

**Bangladesh University of Business & Technology (BUBT)**  
**Department of Computer Science and Engineering (CSE)**



## Lab Course Outline

Program : B.Sc. in CSE  
Course Code : CSE 332  
Course Title : Advanced Programming Language Lab  
Course Credit : 1.50  
Contact Hours : 3hrs  
Semester : Fall 2024  
Intake : 50<sup>th</sup>  
Section: 3, 7

## 1. Course Objectives

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.

## 2. Course Outcomes

Upon successful completion of this course, students should be able to:

<b>CO1</b>	<b>:</b>	<b>Demonstrate</b> basic problem-solving skills: analyzing problems, and modeling a problem as a system of objects.
<b>CO2</b>	<b>:</b>	<b>Implement</b> solutions for different problem scenarios based on object-oriented features of Java.
<b>CO3</b>	<b>:</b>	<b>Apply</b> Java’s GUI frameworks to develop a small-scale project exploiting the technology and features of Java.

## 3. Mapping of Course Outcomes (COs) to Program Outcomes (POs)

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
<b>CO1</b>	√											
<b>CO2</b>			√									
<b>CO3</b>									√			

Sl. No.	COs	Corresponding POs	Bloom's taxonomy domain/level	Delivery methods and activities	Assessment tools
CO1	<b>Demonstrate</b> basic problem solving skills: analyzing problems, modeling a problem as a system of objects.	PO1	C: Understand	Lab Demonstration	Lab Performance
CO2	<b>Implement</b> solutions for different problem scenarios based on object-oriented features of Java.	PO3	A: Responding	Lab Demonstration	Lab Performance
CO3	<b>Apply</b> Java's GUI frameworks to develop a small scale project exploiting the technology and features of java.	PO9	P: Guided Response	Project Supervision	Project Evaluation

#### 4. Descriptions of Program Outcomes (POs)

PO1	<b>Engineering Knowledge (Cognitive):</b> Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem Analysis (Cognitive):</b> 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	<b>Design/Development of Solutions (Cognitive, Affective):</b> 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	<b>Investigation (Cognitive, Psychomotor):</b> Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

PO5	<b>Modern Tool Usage (Psychomotor, Cognitive):</b> 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	<b>The Engineer and Society (Affective):</b> 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	<b>Environment and Sustainability (Affective, Cognitive):</b> Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics (Affective):</b> Apply ethical principles and commit to professional ethics, responsibilities and the norms of the engineering practice.
PO9	<b>Individual Work and Teamwork (Psychomotor, Affective):</b> Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.
PO10	<b>Communication (Psychomotor, Affective):</b> 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	<b>Project Management and Finance (Cognitive, Psychomotor):</b> 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	<b>Life-Long Learning (Affective, Psychomotor):</b> Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.

## 5. Software Requirements

The following software is needed for conduct the course:

Windows 10  
 Netbeans IDE  
 Eclipse  
 Oracle 11g

## 6. Course Evaluation

Grades			
Numerical Grade	Letter Grade		Grade Pont
80% and above	A+	(A Plus)	4.00
75% to less than 80%	A	(A Regular)	3.75
70% to less than 75%	A-	(A Minus)	3.50
65% to less than 70%	B+	(B Plus)	3.25
60% to less than 65%	B	(B Regular)	3.00
55% to less than 60%	B-	(B Minus)	2.75
50% to less than 55%	C+	(C Plus)	2.50
45% to less than 50%	C	(C Regular)	2.25
40% to less than 45%	D		2.00
Less than 40%	F		0.00

