

Department of Computer Science and Engineering
Kathmandu University
Dhulikhel, Kavre

Subject: Object Oriented Programming
Level: B. Tech in AI (1st year 2nd Semester)

Course Code: AIPC 102
Credit Hours: 3

Course Description

This course introduces the fundamental concepts of object-oriented programming in C++. Topics include familiarization with features of OOP and its implementation using the concepts of classes, objects, inheritance, polymorphism, abstraction, template etc.

Objectives:

- To make students familiar with features of OOP with C++
- To teach students about the implementation of OOP in real-world problems.

Prerequisite:

Concepts of Structured Programming/ Procedural Programming.

Contents

Chapter One: Introduction to Object-Oriented Programming [4 hours]

- Concept of Object-Oriented Paradigm
- Features of OOP
- Benefits of OOP
- Introduction
- A Sample of C++ Program
- Reference Variables
- Inline Functions
- Function Overloading
- Comparison between C and C++

Chapter Two: Classes and Objects [6 hours]

- Introduction to classes and objects
- Defining a class with member function
- Private Member Functions

- Initializing an Object
- Static Data Members
- Static Member Functions

Chapter Three: Memory Management [4hrs]

- Logistics of Memory manipulation in C (Pointers, Structs)
- Advanced Memory manipulation in C (double pointer)
- Memory Management in C++ (New, Delete)

Chapter Four: Object Constructions and Destructions [5 hours]

- Introduction to Constructor
- Parameterized Constructor
- Copy Constructor
- Destructor
- Scoping in Constructor and Destructor
- New Delete implementation in constructor and destructor

Chapter Five: Operator Overloading [6 hours]

- Introduction
- Defining Operator Overloading
- Overloading Unary Operators
- Overloading Binary Operators
- Overloading Binary Operators using Friend Functions

Chapter Six: Inheritance [6 hours]

- Introduction
- Base Classes and Derived Classes
- Single Inheritance and Multiple Inheritance
- Protected Members
- Virtual Base class and Abstract Classes
- Constructors and Destructors in Derived Classes

Chapter Seven: Polymorphism [4 hours]

- Introduction
- Pointers to Objects
- Pointers to Derived Classes
- Virtual Functions
- Pure Virtual Functions

Chapter Eight: Template [4 hours]

- Introduction
- Class Templates
- Function Templates

Chapter Nine: Exception Handling [2 hours]

- Introduction
- Basics of Exception Handling
- Basics of Handling Mechanism
- Throwing and Catching Exceptions
- Re-throwing an Exception

Chapter Ten: Useful topics [4 hrs]

- Commonly used C++ libraries, C++ libraries related to AI
- Compiling and Adding external library
- Make and Cmake
- Code Optimization
- Multithreading

Reference Books

1. Hubbard, John R. *Theory and Problems of Programming with C++*. Second ed., McGraw-Hill.
2. Deitel, H. M. (2017). *C++ How to Program* (Tenth ed.). D&D..
3. FRIEDMAN, F. L., & KOFFMAN, E. B. (2006). *Problem Solving, Abstraction and Design using C++* (Fifth ed.). Addison- Wesley.