Bangladesh University of Business and Technology (BUBT)
Faculty of Engineering & Applied Sciences (FEAS)
Department of Computer Science and Engineering (CSE)

Program: B.Sc. Engg. in Computer Science and Engineering	**Session:** Spring 2024	**Level-Term:** L3-T1
Course Code: 0611-342	**Course Title:** Advanced Programming Lab	**Credit Value**: 1.5
Course Type: Core Course	**Credit Hours:** 1.5	**Prerequisite:** 0613-221	**Total Marks:** 100

COURSE TEACHER:

Name	:	Humayra Ferdous	**Classroom Code**	:	a3eq7b2
Designation	:	Lecturer	**Contact:**	:	+8801751948092
Email	:	humayra@bubt.edu.bd	**Specialization:**	:	Artificial Intelligence, Machine Learning,Data Mining.

CLASS SCHEDULE:

Class Day	Class Hours	Room
Tuesday	04:00 PM – 06:30 PM	B2/420

COUNSELING HOURS:

Day	Counseling Hours	Room
Monday	09.15 am – 10.30 am	B1/303
Tuesday	10.30 am – 11.45 am	B1/303
Wednesday	01.30 am – 02.45 am	B1/303

Course Rationale	This lab course is based on ‘CSE 331: Advanced Programming Language’ theory course. In this lab course, students can learn how to design, implement, and debug Object-Oriented features-based programs using Java. In addition, student will apply OOP based knowledge to implement a program using the exclusive features & packages of Java with an industry requirement for building a project from scratch.
Course Objectives	This laboratory course complements the theoretical concepts covered in 'CSE 331: Advanced Programming Language.' Here, students have the opportunity to acquire practical skills in designing, implementing, and troubleshooting programs that leverage Object-Oriented principles using Java. Furthermore, participants will apply their understanding of OOP to develop a project from the ground up, incorporating Java's unique features and packages in alignment with industry standards and demands.
Course Outcomes (COs)	Upon completing this course, students will be able to: **CLO1: Demonstrate** basic problem solving skills: analyzing problems, modeling a problem as a system of objects. **CLO2: Implement** solutions for different problem scenarios based on object-oriented features of Java. **CLO3: Apply** Java’s GUI frameworks to develop a small scale project exploiting the technology and features of java.

COs to POs Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√											
CO2			√									
CO3									√			

CO	PO	Bloom's Domain / Level	Delivery Methods / Activities	Assessment Tools
CO1	PO1	Cognitive/Understanding	Lectures, Lab Task, Assignment.	Lab Performance
CO2	PO3	Cognitive/Affective	Lectures, Lab Task, Assignment.	Lab Performance, Final Exam
CO3	PO9	Psychomotor/Affective	Lectures, Lab Task, Assignment.	Lab Performance, Final Exam

Week	Selected Topics	Corresponding CLOs
Week 1	• Understand Java Language Syntax & Semantics • Operations, Expressions, Control-flow, Strings etc.	
Week 2	➢ **Class, objects and methods** • To write a java program to get and sort names by command line argument • To write a java program to work with the creation of objects for the class with user defined methods returning a value.	CO1
Week 3	➢ **Constructors, and Access Modifiers** • To write a JAVA program to implement constructor. • To write a JAVA program to implement constructor overloading and method overloading • To write a java program to implement inner class and demonstrate its access protections. ➢ **Evaluation of Lab Performance 1**	
Week 4	➢ **Inheritance** • To write a Java program to understand the concept of Single inheritance. • To write a Java program to understand the concept of Multilevel inheritance. • To write a JAVA program to give example for "super" keyword	CO1
Week 5	➢ **Runtime Polymorphism** • To write a java program to understand the concept of Method Overriding • To write a Case study on run time polymorphism and inheritance. • **Evaluation of Lab Performance 2**	
Week 6	➢ **Abstract, Final** • To write a java program to implement the concept of Abstract and Final class ➢ **Interface** • To write java program to implement the concept of interface. ➢ **Evaluation of Lab Performance 3**	CO1
Week 7	**Mid Term Lab Examination.**	
Week 8	➢ **GUI Programming** • Write a JAVA program to build a Calculator in Swings	

