FAST NUCES | PESHAWAR

Object Oriented Programming Lab Syllabus

Course Code & Title:	**Object Oriented Programming Lab, CL1004**
Program(s):	BS CS Batch 24
Academic Calendar Semester:	Spring 2025
Lecture Timing:	**Tuesday**: 9:30 am-12:30 pm & 2pm – 5pm **Thursday**: 11:00 am-02:00 pm **Friday**: 8:00 am-11:00 am
Prerequisites and/or Expectations:	
Instructor:	Engr. Muhammad Qasim
Email:	muhammad.qasim@nu.edu.pk
Office Location:	Electronics Lab
Office Contact Hours:	Monday 10 am – 4:30 pm Wednesday 10:00 am – 4:00 pm Thursday 2:30 pm – 4:00pm
Course Description:	This is an advanced course on programming where the emphasis would be on programming skills so that students would be able to write a program of reasonable size and complexity and handle more complex computational applications and more importantly get introduced to the basic concepts of object-oriented programming.
Course Objectives:	• Critical Analysis: The course aims to provide students the ability to analyze the given requirements for solving simple problems that can be implemented on the computer system. • Solution finding: The computer-programming course attempts to teach students the art of designing algorithm-based solutions to solve problems in different domains. • Interface and Implementation: The course would teach students the syntax and control structures of a programming language to implement algorithms for solving a particular problem. It would emphasize on the need to separate the interface from the implementation. • Collaboration: The course stresses on the ability of students to work efficiently in pairs and to have effective

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	communication skills.
Student Learning Outcomes:	1. Apply the basic concepts of structured programming to write C++ programs. 2. Write C++ programs that employ the use of pointers, and structures (records). 3. Apply the basic concepts of Object-Oriented Programming (class, object, attributes, data hiding, constructors, destructor, static, constant, object as argument, array of objects) to write C++ programs by using single/multiple objects. 4. Use the concepts of operator overloading, inheritance, aggregation, friend function, virtual function and polymorphism to write C++ programs. 5. Demonstrate the use of C++ generic programming concepts, function and class templates.

Course Assessment(s):	As per FAST policy Lab Work (20%); Quiz (20%), Project (10%), Final-term Exam (50%)

Week	Course Contents/Topics
1	Course Introduction Revision of Basic C++ Concepts
2	Pointers In C++ Pointer Variable Declarations and Initialization Referencing/Dereferencing, Pointer Arithmetic Pointers & Functions
3	Dynamic Memory Allocation Dynamic Variables Dynamic Multi-dimensional Arrays
4	Structures in C++ Language Member Variables & Member Functions Arrays vs. Structures and Arrays of Structures Structs and Pointer Variables
5	Intro to Classes & Objects Member Functions: Access Functions (Accessors and Mutators) Utility Functions
6	Static members and functions

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	Constant members and this pointer
7	Constructor, Destructor, Classes and Pointer Variables Copy Constructor, Overloading Constructors Shallow Copy & Deep Copy (w.r.t. Objects) Inheritance Accessing public, private and protected base class members
8	Inheritance with default/non-default constructors Destructors with inheritance Destructors for the dynamically allocated objects Function Overriding/Redefining Dynamic allocation in base and derived classes Inheritance – Multiple inheritance – Ambiguity errors with detailed examples. Types of inheritance (Public, Private & Protected)
9	Composition: Association & Aggregation Friend Functions and classes
10	Operator overloading – overview Operator overloading and Friend functions.
11	Operator overloading - overloading basic operators with detailed examples
12	Polymorphism – Introduction (Virtual functions) Polymorphism Abstract and concrete classes
13	Abstract Classes & pure Virtual Functions (Interface vs. Implementation)
14	C++Templates – Introduction and usage with detailed examples
15	C++Templates – Introduction and usage with detailed examples
16	Final Exam

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Course Resources:	1. Handouts 2. Object-Oriented Programming in C++ (Robert Lafore)
Course Methodology:	Lecturing, Lab Tasks, Handouts
Course Assignment:	Lab Task, Quiz, Project, Final Exam
General Policies and Behavioural Expectations:	During the class sessions students are expected to; ● Ensure timely arrival in class and remain present throughout the class session ● Participate in class discussions and engage in any individual or group tasks ● Adhere to FAST attendance policy and general code of conduct ● Maintain and update record of all class notes, handouts and relevant materials ● Adhere to basic principles of academic integrity with regards to exams and assignments