NIRMA UNIVERSITY

Institute:	Institute of International Study
Name of Programme:	Bachelor of Science (Computer Science and Engineering)
Faculty:	Faculty of Technology & Engineering
Course Code:	1CS502
Course Title:	Computer Programming I
Course Type:	Core
Year of Introduction:	2022-23

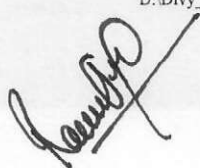| L	T	Practical Component				C
		LPW	PW	W	S	
2	-	2	-	-	-	3

Course Learning Outcomes (CLOs):

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

1. demonstrate the significance and application of C language constructs in program development (BL2)
2. apply the programming skill to solve real-life problems through software or hardware/software co-design (BL3)
3. build task-specific, user-oriented, time-constrained program (BL3)
4. analyze logically the problem and select the optimized method to solve the problem (BL4)

Syllabus: **Total Teaching hours: 30**

Unit	Syllabus	Teaching hours
Unit I	**Introduction to Computers:** Introduction to Computers and the Internet in Industry and Research, Web Resources, Hardware and Software, Computer Organization, Programming Languages	03
Unit II	**Introduction to Programming:** Understanding logic using Flowchart, Algorithms, Pseudocode, Test-cases, Overview of C	05
Unit III	**Constants, Variables and Data Types in C:** Character Set, C Tokens, Keywords and Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to Variables, Defining Constants **Operators and Expressions in C:** Arithmetic, Relational, Logical, Assignment, Increment, Decrement, Conditional, Bitwise and Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Type Conversion in Expressions, Operator Precedence and Associativity	06
Unit IV	**Managing Input and Output Operations in C:** Reading/Writing a character, Formatting Input/Output **Decision Making and Branching in C:** Decision Making with *if* and its Variant Statements, The Switch Statement, The *?:* operator, The *goto* Statement **Decision Making and Looping in C:** The *while*, *do*, and *for* Statements, Jumps in Loops	10

Unit V	**Arrays in C:** One-dimensional Arrays and their Declaration and Initialization, Two-dimensional Arrays and their Initialization, Multi-dimensional Arrays, Dynamic Arrays	06

Character Arrays and Strings in C: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operators on Characters, Putting Strings Together, Comparison of Strings, String-handling Functions, Table of Strings, Features of Strings

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	**Introduction to CodeBlocks IDE, Writing and compiling a simple C program**	04
		a. Introduction to CodeBlocks IDE. Use CodeBlocks to write and compile a simple C program ("Hello World").	
		b. Write C programs:	
		i. To scan and print values of different types of variables	
		ii. To print address of a variable	
		iii. To demonstrate different escape sequences	
	2-3	**C programs to demonstrate various operators**	06
		Write C programs for the following:	
		a. To scan two numbers and display result of different arithmetic operations (+, -, *, / and %)	
		b. A company has following scheme for payment to their staff.	
		• Net salary = Gross salary – Deduction	
		• Gross salary = Basic + DA + HRA + Medical	

11

- Deduction = Insurance + PF
- DA (Dearness allowance) = 50% of Basic
- HRA (House rent allowance) = 10% of Basic
- Medical = 4% of Basic
- PF (Provident Fund) = 5% of Gross
- Insurance = 7% of Gross
  Calculate the net payment to any employee.

c. The driver is driving a car from city Ahmedabad to city Mumbai, in Ahmedabad temperature displays in Celsius while in Mumbai the temperature displayed in Fahrenheit, a driver wants to find the difference between the temperatures of two cities in Celsius.

d. To calculate simple interest.

e. A boy was punished and asked to cover 5 rounds of the circular ground. Area of the ground is 32000 sq mtr. Calculate how many kilometers the boy has covered.

f. Read the price of item in decimal form. For example, 12.52 and separate rupee and paise from the given value. For example, 12 rupees and 52 paise.

g. To swap the value of two numbers (i) using and (ii) without using a temporary variable.

h. To find greatest of two and three numbers using the ternary operator.

4-5   **C programs to demonstrate use of conditional statements**   06

Write C programs for the following:

a. Write a program to take the values for A, B, C of a quadratic equation $A*X2+B*X+C=0$ and then find all the roots of the equation. It is guaranteed that $A \neq 0$ and that the equation has at least one real root.

b. Write a C program to make a simple calculator using the following:

   i.   if...else if
   ii.   switch-case

c. In an organization, employees are paid on hourly basis. Clerks are paid 100/hr, Teachers are paid 200/hr and Principal is paid 400/hr. If the weekly hours exceed 44, then employee should be paid 2 times their regular pay for the overtime. Write a C program to compute the weekly salary of the employee and also the program should take care that the

12

employee should not be paid for hours beyond 50 in a week. Use best suitable control construct to implement the program.

d. Ajay and Amit are playing a game with a number X. In one turn, they can multiply X by 2. The goal of the game is to make X divisible by 10. Write a C program to find the number of turns necessary to win the game (it may be possible to win in zero turn, 1 turn or it might be impossible (-1 turns)).

e. Write a program to implement a simple number guessing game. Program should generate an integer randomly and ask the user to guess the integer. Based on the number guessed, it should display the appropriate message (correct or incorrect).

f. Write a C program to find the grade of a student based on the following policy.
Class test: 12% weightage, Tutorial-12%, SE:16%, LPW:20%, SEE:40%.
Grade is decided based on the below range of total marks.

Grade	Range of total marks
A+	91-100
A	81-90
B+	71-80
B	61-70
C+	51-60
C	>40
Fail	<40

6-7 **C programs to demonstrate use of loop constructs** 04
Write C Programs:

a. To display following patterns:

A	1	1
A B	0 1	1 2 1
A B C	1 0 1	1 2 3 2 1
A B C D	0 1 0 1	1 2 3 4 3 2 1
1	*	1
A B	* * *	1 2
2 3 4	* * * * *	1 2 3
C D E F	* * * * * *	1 2 3 4

b. To check whether the input number is an Armstrong number
c. To check whether the entered number is Prime
d. To check whether the entered number is Palindrome

e. Enhance the number guessing game developed earlier. The program should now display more appropriate message (Greater, Smaller or Correct). It should allow maximum 5 attempts from the user and still if the user cannot guess the number correctly, it should display "Sorry".

8-9 | **C programs based on arrays** | 06

a. Write a program
  i. To read data from keyboard and store into 1-D array
  ii. To read data from array and copy its square back to another array
  iii. To reverse all elements of original array
  iv. To find out maximum element of an original array and print its location
b. Write a program to delete an element from 1-D array.
c. Write a program that fills a 5 x 5 matrix with the following data:
  i. Upper left triangle with -1
  ii. Lower right triangle with 1
  iii. Right to left diagonal with 0
  Display the matrix on the screen.
d. Suppose that a class has 5 students. Each student study four subjects; CP, CS, Math, and Physics. Make a 2D array for the same. Write a C program
  i. To find total marks in all subjects obtained by each student.
  ii. To find average marks obtained by all 5 students in C programming subject.

10 | **C programs to explore String manipulation** | 04

Write C programs:
a. Write a program to delete a character entered by the user from the input string. All occurrences of the input character should be deleted from the string.
b. Write a program to swap even positioned characters with odd positioned characters in a given string.
c. Read a name from keyboard and find out how many times same character (case insensitive) is repeating.
  Example:

  Input: Anand

  Output: a is repeating two times, n is repeating two times

14

Input: Kunal

Output: None of the character are repeating.

d. Write a program to sort the strings entered by user as per dictionary order.