	• Write a JAVA program to display the digital watch in swing tutorial • Insertion • Deletion	
Week 9	➢ **GUI Programming (Continued) and Java Database Connectivity (JDBC)** • Write a JAVA program that to create a single ball bouncing inside a JPanel. • Write a java program that connects to a database using JDBC with insert values into it and delete values from it	
Week 10	➢ **Package** • To write a java program to understand the steps in the creation of packages.	
Week 11	➢ **Multithreaded Programming:** • To write a JAVA program that creates threads by extending Thread class and implementing the runnable interface ➢ **Evaluation of Lab Performance 4**	CO2
Week 12	➢ **Multithreaded Programming (Continued):** • To create a java program in a multithread environment and implement join() and isAlive() functions. • To create a java program to understand the concept of thread synchronization • To write a java program to implement the concept of inter-thread communication.	
Week 13	➢ **Exception Handling:** • To write a java program to implement the concept of exception handling • To write a java program to implement the concept of user defined exception. **Evaluation of Lab Performance 5**	CO2
Week 14	➢ **Java Collections Framework** • To implementation of collection interface, set interface, Arraylist class, linked list class, Priority queue class, Map class etc.	
Week 15	➢ **File Input/ Output** • Write a Java program that reads a file name from the user then displays information about whether that file exists, file is writable, the type of file and length of the file in bytes. • Write a Java program that reads a file and displays the no of lines and words in that file. **Evaluation of Lab Performance 6**	CO2
Week 16	**Project Presentation and Evaluation**	CO3

Teaching Strategy	Maximum topics will be covered from the textbook. For the rest of the topics, reference books will be followed. Some class notes will be uploaded on the web. White board will be used for most of the time. Multimedia projector and a PC will be used for the convenience of the students to understand codes practically. Students must participate in classroom discussions for case studies, problems solving and project developments.

Assessment and Marks Distribution

Continuous	Class Participation	**10%**
	Lab Report	**10%**
	Class Evaluation	**30%**
Summative	Lab Final	**40%**
	Viva	**10%**

Grading Policy

A+	**≥ 80**
A	**75 - < 80**
A-	**70 - < 75**
B+	**65 - < 70**
B	**60 - < 65**
B-	**55 - < 60**
C+	**50 - < 55**
C	**45 - < 50**
D	**40 - < 45**
F	**< 40**

Additional Information

1. Academic Calendar: https://www.bubt.edu.bd/Home/page_details/Academic_Calender_
2. Rules & Regulations: https://www.bubt.edu.bd/Home/page_details/Rules_and_Regulations
3. Grading & Evaluation: https://www.bubt.edu.bd/Home/page_details/Evaluation_Grading_System
4. Proctorial Rules: https://www.bubt.edu.bd/Home/page_details/Office_of_the_Proctor

Overall CO Assessment Criteria

Assessment methods of COs are given below:

Assessment Area	CO			Assessment
	CO1	CO2	CO3	Area Mark
Lab Attendance	-	-	-	-
Lab Assignment	-	-	-	-
Lab Performance	15	15	-	30
Project Evaluation/Final Exam	-	-	40	40
Total Mark	**15**	**15**	**40**	**70**

Additional Course Policies

There will be assignments. No late assignment will be accepted. ***Any kind of copy/manipulation in assignment will carry zero mark.*** Two or more copied assignments will carry zero mark in all assignments. **Zero tolerance will be shown in this regard.** Solutions to assignment problems will be provided through web and on hand.

There will be at least three class tests (CT). Best two of three or best three CTs will be counted. Both of regular and surprise CTs can be conducted.

CT, Mid-term and final exam will be closed book, closed notes. Mobile phone is strictly prohibited in exam hall. Students are insisted to carry their own watch and synchronize time during exam hours.

If a student is absent from class test anyway and made no report to the class teacher personally beforehand, his/her score for that test will be zero. No make-up for the class test will be allowed as 2 of 3 CTs are being considered. No make-up for Mid-exam will be entertained without physical presence and recommendation of the guardian along with written permission of the department. Make-up of Mid-exam may be much harder than the regular one.

Rubrics

COs (Bloom's Level)	Excellent (80%-100%)	Good (70%-79%)	Satisfactory (60%-69%)	Poor (40%-59%)	Unsatisfactory (0-39%)	Marks (70)
CO1 Understanding	Answer is complete and sufficient detail provided to support issues related to the question. And also deals fully with the entire question.	Answer is brief with sufficient detail provided to support issues were introduced. And most of the basic details are included but some are missing.	Answer is brief with insufficient detail provided to support issues were introduced.	Answer is incomplete and excessive discussion of unrelated issues. And serious gaps in the basic details.	None of the relevant details were included or didn't answer.	**10**

