



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Computer Application

Choice Based Credit System (CBCS) in the light of NEP-2020

B. Sc. Data Science

Batch (2026-29)

SEMESTER-I

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BCCA105	Major-1	Programming Methodology and C	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

1. To familiarize the students with programming and to encourage them to develop their logic.
2. To make students well versed with C language to solve problems efficiently.
3. Using simple and well drawn illustrations develop their programming skills using modular programming.
4. To cover the various data structures and their applications.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- CO1** Develop algorithms for problems.
- CO2** Apply the programming concepts to solve the given problems.
- CO3** Write the programs using modular programming.
- CO4** Understand and write programs using various data structures very efficiently.
- CO5** Write the programs using pointers and to manage memory and file handling.

TEACHING PEDAGOGY:

T1

Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching

T2

ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

ATL1

Quiz

ATL2

Activity Based Learning

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ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	An overview: Problem identification, analysis, design, coding, testing & debugging, implementation, modification & maintenance; algorithms & flowcharts; Characteristics of a good program - accuracy, simplicity, robustness, portability, minimum resource & time requirement, modularization; Rules/ conventions of coding, documentation, naming variables; Top down design; Bottom-up design.	12	ATL3 ATL5 ATL6
II	Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case switch statement; Arrays; Formatted & unformatted I/O; Type modifiers & storage classes; Ternary operator; Type conversion & type casting; Priority & associativity of operators.	12	ATL3 ATL6

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III	Modular Programming: Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable, static variable; Calling a function; Recursion – basics, types of recursion- direct, indirect.	12	ATL3 ATL6
IV	Advanced Programming Techniques: Special constructs – Break, continue, exit (), goto & labels; Pointers - & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free(); String; Pointer v/s array; Structure – basic, declaration, membership operator.	12	ATL3 ATL6
V	Miscellaneous Features: printf & scanf family; C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef	12	ATL6
Total Hours		60	

ADDITIONAL RESOURCES

- https://www.reddit.com/r/C_Programming/comments/1oqwkp3/best_c_programming_book_with_free
- <https://github.com/iczelia/C-Learning-Resources>

SUGGESTED READINGS:

Textbooks

1. KanitkarYashwant, 'Let us C', BPB New Delhi
2. Balaguruswami, 'Ansi C', TMH, Delhi
3. Kerninghan& Ritchie "The C programming language", PHI
4. Schildt, "C:The Complete reference" 4th ed TMH.

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5. Cooper Mullish, “The Spirit of C”, Jaico Publishing House, Delhi

Suggested e- resources (Websites/e- books)

- <https://github.com/iczelia/C-Learning-Resources>
- <https://www.codecademy.com/catalog/language/c>

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	1	-	-	-	-	-	-	1	-			
CO2	3	3	3	2	-	-	-	-	-	-	1	-			
CO3	2	3	2	3	-	-	-	1	-	-	1	-			
CO4	3	2	3	2	-	-	-	-	-	-	1	-			
CO5	3	3	2	3	1	-	-	-	-	-	1	-			

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BCCA106	Practical (Major-1)	Programming Lab using C	Max	0	0	0	30	20	0	0	4	2
			Min	0	0		13.5	9				

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- CO5** Write the programs using pointers and to manage memory and file handling.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Define an algorithm and flowchart. Draw algorithm and flow chart for a program that converts an input Fahrenheit degree into Celsius equivalent.	CO1

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2.	Write an algorithm and a C program to find the greatest among three numbers.	CO1
3.	WAP to print an input string in lower case, upper case and mixed case using library function. WAP to read in a three digit number produce following output (assuming that the input is 679) 6 hundreds 7 tens 9 units	CO1
4.	WAP a C program to reverse an input number.	CO2
5.	Draw a flow chart to find prime number from 1 to 100.	CO2
6.	Draw a flow chart to find prime number from 1 to 100.	CO2
7.	Draw a flow chart to find prime number from 1 to 100.	CO2
8.	WAP to find factorial of accepted number.	CO2
9.	WAP to calculate factorial of a number using recursion.	CO3
10.	WAP in C to generate Fibonacci series.	CO3
11.	WAP in C to generate Pascal triangle.	CO3
12.	WAP in C to swap values of two variables.	CO3
13.	WAP in C to search a given element in an array using linear search.	CO4
14.	WAP to sort an integer array in ascending and descending order according to user's choice.	CO4

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BCCA106	Practical (Major-1)	Programming Lab using C	Max	0	0	0	30	20	0	0	4	2
			Min	0	0		13.5	9				

