

## NIRMA UNIVERSITY

<b>Institute:</b>	Institute of International Study
<b>Name of Programme:</b>	Bachelor of Science (Computer Science and Engineering) [2+2 Dual Degree]
<b>Faculty:</b>	Faculty of Technology & Engineering
<b>Course Code:</b>	<del>1XXXX</del> 1C3504
<b>Course Title:</b>	Computer Programming II
<b>Course Type:</b>	Core
<b>Year of Introduction:</b>	2022-23

L	T	Practical Component				C
		LPW	PW	W	S	
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### Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. explain the functional hierarchical code organization
2. experiment with complex datatypes
3. develop defensive programming skills to handle possible errors during program execution
4. apply the programming skills to solve real-life problems

### Syllabus:

**Total Teaching hours: 30**

Unit	Syllabus	Teaching hours
Unit I	<b>User-Defined Functions in C:</b> Need, Multi-Function Programmes, Elements of User-Defined Functions, Definition of Functions, Return Values and Their Types, Function Calls, Function Declaration, Category of Functions, Arguments and Return Values, Nesting of Functions, Recursion, Passing Arrays and Strings to Functions, The Scope, Visibility and Lifetime of Variables, Multiple Programs	06
Unit II	<b>Structures and Unions in C:</b> Defining a Structure, Declaring and Accessing Structure Variables, Copying and Comparing Structure Variables, Operations on Individual Members, Arrays of Structures, Arrays and Structures within Structures, Structures and Functions, Unions, Size of Structures, Bit Fields <b>Pointers in C:</b> Introduction, Accessing the Address of a Variable, Declaring and Initialization Pointer Variables, Accessing a Variable Through its Pointer, Chain of Pointers, Pointer Expressions, Pointer Increments and Scale Factor, Pointers and Arrays, Pointers and Character Strings, Array of Pointers, Pointers as Function Arguments, Functions Returning Pointers, Pointers and Structures	08
Unit III	<b>File Management in C:</b> Defining, Opening and Closing a File, Input/Output Operations on Files, Error Handling During I/O Operations, Random Access to Files, Command Line Arguments <b>Dynamic Memory Allocation and Linked Lists in C:</b> Dynamic Memory Allocation, <i>malloc</i> , <i>calloc</i> , <i>free</i> and <i>realloc</i> , Introduction to Linked Lists, Advantages of Linked Lists, Types of Linked Lists, Creating a Linked List, Inserting and Deleting an Item	09

Unit IV	<b>The C Preprocessor:</b> Introduction, Macro Substitution, File Inclusion, Compiler Control Directives, ANSI Additions <b>C Program Development Guidelines:</b> Introduction, Program Design and Coding, Common Programming Errors, Program Testing and Debugging, Program Efficiency	04
Unit V	Bit-Level Programming in C, C99/C11 Features, Graphic Programming in C	03

**Self-Study:** The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

**Suggested Readings/References:**

1. E Balagurusamy, 'Programming in ANSI C', McGraw Hill
2. Deitel and Deitel, 'C How to program', Pearson
3. Yashwant Kanitkar, 'Let Us C', BPB Publications
4. V Rajaraman, 'Fundamentals of Computers', Prentice Hall of India
5. Joyce Farrell, 'Programming Logic and Design Comprehensive', Cenage Learning
6. David Gries, 'The Science of Programming', Springer, New York, Hedelberg, Berlin
7. Dromey R.G., 'How to solve it by computers', Prentice Hall of India
8. Jean-Paul Tremblay, Richard B. Bunt, 'Introduction to Computer Science', McGraw-Hill
9. Kernighan., Ritchie, 'ANSI C Language', Prentice Hall of India
10. Sedgewick R., 'Algorithms in C', Addison Wesley
11. Schaum Ourline Series, 'Programming in C', McGraw-Hill
12. E Balagurusamy, 'Pointers in C', McGraw-Hill

Suggested List of Experiments:	Sr. No.	Title	Hours
	1-2	<b>C programs to understand user defined function and parameter passing</b>	06
		a. Find union and intersection of two input integer arrays using user defined function. The function should return the resultant array to the main function.	
		b. Consider a currency system in which there are notes of seven denominations, namely Rs. 1, Rs. 2, Rs. 5, Rs. 10, Rs. 20, Rs. 50 and Rs. 100. A sum of Rs. N is entered as an input. Write a function to compute the smallest number of notes that will combine to give Rs. N.	
		c. Write a program to compute F(n) such that $F(n) = 0$ , if $n = 0$ , $F(n) = 1$ , if $n = 1$ , otherwise $F(n) = F(n - 1) + F(n - 2)$ .	
		d. Aman has 10 balls that have different numbers on it and Shoaib has 6 balls. They both arrange balls in all different possible ways. What is the ratio of number of arrangements made by Aman to that made by Shoaib? Use recursive function to calculate.	
		e. Perform Q 7c using user defined function iteratively.	
	3-4	<b>Understanding C programs based on structures</b>	04

*cdh*  
9.3

**using virtual lab**

(<https://cse02-iiith.vlabs.ac.in/List%20of%20experiments.html>)

[iiith.vlabs.ac.in/List%20of%20experiments.html](https://cse02-iiith.vlabs.ac.in/List%20of%20experiments.html))

- a. Create a structure which holds various attributes (e.g., name, id, basic\_salary, DA%, HRA%, total\_salary etc.) of an employee. Write a program which allows you to scan these (except total\_salary) attributes for 3 employees. The program should support the following operations:
  - i. Display (total salary of the selected employee)
  - ii. Max (find and display the name of the employee with maximum salary)
- b. Write a structure to accept item information such as name, quantity and unit price. Structure should take information about 5 items. Create a user-defined function that calculates the cost of each item. Print details of each item such as:

Name	Quantity	Price	Cost
Notebook	5	50.0	250.0
Pen Drive	2	500.0	1000.0
Pen	20	5.0	100.0

- c. Write a structure for a complex number which has a real part and an imaginary part. Add the 2 complex numbers, store it in another complex number using user defined function and display the result as a complex number.

5-6

**C programs to demonstrate use of pointers**

06

- a. Write a UDF using concept of pointers which can accept a one-dimensional array as an argument. The function should add 1 to all odd element of the array and 2 to all even elements of the array. The final array should be displayed by the main () function. Repeat this program for two-dimensional array.
- b. Write a function that swaps values of three numbers in a cyclic order and prints the output from main function.  
Example: a = 1, b = 2, c = 3 → Output: a = 3, b = 1, c = 2
- c. Write a program to print array elements in reverse using pointer.
- d. Write a UDF which accepts three strings as arguments. The function should concatenate first two strings and keep the result in the third string which should be displayed by the main () function.

7

**C Programs for file processing**

04

Write C Programs:

- a. To calculate the length of a file

28

Handwritten signature and number 9-3

- b. To concatenate two files
- c. To copy the content of one file in to another file

8

**C Programs for Dynamic Memory Allocation**

04

- a. Write an iterative program to create linear linked lists of customer names and their telephone numbers. The program should be menu driven and include features for adding a new customer and editing/deleting/searching an existing customer.
- b. Write a program to create a circular linked list so that the input order of data item is maintained. Add functions to carry out following operations on circular linked list.
  - i. Count the number of nodes
  - ii. Write out contents
  - iii. Locate and write contents of a given node
- c. Write a function to implement the following tasks for a doubly linked list.
  - i. To insert a node
  - ii. To delete a node
  - iii. To find a specified node

9-10

Create a project which makes use of all the concepts covered in the course. 06

*cdh*  

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*9.3*