**National University of Computer & Emerging Sciences, Karachi  
Spring 2021 CS-Department  
CS 217 – Object-oriented Programming**Fast

**Course Learning Outcomes (CLOs):**

**CLO 1:** Acquire knowledge of underlying concepts of object oriented paradigm like abstraction, encapsulation, polymorphism, inheritance etc.

**CLO 2:** Interpret real world problems in terms of objects rather than procedure.

**CLO 3:** Develop an understanding of Object-Oriented design artifacts and their mapping to Object-Oriented Programming using C++.

**CLO 4:** Apply object-oriented programming principles to implement small and medium scale C++ / C# programs.

**CLO 5:** Implement Generic Programming Concepts and exception handling.

**Course Outline:**

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| **Week** | **Topic** | **Lab Topic** | **Assessment** |
| 1 | Introduction to OO paradigm | Introduction to IDE, skeleton of C++ program, pointers, array, basic I/O in C++ | **Announce project proposals in 2nd week and submissions in 3rd week**  At least 2 Assignment |
| Comparison from sequential & procedural paradigms |
| Data Abstraction |
| 2 | Encapsulation | C++ data types, functions, struct revisited |
| Introduction to Objects in real world |
| 3 | Introduction to classes and objects | Classes & Objects |
| Access Control |
| Constructors & its types |
| 4 | Destructor | Working with classes and  constructors |
| Implicit and explicit casting |
| Member initialization list & constants |
| 5 | Static data and member functions | Working with access modifiers, static and constant keywords, some examples to revise concepts of classes and objects, constructors & destructors (before Mid 1) |
| Inline functions |
| **Mid I Exam** | | |  |
| 6 | Inheritance | Working with Static functions, constants, constant function and member initialization list | At least 2 assignments |
| Types of inheritance |
| Data and code hiding |
| 7 | Polymorphism in OOP | Inheritance |
| Function overloading |
| Function overriding |
| 8 | Friend function | Polymorphism, Function overloading and overriding |
| Operator overloading |
| 9 | Multiple inheritance & its issues (Diamond Problem) | Friend classes, Friend functions, operator overloading |
| Virtual inheritance |
| Virtual functions |
| 10 | Abstract classes & Interfaces | Abstract Classes and virtual functions |
|  |
| 11 | Introduction to filing | Multiple inheritance, virtual keyword, abstract class |
| **Mid II Exam** | | |  |
| 12 | Generics | Project Submission & Project demo | **Project Submission in 12th LAB** |
| Introduction to exception handling |
| 13 | Introduction to C# | Filing and I/O stream  Working with template functions and template classes |
| Properties in C# |
| GUI |
| 14 | Linking window forms & Exception handling in C# | Final lab exam |  |
| 15 | Revision |  | **Finalized Sessional Marks for both Theory and Labs** |
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| **Final Exam** | | |  |

**Course Coordinator:**

Dr. Abdul Aziz

**Course Instructor:**

Mr. Syed Zain-ul-Hassan, Mr. Basit Jasani, Mr. Behraj Khan, Ms. Nida Munnawar, Mr. Qaiser Abbas

**Lab Instructor:**

Mr. Sohail Afzal, Mr. Qaiser Abbas, Mr. Ali Fatmi, Mr. M. Fahim, Ms**.** Romesha, Ms. Nida Munawwar, Ms. Abeer Gouhar

**Books:**

1. "Problem Solving with C++", 9e Global Edition, Walter Savitch, ISBN-13:9781292018249, Addison-Wesley, 2015.
2. C++ How to program By Deitel & Deitel.

**Reference Books:**

1. The C++ Programming Language by Bjarne Stroustrup.
2. Object Oriented Software Engineering by Jacobson.
3. C# 4.0: The Complete Reference by Herbert Schildt

**Marks Distribution**

***For Theory:***

Assignments 10%

Course Project 10%

Mid Exam 30% (15% each)

Final Exam 50%

**Total 100**

***For Lab:***

Lab Activities 20%

Lab Mid exam 20%

Course Project 10% (including viva exam & report)

Lab Final Exam 50%

**Total 100**