

NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	BTech CSE, Integrated BTech (CSE)-MBA, BTech AI&ML
Course Code:	2CS502CC25
Course Title:	Object Oriented Programming
Course Type:	Core
Year of Introduction:	2025-26

L	T	Practical Component				C
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Course Learning Outcomes (CLO):

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

1. infer the principles of Object-Oriented Programming (OOP) (BL2)
2. apply fundamental concepts of C++ programming to solve problems (BL3)
3. make use of object-oriented concepts to define classes and objects in the real world of problems (BL3)
4. design programs based on inheritance, polymorphism, and virtual function concepts. (BL6)

Unit	Contents	Teaching Hours (Total 30)
Unit-I	Principles of Object-Oriented Programming: Software Evolution, Procedure-Oriented Programming, Object-Oriented Programming Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOP, Object-Oriented Languages, Applications of OOP	03
Unit-II	C++ Tokens, Expressions, and Control Structures: Introduction to C++ and its Applications, Basic C++ Statements, Classes and Objects, Structure of C++ Program, Tokens Expressions and Control Structures: Tokens, Keywords, Identifiers and Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Constants, Type Compatibility, Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operator, Memory Management Operators, Manipulators, Expressions and their Types, Implicit Conversions, Operator Overloading, Operator Precedence, Control Structures Functions in C++: The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, Function Overloading, Friend and Virtual Functions	09
Unit-III	Classes and Objects: C Structures Revisited, specifying a Class, Defining Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function Arguments, Returning Objects, Pointers to Members	04

Unit-IV	Constructors and Destructors: Introduction, Constructors, Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Copy Constructor, Destructors Operator Overloading and Type Conversions: Concepts of Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Manipulation of Strings Using Operators, Rules for Overloading Operators	06
Unit-V	Inheritance: Defining Derived Classes, Types of Inheritance, Abstract Classes, Constructors in Derived Classes, Virtual Base Classes	04
Unit-VI	Pointers, Virtual Functions and Polymorphism: Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions.	04

Self-Study:

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

Suggested Readings/ References:

1. E Balagurusamy, Object Oriented Programming with C++, McGraw Hill
2. A.K. Sharma, Object-Oriented Programming with C++, Pearson
3. Herbert Schildt, C++: The Complete Reference, McGraw-Hill
4. Jana, Debasish, C++ And Object-Oriented Programming Paradigm, Prentice Hall.

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	Basic of C++ Program	02
2	Exemplify the Control Structures in C++	02
3	Demonstrate the Function Overloading and Inline Functions concepts	04
4	Array handling in C++	02
5	Implement the concepts of Classes and Objects	04
6	Develop a program to demonstrate the use of default constructors, parameterized constructors, copy constructors, and destructors in managing object lifecycles	04
7	Implement a program to overload operators (e.g., +, -, ==) for user-defined classes, such as performing arithmetic operations on complex numbers or comparing two strings	02
8	Write a program to demonstrate type conversion between basic and user-defined data types.	02
9	Write programs to demonstrate types of inheritance and abstract classes	04
10	Demonstrate the concepts of pointers and virtual functions.	04