Attendance	:	10 %
Lab Assignment	:	20 %
Lab Performance	:	30 %
Project	:	40 %

## 7. Weekly Schedule

		❖ Understand Java Language Syntax & Semantics	
Week1	Lab 1	❖ Operations, Expressions, Control-flow, Strings etc.	
Week2	Lab 2	❖ Class, objects and methods <ul style="list-style-type: none"> <li>To write a java program to get and sort names by command line argument</li> <li>To write a java program to work with the creation of objects for the class with user defined methods returning a value.</li> </ul>	
Week3	Lab 3	❖ Constructors, and Access Modifiers <ul style="list-style-type: none"> <li>To write a JAVA program to implement constructor.</li> <li>To write a JAVA program to implement constructor overloading and method overloading</li> <li>To write a java program to implement inner class and demonstrate its access protections.</li> </ul> ❖ Evaluation of Lab Performance 1	CO1
Week4	Lab 4	❖ Inheritance <ul style="list-style-type: none"> <li>To write a Java program to understand the concept of Single inheritance.</li> <li>To write a Java program to understand the concept of Multilevel inheritance.</li> <li>To write a JAVA program to give example for “super” keyword</li> </ul>	
Week5	Lab 5	❖ Runtime Polymorphism <ul style="list-style-type: none"> <li>To write a java program to understand the concept of Method Overriding</li> <li>To write a Case study on run time polymorphism and inheritance.</li> </ul>	CO1

		❖ <b>Evaluation of Lab Performance 2</b>	
Week6	Lab 6	❖ <b>Abstract, Final</b> <ul style="list-style-type: none"> <li>To write a java program to implement the concept of Abstract and Final class</li> </ul> ❖ <b>Interface</b> <ul style="list-style-type: none"> <li>To write java program to implement the concept of interface.</li> </ul> ❖ <b>Evaluation of Lab Performance 3</b>	CO1
Week7	<b>Midterm Week</b>		
Week8	Lab 7	❖ <b>GUI Programming</b> <ul style="list-style-type: none"> <li>Write a JAVA program to build a Calculator in Swings</li> <li>Write a JAVA program to display the digital watch in swing tutorial.</li> </ul>	
Week9	Lab 8	❖ <b>GUI Programming (Continued) and Java Database Connectivity (JDBC)</b> <ul style="list-style-type: none"> <li>Write a JAVA program that to create a single ball bouncing inside a JPanel.</li> <li>Write a java program that connects to a database using JDBC with insert values into it and delete values from it</li> </ul>	
Week10	Lab 9	❖ <b>Package</b> <ul style="list-style-type: none"> <li>To write a java program to understand the steps in the creation of packages.</li> </ul> ❖ <b>Multithreaded Programming:</b> <ul style="list-style-type: none"> <li>To write a JAVA program that creates threads by extending Thread class and implementing the runnable interface</li> </ul> ❖ <b>Evaluation of Lab Performance 4</b>	CO2
Week11	Lab 10	❖ <b>Multithreaded Programming (Continued):</b> <ul style="list-style-type: none"> <li>To create a java program in a multithread environment and implement join() and isAlive() functions.</li> <li>To create a java program to understand the concept of thread synchronization</li> <li>To write a java program to implement the concept of inter-thread communication.</li> </ul>	
Week12	Lab 11	❖ <b>Exception Handling:</b> <ul style="list-style-type: none"> <li>To write a java program to implement the concept of exception handling</li> <li>To write a java program to implement the concept of user defined exception.</li> </ul> ❖ <b>Evaluation of Lab Performance 5</b>	CO2

Week13	Lab 12	<b>❖ Java Collections Framework</b> <ul style="list-style-type: none"> <li>To implementation of collection interface, set interface, Arraylist class, linked list class, Priority queue class, Map class etc.</li> </ul>	
Week14	Lab 13	<b>❖ File Input/Output</b> <ul style="list-style-type: none"> <li>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.</li> <li>Write a Java program that reads a file and displays the no of lines and words in that file.</li> </ul> <b>❖ Evaluation of Lab Performance 6</b>	CO2
Week15	Lab 14	<b>Project Presentation and Evaluation</b>	CO3

## 8. Description of Cognitive, Affective, and Psychomotor Domains

### Cognitive Domain:

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, Explain, Identify, label, list, match, name, quote, recall, recite, tell, write, Demonstrate, State, Show, Summarize
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, discuss, describe, explain, identify, paraphrase, Show, Brief
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, Build, change, compute, implement, prepare, produce, role play, select, show, transfer, use Produce, Generate, Construct, Write, Create, Find

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, Explain, Evaluate, Find, organize, outline, output relate, research, separate, structure, predict, report
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 something new 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

