



**National Computing Education Accreditation Council**  
**NCEAC**



NCEAC.DOC.001-E

**COURSE DESCRIPTION**

|                                    |                                |
|------------------------------------|--------------------------------|
| <b>NAME OF INSTITUTION</b>         | Lahore Garrison University     |
| <b>PROGRAM (S) TO BE EVALUATED</b> | Computer Science , Spring 2022 |

**Course Description :**

| Course Code                                                                                                       | CSC321                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------|-----------|----------------------------------------------------|---|---|------------------------------------------------------------------------------|---|---|-----------------------------------------------------------------------|---|---|--------------------------------------|---|---|--------------------------------------|---|---|---------------------------------------------------------------------------------------|--|--|
| Course Title                                                                                                      | Object Oriented Programming                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Credit Hours                                                                                                      | 3+1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Prerequisites by Course(s) and Topics                                                                             | Programming Fundamentals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Assessment Instruments with Weights (homework, quizzes, midterms, final, programming assignments, lab work, etc.) | SESSIONAL (Quizzes, Assignments, Presentations) =25 %<br>Midterm Exam =25 %<br>Final Exam = 50%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Course Coordinator                                                                                                | Dr. Mujtaba Asad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| URL (if any)                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Current Catalog Description                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Textbook (or Laboratory Manual for Laboratory Courses)                                                            | • C++ Programming from Problem Analysis to Program Design by D.S. Malik 5th Edition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Reference Material                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Course Goals                                                                                                      | Introduction to object oriented design, history and advantages of object oriented design, Structures introduction to object oriented programming concepts, classes, objects, data encapsulation, constructors, destructors, access modifiers, const vs non-const functions, static data members & functions, function overloading, operator overloading, identification of classes and their relationships, composition, aggregation, inheritance, multiple inheritance, polymorphism, abstract classes and interfaces, generic programming concepts, function & class templates, standard template library, object streams, data and object serialization using object streams, exception handling, file handling.               |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Course Learning Outcomes (CLOs):                                                                                  | <table><tr><th>At the end of the course the students will be able to:</th><th>Domain</th><th>BT Level*</th></tr><tr><td>Understand principles of object oriented paradigm.</td><td>C</td><td>2</td></tr><tr><td>Identify the objects &amp; their relationships to build object oriented solution</td><td>C</td><td>3</td></tr><tr><td>Model a solution for a given problem using object oriented principles</td><td>C</td><td>3</td></tr><tr><td>Examine an object oriented solution.</td><td>C</td><td>3</td></tr><tr><td>Examine an object oriented solution.</td><td>C</td><td>4</td></tr><tr><td colspan="2">* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain</td><td></td></tr></table> | At the end of the course the students will be able to: | Domain | BT Level* | Understand principles of object oriented paradigm. | C | 2 | Identify the objects & their relationships to build object oriented solution | C | 3 | Model a solution for a given problem using object oriented principles | C | 3 | Examine an object oriented solution. | C | 3 | Examine an object oriented solution. | C | 4 | * BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain |  |  |
| At the end of the course the students will be able to:                                                            | Domain                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | BT Level*                                              |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Understand principles of object oriented paradigm.                                                                | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2                                                      |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Identify the objects & their relationships to build object oriented solution                                      | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3                                                      |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Model a solution for a given problem using object oriented principles                                             | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3                                                      |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Examine an object oriented solution.                                                                              | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3                                                      |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| Examine an object oriented solution.                                                                              | C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4                                                      |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |
| * BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                        |        |           |                                                    |   |   |                                                                              |   |   |                                                                       |   |   |                                      |   |   |                                      |   |   |                                                                                       |  |  |

|                                                                                                                                  |                          |                |                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------|------------------------------------------------------------------------------------------------|
| <b>Topics Covered in the Course, with Number of Lectures on Each Topic</b><br>(assume 15-week instruction and one-hour lectures) | <b>Week</b>              | <b>Lecture</b> | <b>Topics Covered</b>                                                                          |
|                                                                                                                                  | Week 1                   | 1              | Review of Functions I                                                                          |
|                                                                                                                                  |                          | 2              | Review of Functions II                                                                         |
|                                                                                                                                  | Week 2                   | 3              | Programming Fundamentals concepts review : Background of Object Oriented Programming           |
|                                                                                                                                  |                          | 4              | Structures in C++                                                                              |
|                                                                                                                                  | Week 3                   | 5              | Arrays with Structures                                                                         |
|                                                                                                                                  |                          | 6              | Structures and Functions, Nested structures                                                    |
|                                                                                                                                  | Week 4                   | 7              | C++ File Handling                                                                              |
|                                                                                                                                  |                          | 8              | Structs with File handling                                                                     |
|                                                                                                                                  | Week 5                   | 9              | Objects & Classes, Data Abstraction, Information Hiding, ADTs                                  |
|                                                                                                                                  |                          | 10             | UML Diagrams, , Members of class, Functions and Classes Constructor Types                      |
|                                                                                                                                  | Week 6                   | 11             | Function overloading, Destructors                                                              |
|                                                                                                                                  |                          | 12             | Inheritance: Class hierarchies:                                                                |
|                                                                                                                                  | Week 7                   | 13             | Protected Member of class, types of inheritance, Scope resolution with overridden functions    |
|                                                                                                                                  |                          | 14             | Public and private inheritance:                                                                |
|                                                                                                                                  | <b>Week 8</b>            | <b>1 hours</b> | <b>Mid Term</b>                                                                                |
|                                                                                                                                  | Week 9                   | 15             | Mid terms                                                                                      |
|                                                                                                                                  |                          | 16             | Mid terms                                                                                      |
|                                                                                                                                  | Week 10                  | 17             | Multiple inheritance and Multi-level inheritance                                               |
|                                                                                                                                  |                          | 18             | Multiple inheritance and Multi-level inheritance                                               |
|                                                                                                                                  | Week 11                  | 19             | Composition/Aggregation                                                                        |
|                                                                                                                                  |                          | 20             | Pointers, Pointer Data Type and Pointer Variables                                              |
|                                                                                                                                  | Week 12                  | 21             | Address of Operator (&) Dereferencing Operator (*) Classes, Structs, and Pointer Variables     |
|                                                                                                                                  |                          | 22             | Operations on Pointer Variables Dynamic Arrays                                                 |
|                                                                                                                                  | Week 13                  | 23             | Virtual functions                                                                              |
|                                                                                                                                  |                          | 24             | Friend functions Friend classes Static functions                                               |
|                                                                                                                                  | Week 14                  | 25             | Polymorphism,                                                                                  |
|                                                                                                                                  |                          | 26             | Polymorphism-II, Different types of polymorphism                                               |
|                                                                                                                                  | Week 15                  | 27             | Operator Overloading -I                                                                        |
|                                                                                                                                  |                          | 28             | Operator Overloading -II                                                                       |
|                                                                                                                                  | Week 16                  | 29             | Function Templates - A simple functions template - Functions templates with multiple arguments |
|                                                                                                                                  |                          | 30             | Class Templates                                                                                |
|                                                                                                                                  | <b>Week 17</b>           | <b>2 hours</b> | <b>Final Term</b>                                                                              |
| Laboratory Projects/Experiments Done in the Course                                                                               | Student Oriented Project |                |                                                                                                |
| Programming Assignments Done in the Course                                                                                       | Four Assignments         |                |                                                                                                |

**Instructor Name** Dr. Mujtaba Asad

**Instructor Signature**

**Date**