Write a program to generate Fibonacci sequence of length (N). Read N from the console.
7. Write a program to generate Factorial sequence of length (N). Read N from the console.
8. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
9. Write a Python program to demonstrate string operations. Your program should:
 - Create a string
 - Display the length of the string
 - Convert the string into uppercase and lowercase
 - Count occurrences of a particular character
 - Find the position of a substring inside the main string
 - Use string slicing to print the first 5 and last 5 characters
 - Replace a word in the string with another word
10. Write a program to create a text file and compute the number of characters, words and lines in a file.

PART B

1. Program to create a class Employee with empno, name, depname, designation, age and salary and perform the following function.
 - a. Accept details of N employees
 - b. Search given employee using empno
 - c. Display employee details in neat format.
2. Write a program to implement multiple inheritance .
3. Write a program to create a stack using list and perform the following operations
 - Inserting an element
 - Removing an element
 - Appending an element
 - Displaying the length of the list

- Popping an element
 - Clearing the list
4. Write a Python program to implement a Queue using a list. Your program should include the following operations:
 - Enqueue – To insert an element into the queue
 - Dequeue – To delete an element from the queue
 - Display – To show all elements present in the queue
 5. Write a function that takes a sentence as input from the user and calculates the frequency of each letter. Use a variable of dictionary type to maintain the count.
 6. Consider a tuple t1= (1,2,5,7,9,2,4,6,8,10). Write a program to perform following operations:
 - Print half the values of tuple in one line and the other half in the next line.
 - Print another tuple whose values are even numbers in the given tuple.
 - Concatenate a tuple t2= (11,13,15) with t1.
 - Return maximum and minimum value from this tuple.
 7. Write a Python program to demonstrate set operations. Your program should:
 - Create two sets with at least 5 elements each
 - Perform and display:
 - Union
 - Intersection
 - Difference
 - Symmetric Difference
 - Add an element to one set
 - Remove an element from the set
 - Display all results clearly.
 8. Create a GUI to input Principal amount, rate of interest and number of years, Calculate Compound interest. When button submit is pressed Compound interest should be displayed in a textbox. When clear button is pressed all contents should be cleared.
 9. Write a Python program using NumPy to perform the following operations:
 - I. Create two 1-D NumPy arrays of size 4
 - II. Perform element-wise addition and multiplication
 - III. Find the mean, maximum, and minimum value of the arrays
 10. Write a Python program using Matplotlib to visualize data. Your program should:
 - Create two lists — one for months, one for sales
 - Draw the following charts:
 - Line Chart
 - Bar Chart
 - Pie Chart
 - Add title, labels, and proper formatting
 - Display all charts clearly

Practical Examination:

- One Question has to be given from part A (Carries 15 Marks[write and execute]).
- One Question has to be given from part B (Carries 15 Marks[write and execute]).
- Viva carries 10 Marks.

Practical Proper Examination I-VI semesters**Duration: 3 Hrs**

• Experimentation (Major & Minor/Spotters) -	30 Marks#
• Viva Voice -	10 Marks
Total	40 Marks

- #One Question has to be given from part A (Carries 15 Marks).
- #One Question has to be given from part B (Carries 15 Marks).
- #Write and execute both of the programs.

Internal Assessment for Practical Paper I-VI semesters

• Attendance -	05 Marks
• Test + Record -	05 Marks
Total	10 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment**Major Courses**

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (5+5 = 10)	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	05
03	Attendance with proper record	05
TOTAL MARKS		20

- **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%	-	03 Marks
90-95%	-	04 Marks
>95%	-	05 Marks

Continuous Assessment Programme/Internal Assessment/Formative Assessment
Elective/Optional Papers

Sl. No.	Continuous Assessment Programme/Internal Assessment	Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment (2+2 = 4)	04
02	Assessment of Skill Development activities/Seminars/Group Discussion/Assignment etc., with proper record	03
03	Attendance with proper record	03
TOTAL MARKS		10

- **Attendance Marks-breakup**

<75%	-	00 Marks
75-80%	-	01 Mark
85-90%	-	02 Marks
90-100%	-	03 Marks

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR SUBJECTS

(Semesters I–VI)

B.Sc. Data Science Semester-I Degree Examination;2026-27

(Semester Scheme; New Syllabus: 2026-27)

SUBJECT: SCIENCE COURSES

Paper – _____ : _____

Paper Code: _____

Time: 3 Hours

Max. Marks: 80

Instructions to candidates:

- 1) All sections are compulsory
- 2) Draw neat and labeled diagrams wherever necessary.

SECTION-A

1. Answer all the following questions:

(2×10=20)

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

SECTION-B

Answer any SIX of the following:

(5×6=30)

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

SECTION -C

Answer Any Three of the following:

(10×3=30)

10. From Unit-I/Unit-I
11. From Unit-II/Unit-II
12. From Unit-III/Unit-III
13. From Unit-IV/Unit-IV

**THEORY EXAMINATION QUESTION PAPER PATTERN FOR
ELECTIVE/OPTIONAL PAPERS**

(Semesters III & IV)

B.Sc. Data Science

(Semester Scheme; New Syllabus: 2026-27)

SUBJECT: SCIENCE COURSES

Paper –ELECTIVE/OPTIONAL III&IV _____ : _____

Paper Code: _____

Time: 2 Hours

Max. Marks: 40

Instructions to candidates:

- 1) All sections are compulsory
- 2) Draw neat and labeled diagrams wherever necessary.

SECTION-A

Answer **all** the following questions:

(2×5=10)

- 1.
- 2.
- 3.
- 4.
- 5.


SECTION-B

Answer any **SIX** of the following:

(5×6=30)

- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.


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