

**NATIONAL UNIVERSITY**

**OF COMPUTER & EMERGING SCIENCES PESHAWAR CAMPUS**

**PROGRAM:**

Software Engineering and Artificial Intelligence

**COURSE:**

(CL-217) OBJECT ORIENTED PROGRAMMING LAB

**COMPUTER INSTRUCTOR:** Fariba Laiq

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**EVALUATION & ASSESSMENTS WITH WEIGHTS**

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| 1 | Lab Tasks | 30 % |
| 2 | Quizzes | 10 % |
| 3 | Assignments | 10 % |
| 5 | Final Lab Exam | 50 % |
| 6 | Total | 100 % |

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**OBJECT ORIENTED PROGRAMMING LAB**

**COURSE OUTLINES**

March 01,2021

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| **Course Code** | CL-217 |
| **Course Title** | Object Oriented Programming |
| **Credit hours** | 1 |
| **Prerequisite** | CL-118 Fundamental Programming |
| **Objectives** | The lab will introduce the basic principle of C++. It will cover the implementation of C++ basics and mainly OOP concepts i.e. classes and objects, inheritance, polymorphism and much more… |
| **Class Participation** | Every student should participate in class discussions and presentations. Do not hesitate to ask questions or present something in lab. |
| **Topics covered in the lab with the number of lab sessions on each topic** | |  |  | | --- | --- | | **Lab No & Duration** | **Topics** | | 1. (3 hours) | **INTRODUCTION TO C++**   * Basic Terminologies * Introduction to C++ * C++ History * C++ Program Structure * C++ Syntax * C++ Output * C++ new lines * C++ Comments * C++ Input   **C++ VARIABLES AND DATA TYPES**   * Keywords * Tokens * Variables * Rules for naming variables * Data Types * C++ Constants   **C++ OPERATORS**   * Unary operators * Binary operators * Ternary operators | | 2 (3 hours) | **C++ STRINGS**   * String Concatenation * Numbers and Strings * String Length * Access String * User Input Strings   **C++ MATH**   * C++ Math * Min and Max functions * C++ <cmath> Header * Other math functions   **C++ BOOLEANS**   * C++ Booleans * Boolean Values * Boolean expressions | | 3 (3 hours) | **CONDITIONAL/CONTROL STATEMENTS**   * if statement * if-else statement * if-else if- else statement * Nested if-else statement * Conditional operator * Switch Statement * Boolean variable   **CONTROL STRUCTURE/LOOP**   * for loop * while loop * do-while loop * foreach loop * Break statement * Continue statement * Nested Loop | | 4 (3 hours) | **C++ FUNCTIONS**   * Type of Functions * Function Definition * Calling Function * Function declaration and definition * Passing Arguments to Function * Functions different Scenarios * Function Overloading   **C++ ARRAYS**   * Array * Array Declaration * Array Initialization * Accessing Array Elements * Change Array Element * Loop through an array * String Array * Multidimensional Arrays | | 5 (3 hours) | **C++ FUNCTIONS AND ARRAYS**   * Functions Overloading * Function with default Parameters * How to Pass arguments to functions * Pass by value * Pass by reference * How to Pass 1 D array to function * Find Maximum value in 1 D array * Find Minimum value in 1 D array * Inline Functions * C++ Templates * Functions templates | | 6 (3 hours) | **C++ POINTERS**   * Memory Address and Variables * Pointer Variables * The void type pointers * Pointer to pointers * The Reference (Address Of) Operator (&) * The Dereferencing Operator (\*) * Pointers and Arrays * Passing Pointers as Arguments to Functions * Passing Pointers to a Function * Returning Pointers from Function * String in C++   + C-strings   + string Object * Pointers and Strings | | 7 (3 hours) | **C++ STRUCTURE**   * Why we need Structure * Declaring a structure * Structure variables * Member of Structures * Structs of arrays * Arrays of Structs * What is a structure pointer? * Nested Structure in C++ * Structure and Function in C++   + Passing Structure by Value   + Passing Structure by Reference   + Function Returning Structure | | 8 (3 hours) | **C++ File Handling**   * Stream * Text File * Binary File * File Handling * Classes for file Stream Operations * File Operations   + Opening a file   + Creating a new file   + Writing to a File   + Reading from a File   + Closing of a file | | 9 (3 hours) | **C++ Classes and Objects**   * Classes and Objects * Defining a Class * Members of Class * Declaration of object of Class * Accessing Members of Class * Defining Member Functions outside class * Storage of Object in Memory * Functions vs Methods | | 10 (3 hours) | **C++ Classes and Objects**   * Access Specifiers/Modifiers in C++ * Constructor * Types of Constructor (Default Constructor and Parametrized Constructor) * Default Copy Constructor * Constructor Overloading * Defining Constructor Outside Class * Destructors | | 11 (3 hours) | **C++ Classes and Objects**   * C++ Objects and Functions * Passing objects as arguments to function * Returning objects from function * Arrays as Class Members in C++ * C++ this pointer * C++ static keyword * C++ Enumeration * C++ Friend Function * C++ Friend Class | | 12 (3 hours) | **C++ Inheritance**   * C++ Protected Access Specifier * C++ Defining Derived Classes * C++ Public Inheritance * C++ Private Inheritance * C++ Protected Inheritance | | 13 (3 hours) | **C++ Inheritance**   * C++ Function Overriding * Access Overridden Function in C++ * Types of Inheritance * Single Inheritance * Multilevel Inheritance * Multiple Inheritance * Hierarchical Inheritance * Hybrid Inheritance | | 14 (3 hours) | **C++ Inheritance**   * Derived Class Constructors * Constructor in Single Inheritance without Arguments * Constructor in Single Inheritance with Arguments * Constructors in Multiple Inheritance Without Arguments * Constructors in Multiple Inheritance with Arguments | | 15 (3 hours) | **C++ Polymorphism**  Pointer to objects  Early Binding  Virtual Functions  Late Binding  Pure Virtual Function  Abstract Base Class and Concrete Derived Class | |

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