SUMMER SCHOOL PROGRAMS- 2025

C PROGRAMMING FUNDAMENTALS

Department of Computer Science & Engineering

Siddhartha Academy of Higher Education (SAHE)

Course Category:	Summer School Program	**Duration:**	4 Weeks
Course Type:	Theory & Practical	**Lecture - Practice:**	1Hrs-2Hrs
Pre-requisites:	Basics Mathematics	**Certification:**	Cisco NetAcad C Programming Certificate

Course Description

This C programming summer course provides students with a strong foundation in programming concepts, covering data types, control structures, loops, functions, arrays, and strings. Through practical exercises, students develop logical thinking and problem-solving skills essential for engineering studies. C is the backbone of programming, making it easier to grasp advanced languages like C++, Java, and Python. Understanding C also prepares students for key engineering subjects such as data structures, algorithms, operating systems, and embedded systems. By mastering C early, students gain confidence in programming, which is crucial for success in engineering disciplines like computer science and electronics.

Course Objectives

- **Week 1:** Understand the fundamentals of C programming, including its structure, data types, and basic syntax, to write and execute simple programs.
- **Week 2:** Develop problem-solving skills using variables, operators, and decision control statements to create interactive C programs.
- **Week 3:** Implement loops and functions, including recursion, to write efficient and modular C programs.
- **Week 4:** Apply arrays and string manipulation techniques to handle and process data effectively in C programs.

Course Outcomes

- **Week 1:** Students will be able to write, compile, and execute basic C programs while understanding the fundamental concepts of programming and C language syntax.
- **Week 2:** Students will be able to use variables, operators, and decision control statements to create interactive and logical C programs.
- **Week 3:** Students will be able to implement loops and functions, including recursion, to develop efficient and modular C programs.
- **Week 4:** Students will be able to manipulate arrays and strings effectively to perform data processing and problem-solving tasks in C.

Course Content: Week-I: Introduction to Programming and C Basics

Course Content:

- Introduction to Programming and C Basics
- Introduction: Programming Languages and their Generations, Software and Hardware, Computer Languages
- Basics of Operating Systems: High-level and Low-Level Languages
- C Program Basics: Structure of a C Program, Installation of C Compiler
- First C Program: Writing, Compiling, and Executing C Programs
- Comments, Keywords, Identifiers, Data Types

Programming Questions:

1. Write a C program to print "Hello, World!"
2. Write a C program to display your name, age, and school.
3. Explain the structure of a C program with an example.
4. Write a program to demonstrate the use of comments.
5. Identify and list all keywords used in C programming.
6. Write a program to declare different data types and print their sizes.
7. Write a program to take input of two integers and print their sum.
8. Write a program to swap two numbers using a third variable.
9. Write a program to swap two numbers without using a third variable.
10. Explain the difference between high-level and low-level languages.
11. Install and set up a C compiler on your system and compile a sample program.
12. Write a program to check whether a number is even or odd.

Course Content: Week-II: Data Types, Variables, and Decision Making

Course Content:

- Data Types: Basic Data Types, Variables, Constants
- Input/Output: Using printf() and scanf() functions
- Operators: Arithmetic, Relational, Logical, Bitwise, Assignment, Increment-Decrement
- Type Conversion and Typecasting
- Decision Control Statements: if, if-else, else-if ladder, Conditional Branching

Programming Questions:

1. Write a program to declare and print variables of different data types.
2. Write a program to demonstrate the use of const in C.
3. Write a program to take user input of two numbers and perform all arithmetic operations.
4. Write a program to check if a number is positive, negative, or zero using if-else.
5. Write a program to find the largest of three numbers using nested if.
6. Write a program to check if a number is divisible by both 3 and 5.
7. Write a program to convert temperature from Celsius to Fahrenheit and vice versa.
8. Write a program to check whether a character is a vowel or a consonant.
9. Write a program to demonstrate the use of type conversion.
10. Write a program to calculate the sum of the first N natural numbers.
11. Write a program to check whether a year is a leap year or not.
12. Write a program to implement a simple calculator using switch-case.

Course Content: Unit-III: Loops and Functions

Course Content:

- Loops: while, for, do-while, Nested Loops
- Control Statements: Break, Continue, Goto
- Functions: Function Declaration, Definition, Function Call, Return Statement
- Recursion: Understanding Recursive Functions

Programming Questions:

1. Write a program to print numbers from 1 to 10 using a while loop.
2. Write a program to calculate the factorial of a number using a for loop.
3. Write a program to generate the Fibonacci series up to N terms using a loop.
4. Write a program to check if a number is prime.
5. Write a program to print a multiplication table for a given number.
6. Write a program to print a pattern using nested loops.
7. Write a program to calculate the sum of digits of a number using a while loop.
8. Write a program to find the GCD of two numbers using loops.
9. Write a function to check whether a number is even or odd.
10. Write a function to calculate the power of a number using recursion.
11. Write a recursive function to find the sum of natural numbers up to N.
12. Write a program that demonstrates the use of the break and continue statements.

Course Content: Week-IV

Course Content:

- **Arrays:** Declaration, Accessing Elements, Storing Values
- **Array Operations:** One-Dimensional, Two-Dimensional, and Multidimensional Arrays
- **Strings:** Introduction, String Operations, String Functions

Programming Questions:

1. Write a program to store and print 5 integer values in an array.
2. Write a program to find the largest and smallest number in an array.
3. Write a program to calculate the sum of array elements.
4. Write a program to reverse an array.
5. Write a program to take a 3x3 matrix as input and print its transpose.
6. Write a program to concatenate two strings without using the built-in function.
7. Write a program to count the number of vowels in a given string.
8. Write a program to check if a string is a palindrome.
9. Write a program to sort an array in ascending order.
10. Write a program to replace all occurrences of a character in a string.
11. Write a program to find the length of a string without using strlen().
12. Write a program to find the frequency of a character in a given string.

Certification:

All summer school students will receive the **Cisco NetAcad C Programming Certificate** upon course completion. This certification validates their C programming skills, enhancing their academic and career prospects in software development, networking, and embedded systems, while providing a strong foundation for advanced engineering studies.