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15.	Write a menu driven program to perform matrix addition, subtraction and multiplication.	CO4
16.	WAP a C program to reverse a string by recursion.	CO4
17.	WAP to read and write a structure.	CO4

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	1	-	-	-	-	-	-	1	-		
CO2	3	3	3	2	-	-	-	-	-	-	1	-		

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CO3	2	3	2	3	-	-	-	1	-	-	1	-		
CO4	3	2	3	2	-	-	-	-	-	-	1	-		
CO5	3	3	2	3	1	-	-	-	-	-	1	-		

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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCMTN102	Minor -1	Differential Calculus	Max	60	20	20	0	0	4	0	0	4
			Min	24	16		0	0				

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; *Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES:

The student will have ability to:

1. Understand the concepts of derivatives and applications.
2. Learn series expansions and curve analysis.
3. Apply partial differentiation techniques.
4. Solve optimization problems involving multiple variables.

COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)**.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

- | | |
|------------|---|
| CO1 | Understand the significance of derivatives and their applications. |
| CO2 | Construct Taylor's and Maclaurin's series expansions. |
| CO3 | Apply partial differentiation and curve tracing techniques. |
| CO4 | Solve optimization problems involving functions of several variables. |

TEACHING PEDAGOGY:

- | | |
|-----------|---|
| T1 | Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching |
| T2 | ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination |

ASSESSMENT TOOLS:

- | | |
|-------------|----------------------------|
| ATL1 | Quiz |
| ATL2 | Activity Based Learning |
| ATL3 | Midterm Exams |
| ATL4 | Seminar Presentation |
| ATL5 | Poster |
| ATL6 | Assignments |
| ATL7 | Oral Viva-voce examination |

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PREREQUISITES:			
Knowledge of Higher Secondary Mathematics			
SYLLABUS:			
Module	Descriptors/Topics	Hours	Assessment Tools
I	Derivative and its geometrical and physical interpretation, Sign of derivatives and monotonic increasing and decreasing functions, Rolle's and Mean value theorems and simple applications.	10	ATL1 ATL3 ATL6
II	Successive differentiation, Leibnitz theorem, Maclaurin's and Taylor's series expansion, Asymptotes.	10	ATL1 ATL3 ATL6
III	Curvature, test for concavity and convexity, points of inflection, multiple points, tracing of curves in cartesian and polar coordinates.	10	ATL1 ATL3 ATL6
IV	Indeterminant form, L'Hospital's rule, Tangents and Normal, Partial differentiation, Euler's theorem, total derivatives.	10	ATL1 ATL3 ATL6
V	Functions of two and three variables, Maxima and minima of functions of two variables - Lagrange's Method of undetermined multiplier - Problems only. Implicit function in case of function of two variables (existence assumed) and derivative.	10	ATL1 ATL3 ATL6 ATL7
Total Hours		50	
ADDITIONAL RESOURCES			
A.	Value addition to course content/ Skill enhancement content:		
	https://www.youtube.com/@satishshukla2553330		
B.	Remedial classes for slow learners:		
	As per the AUMP SOP for slow and fast learners.		

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SUGGESTED READINGS:

Textbooks

1. Gorakh Prasad, *Differential Calculus*, Pothishala Pvt. Ltd., Allahabad.
2. Shanti Narayan, *Differential Calculus*, S. Chand Publications.

Reference Books

1. Walter Rudin, *Principles of Mathematical Analysis*, McGraw-Hill Publications.
2. J. Edwards, *An Elementary Treatise on Differential Calculus*, Radha Publishing House.
3. David V. Widder, *Advanced Calculus*, Prentice Hall.
4. Courant and John, *Differential and Integral Calculus*, Wiley Eastern Ltd.
5. N. Piskunov, *Differential and Integral Calculus*, CBS Publishers & Distributors.
6. T. M. Apostol, *Mathematical Analysis*, Addison Wesley Publishing Company.
7. T. M. Apostol, *Calculus, Vol. I & II*, Wiley.

Suggested e- resources (Websites/e- books)

1. <https://www.youtube.com/@satishshukla2553330>
2. <https://youtube.com/@priyae-mathematics1030?si=pZJZYTytr-l5pV7q>

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	-	2	2	-	-	-	-	-	-	-	2	-	-
CO2	3	1	-	2	2	-	-	1	-	-	-	-	2	1	-
CO3	3	2	1	3	3	-	-	1	-	-	-	-	2	1	-
CO4	3	2	1	3	3	1	-	1	-	-	-	-	3	2	1

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