### **Affective Domain:**

Level	Category	Meaning	Keywords
A1	Receiving	Awareness, willingness to hear, selected attention.	acknowledge, asks, attentive, courteous, dutiful, follows, gives, listens, understands
A2	Responding	Active participation on the part of the learners. Attend and react to a particular phenomenon. Learning outcomes may emphasize compliance in responding, willingness to respond, or satisfaction in responding (motivation).	answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, presents, tells



A3	Valuing	The worth or value a person attaches to a particular object, phenomenon, or behavior. This ranges from simple acceptance to the more complex state of commitment. Valuing is based on the internalization of a set of specified values, while clues to these values are expressed in the learner's overt behavior and are often identifiable.	appreciates, cherish, treasure, demonstrates, initiates, invites, joins, justifies, proposes, respect, shares
A4	Organization	Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating an unique value system. The emphasis is on comparing, relating, and synthesizing values.	compares, relates, synthesizes
A5	Characterization	Has a value system that controls their behavior. The behavior is pervasive, consistent, predictable, and most important characteristic of the learner. Instructional objectives are concerned with the student's general patterns of adjustment (personal, social, emotional).	acts, discriminates, displays, influences, modifies, performs, qualifies, questions, revises, serves, solves, verifies

### Psychomotor Domain:

Level	Category	Meaning	Keywords
P1	Perception	The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.	chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects.
P2	Set	Readiness to act. It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets).	begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers.
P3	Guided Response	The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing.	copies, traces, follows, react, reproduce, responds
P4	Mechanism	This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency.	assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches.

P5	Complex Over Response	The skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance. For example, players are often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football, because they can tell by the feel of the act what the result will produce.	assembles, builds, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches.
P6	Adaptation	Skills are well developed and the individual can modify movement patterns to fit special requirements.	adapts, alters, changes, rearranges, reorganizes, revises, varies.
P7	Origination	Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills.	arranges, builds, combines, composes, constructs, creates, designs, initiate, makes, originates.

## 9. Overall CO Assessment Scheme

Field of Marks	Course Outcomes (CO)			Marks
	CO1	CO2	CO3	
Attendance				
Lab Assignment				
Lab Performance	15	15		30
Project Evaluation			40	40
Total	15	15	40	70

## Lab Assessment Details:

Lab No.	Criteria	COs	Excellent(5)	Good(4)	Satisfactory(3)	Unsatisfactory (0-2)	Marks (30)
			Student demonstrates an accurate understanding of the lab objectives and concepts. The student can correctly answer questions and if appropriate,	Student arrives on time to lab, but may be unprepared. Answers to questions are basic and superficial suggesting that	Student tardiness or unpreparedness makes it impossible to fully anticipate. If able to participate, student has difficulty	Student was absent from lab or did not participate. There was no attempt to make prior arrangements to make up the lab.	

			can explain concepts to the course teacher.	concepts are not fully grasped.	explaining key lab concepts.		
<b>L3</b>	Basics of Java Programming, Class, Objects and Methods	CO1	”	”	”	”	<b>5</b>
<b>L5</b>	Constructors, Access Modifiers and Inheritance	CO1	”	”	”	”	<b>5</b>
<b>L6</b>	Runtime Polymorphism, Abstract, Final and Interface	CO1	”	”	”	”	<b>5</b>
<b>L9</b>	GUI Programming	CO2	”	”	”	”	<b>5</b>
<b>L11</b>	Multithreading	CO2	”	”	”	”	<b>5</b>
<b>L13</b>	Exception Handling, Java Collections	CO2	”	”	”	”	<b>5</b>