CO2 Understanding	The question is answered appropriately explaining the problem solving strategy to a specific programming problem described in the question.	The question is answered briefly explaining the problem solving strategy to a specific programming problem described in the question.	The question is answered correctly by the problem solving strategy to a specific programming problem described in the question but some points are missing.	The question is answered incompletely explaining the problem solving strategy to a specific programming problem described in the question but some points are correct.	No attempt to explain the problem solving strategy to a specific programming problem described in the question method.	**20**
CO3 Analyzing	A clear, complete, and properly ordered chain of analyzing steps (i.e. perceive the problem scenario, relate the problem to the programming perception, explore the programming strategy to solve it) is followed to answer the question.	The chain of analyzing steps is complete and correctly ordered but lack of some expected plods.	One or more intermediate analyzing steps are missing or unclear, but the correctness of the analysis is not compromised.	One or more intermediate analyzing steps are missing or unclear to answer the question.	The stated chain of analysis does not lead to the stated question.	**20**
CO4 Applying	The answer shows the complete and appropriate application of conceptual programming strategies to solve a problem.	The answer shows appropriate application of conceptual programming strategies incompletely to solve a problem.	The answer shows partially appropriate but complete application of conceptual programming strategies to solve a problem.	The answer shows partially appropriate application of conceptual programming strategies incompletely to solve a problem.	The answer shows the incomplete and inappropriate application of conceptual programming strategies to solve a problem.	**20**

Text Book	**1.** Java: The Complete Reference, 7th Edition, by Herbert Schildt
Reference Book	**1.** Java: How to Program, 9th Edition, by Harvey Deitel & Paul Deitel **2.** Programming with Java: A Primer, 3rd Edition, E. Balagurusamy

Bloom's Taxonomy for Teaching-Learning

Bloom's Taxonomy is a set of three hierarchical models used to classify educational learning objectives into levels of complexity and specificity. The three lists cover the learning objectives in Cognitive, Affective and Psychomotor domains. The Cognitive domain list has been the primary focus of most education and is frequently used to structure curriculum learning objectives, assessments and activities. The three domains and respective levels are illustrated below.

Descriptions of Cognitive Domain (Anderson and Krathwohl's Taxonomy 2001)

The **cognitive domain** involves the development of our mental skills and the acquisition of knowledge.

Level	Category	Meaning	Keywords
C1	**Remembering**	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.	Define, describe, draw, find, identify, label, list, match, name, quote, recall, recite, tell, write
C2	**Understanding**	Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining.	Classify, compare, exemplify, conclude, demonstrate, discuss, explain, identify, illustrate, interpret, paraphrase, predict, report
C3	**Applying**	Carrying out or using a procedure through executing, or implementing. Applying relates to or refers to situations where learned material is used through products like models, presentations, interviews or simulations.	Apply, change, choose, compute, dramatize, implement, interview, prepare, produce, role play, select, show, transfer, use
C4	**Analyzing**	Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing, as well as being able to distinguish between the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	Analyze, characterize, classify, compare, contrast, debate, deconstruct, deduce, differentiate, discriminate, distinguish, examine, organize, outline, relate, research, separate, structure
C5	**Evaluating**	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation.	Appraise, argue, assess, choose,conclude, critique, decide, evaluate, judge, justify, predict, prioritize, prove, rank, rate, select, Monitor
C6	**Creating**	Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into somethingnew and different creating a new form or product. This process is the most difficult mental function.	Construct, design, develop, generate, hypothesize, invent, plan, produce, compose, create, make, perform, plan, produce

Graduate Attributes (Program Outcomes) for B.Sc. in Engineering Program based on Washington Accord

Program Outcomes (POs) are narrower statements that describe what students are expected to know and be able to do by the Time of graduation. These relate to the knowledge skills and attitudes that students acquire while progressing through the program. The students of the B.Sc. in CSE program are expected to achieve the following graduate attributes or program outcomes at the time of graduation.

PO1–Engineering knowledge (Cognitive): Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

PO2–Problem analysis (Cognitive): Identify, formulate, research the literature and analyze complex engineering problems and reach substantiated conclusions using first principles of mathematics, the natural sciences and the engineering sciences.

PO3–Design/development of solutions (Cognitive, Affective): Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.

PO4–Investigation (Cognitive, Psychomotor): Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5–Modern tool usage (Psychomotor, Cognitive): Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6–The engineer and society (Affective): Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

PO7–Environment and sustainability (Affective, Cognitive): Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.

PO8–Ethics (Affective): Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.

PO9–Individual work and teamwork (Psychomotor, Affective): Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.

PO10–Communication (Psychomotor, Affective): Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.

PO11–Project management and finance (Cognitive, Psychomotor): Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.

PO12–Life-long learning (Affective, Psychomotor): Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

Prepared By: **Checked by:** **Approved By:**