National University of Sciences & Technology (NUST)
School of Electrical Engineering and Computer Science (SEECS)
Department of Software Engineering

Object-Oriented Programming

Course Code:	CS212	**Semester:**	2nd
Credit Hours:	3+1	**Prerequisite Codes:**	CS110 FoCP
Instructor:	Dr. Anis ur Rahman	**Class:**	BSCS-6AB
Office:	A-216, SEECS Faculty Block	**Telephone:**	9085 2172
Lecture Days:	Wednesday & Thursday	**E-mail:**	anis.rahman@seecs.edu.pk
Class Room:	CR 04 SEECS	**Consulting Hours:**	Tuesday 3:00-5:00 pm (by prior email)
Lab Engineer:	TBA	**Lab Engineer Email:**	TBA
Knowledge Group:	KG-PL	**Updates on LMS:**	After every lecture

Course Description:

This course will introduce the Object-Oriented (OO) philosophy to software development, which is a modern and powerful approach. Today, many programming languages support the OO concepts. However, during this course, we'll majorly use the Java programming language. Moreover, some powerful features from the C++ programming language will also be discussed.

Course Objective:

The objective is to make the students understand the benefits of using OO techniques over procedural programming practices, and thereby motivating them to use OO concepts in software development. Further, the students will learn some powerful features of the Java and C++ programming languages.

Course Learning Outcomes (CLOs):		
At the end of the course the students will be able to:	**PLO Mapping****	**BT Level***
1. Understand the difference between procedural and Object Oriented Programming paradigms.	A	C-2
2. Demonstrate the ability to create and use OOP constructs to map real world scenarios.	B	C-5
3. Develop programs using object oriented techniques.	C	C-3
4. Use the latest IDEs to enable quick development, testing, documentation, and packaging of programs.	I	C-3

* BT= Bloom's Taxonomy, C=Cognitive domain, P=Psychomotor domain, A= Affective domain

- *Knowledge(C-1), Comprehension(C-2), Application(C-3), Analysis(C-4), Synthesis(C-5), Evaluation(C-6)*
- *Perception(P-1), Set(P-2), Guided Response(P-3), Mechanism(P-4), Complete Overt Response(P-5), Adaption(P-6), Organization(P-7)*
- *Receiving(A-1), Responding(A-2), Valuing(A-3), Organization(A-4), Internalizing(A-5)*

** Description of Program Learning Outcomes (PLOs) is available on website and in a separate document.

Topics to be Covered:

1. Java Basics	2. Basic I/O & Flow Control
3. Composite Data Types	4. Classes and Objects
5. Inheritance	6. Polymorphism
7. Interfaces and Abstract Classes	8. Exception Handling
9. Graphical User Interfaces	10. Event Handling
11. Streams	12. Advanced Topics

Lecture Breakdown:

Week No.	Topics	Assessment	Remarks
1	Java Basics • Introduction to Java Programming Language • Compiling & Executing Simple Java Programs • Data types & Operators • Input / Output		
2	Flow Control & Composite Data Types • Decisions • Loops and Iterations • Arrays & Array Lists • Strings & String Manipulations		
3	Classes and Objects • Basic Concepts • Encapsulation & Data Hiding • Access modifiers • Constructors & Destructors • Setters & Getters		
4	Classes and Objects • Copy Constructor • Default and No-Argument Constructors • Method (Function) Overloading • Static Class Members • this Reference		
5	Inheritance • Super classes and sub classes • Protected members • Method (Function) Overriding • Constructors in subclasses		
6	**OHT-1**		
7	Polymorphism • Abstract Classes & Methods • Polymorphic Behavior • Final Methods and Classes		
8	Interfaces and Abstract Classes • Creating and Using Interfaces		
9	Exception Handling • Try/Catch/Finally • Re-throwing Exceptions		
10	Graphical User Interfaces • Abstract Window Toolkit (AWT) • Swing Library		
11	Event Handling • Event Listeners • Adapters		
12	**OHT-2**		

13	Streams • Stream I/O and File I/O • Serialization
14	Advanced Topics • Concurrency and Threads • Thread States & Life Cycle • JDBC
15	C++ vs. Java • Inline Member Functions • Friend Functions • Friend Classes
16	C++ vs. Java • Function & Operator Overloading • Virtual Functions • Virtual Destructors
17	C++ vs. Java • Composition vs. Aggregation • Templates – Function & Classes • Standard Template Library – Containers, Algorithms, Iterators
18	**ESE**

Lab Experiments:	
Lab 01	Java Basics [Data types and Operators]
Lab 02	Flow Control [Loops and Decisions]
Lab 03	Composite data types [Arrays & Strings]
Lab 04	Classes and Objects
Lab 05	Constructors, Destructors & Method Overloading
Lab 06	Inheritance
Lab 07	Polymorphism
Lab 08	Interfaces and Abstract Classes
Lab 09	Exception Handling
Lab 10	GUI
Lab 11	Event Handling
Lab 12	I/O and File Handling
Lab 13	Advanced Topic: Java Threads
Lab 14	Advanced Topic: JDBC

Tools / Software Requirement:
Java Development Kit (JDK) 7 or later, NetBeans/Eclipse, Microsoft Visual Studio

Books:	
Text Book:	1. Java – How to Program (Early Objects), Paul Deitel and Harvey Deitel, 10th Edition, ISBN 978-1-292-01819-5, Pearson Education, 2015 2. Beginning C++, Ivor Horton, ISBN13: 978-1-484200-08-7, November 12, 2014
Reference Books:	1. Computing Concepts with Java Essentials, Cay Horstmann, 3rd Edition, ISBN 0-471-24371-x, 2003, John Wiley & Sons. 2. Object Oriented Programming in C++, Robert Lafore, 4th Edition, ISBN-10: 0672323087 | ISBN-13: 978-0672323089, 2001 3. Bruce Eckel, Thinking in C++: Introduction to Standard C++, Volume 1, Second Edition, ISBN-13: 860-1300092737 ISBN-10: 0139798099, 25th March, 2000. (available online)

Course Assessment	
Exam:	2 One Hour Tests (OHT) and 1 End Semester Exam (ESE)
Home work:	3 Assignments minimum
Lab Assignments:	12 Lab Reports , 1 Lab Exam (optional)
Semester Project:	1 Report for the term/semester project
Quizzes:	4 - 6 Quizzes (Surprise)

Course Assessment Weightages (In accordance with NUST statutes)
Theory: 75%
• Quizzes: 15%
• Assignments: 10%
• OHT-1: 15%
• OHT-2: 15%
• End Semester Exam: 45%
Practical: 25%
• Labs Assignments: 70% (17.5 of 100)
• Project : 30% (7.5 of 100)

Grading Policy:	
Quiz Policy:	The quizzes will be unannounced and normally last for ten minutes. The question framed is to test the concepts involved in last few lectures. Number of quizzes that will be used for evaluation is at the instructor's discretion.
Assignment Policy:	In order to develop comprehensive understanding of the subject, assignments will be given. Late assignments will not be accepted / graded. All assignments will count towards the total (No 'best-of' policy). The students are advised to do the assignment themselves. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The questions in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams.
Lab Conduct:	The labs will be conducted for three hours every week. A lab handout will be given in advance for study and analysis The lab handouts will also be placed on LMS. The students are to submit their results by giving a lab report at the end of lab for evaluation. One lab report per group will be required. However, students will also be evaluated by oral viva during the lab.

Plagiarism:	SEECS maintains a zero tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people's work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the SEECS plagiarism policy will lead to strict penalties including zero marks in assignments and referral to the academic coordination office for disciplinary action.