### Lab Project Assessment Details:

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Inadequate (0-2)	Marks
Project Demonstration	Student demonstrates the implementation and simulation of the project completely	Student can demonstrate some main parts of the implementation and simulation of the project	Student can explain the implementation and simulation of the project obscurely	Students were either absent or know nothing about the project	5
Usage of Java library functions, Packages & Interfaces	Student uses Java library functions, Packages & Interfaces appropriately	Student uses Java library functions, Packages & Interfaces without knowing appropriately	Student has very few understanding of Java library functions, Packages & Interfaces	Student has no concept of Java library functions, Packages & Interfaces or they do not use any	10
Linking Database	Student successfully implement the CRUD operations by linking up the database with the Project	Student implement the CRUD operations by linking up the database with some minor problems in the Project	Student implements the project with some missing CRUD operations in their project	Student does not use any database to implement the project	10
Project Report	Student has the complete understanding of the project and the report. The report is appropriate	Student has a basic knowledge of content, but lacks some understanding of	Student has lack of knowledge about project and the report. The report is not	Student either did not submit the report or the report is copied	10

	formatted and no portion of the content is copied.	some concepts. The report is appropriate formatted with some irregularities although no portion of the content is copied	formatted at all and the content of the report is inappropriate.	and totally inappropriate	
Presentation	Student present his Project presentation perfectly	Student seems unprepared in the presentation but can share his knowledge thoroughly	Student expresses his lack of knowledge in the presentation	Student is absent or the cannot deliver presentation	5

## 10. Reference Materials

### Required Reference:

1. Java: The Complete Reference, 7<sup>th</sup> Edition, by Herbert Schildt

### Recommended References:

1. Java: How to Program, 9 th Edition, by Harvey Deitel & Paul Deitel

## 11. Instructor Information

<b>Instructor</b>	:	Md. Tariquzzaman Lecturer Department of CSE, BUBT
<b>Office</b>	:	
<b>Phone</b>	:	01303960207
<b>Email</b>	:	tariquzzamanfaisal1964@gmail.com

## 12. Class Schedule

Day	Time	Room No

## 13. Office Hours

DAYS	8:30-09:30	09:35-10:35	10:40-11:40	11:45-12:45	12:45-01:15	01:15-02:15	02:20-03:20	03:25-04:25	04:30-05:30	06:00-07:30	07:45-09:15
SAT											
SUN											

MON											
TUE											
WED											
THU											
FRI							03.00 PM – 06.00PM		06.00 PM – 09.00PM		

**Prepared by:**

**Checked by:**

**Approved by:**

## **Java Project Guidelines (Total Marks - 40)**

### ▪ Introduction

In this course CSE - 332, you will develop a small scale project exploiting the technology and features of Java.

### ▪ Instructions

- Your project must have at least five basic features implementation using Java GUI Framework.
- You can propose your project proposal but that must be up to the standard.
- Focus on real life problems while finalizing your proposal.

### ▪ Problem Definition

In your project report you should present the situation you have tackled while implementing your project and how you managed to solve it. Your document should start by:

- Illustrate the problem.
- Specify how you will solve the problem, no. of classes and features in which you will implement in your Project.
- You must have at least five features for your intended project.
- Mention the object oriented principles (Encapsulation, Polymorphism, Inheritance, Abstraction) used in your project.

## ▪ Design and Programming

- Describe the classes implemented and include a simple use case diagram for your Project Illustration in your project report.
- Use pseudo-code to explain particular sections of the program, e.g. displaying menu until exit, searching for a particular student, filtering data, getting the highest mark, sorting your data in your project report.

## ▪ Using Database

You have to use oracle database for implementing your project. you should be able to do the following **CRUD** operations exploiting your Oracle database

1. Create
  2. Read
  3. Delete
  4. Update
- Keep in mind hard coded project will not be treated as a complete project and make sure your database connection is ensured in your project.
  - Briefly describe about all the tables used in your database.

## ▪ GUI Framework

- You can use JavaFX or Java Swing to implement your project
- Make sure your graphical User Interface(GUI) does not reflect that you did not put that much effort in your project!!

## ▪ Team Work

- A group can be formed with maximum three members
- Every member of a group should have equal contribution to the project (N.B. They will be asked about their individual role)

## ▪ Project Submission

Remember to properly indent your code and add comments as required before submitting your full project source code. You also have to submit your Project report, Project presentation Slide along with your project source code.

**Note:**

By following the above points, you will be meeting the Basic requirements. Make sure your Project report reflects also good word-processing skills (headers/footers/page numbering, etc.) as marks will be rewarded for that as well in your report.

----- THE END-----