



SRI KRISHNA INSTITUTE OF TECHNOLOGY

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#57, Chimney Hills, Hesaraghatta Main Road, Chikkabanavara Post, Bengaluru- 560090

Department of Artificial Intelligence and Machine Learning

Academic Year	: 2026-27	Course Name	: OOPS with Java
Semester	: 3	Course Code	: 1BCS302
Scheme	: 2025	L: T: P: S	: 3:0:2 Credit: 4
Total Contact hours	: 42	CIE Marks	: 50
Course Plan Author	: Megha H	SEE Marks	: 50
Date	: 31/08/2026	Total Marks	: 100

Course Prerequisites:

- Knowledge of basics of programming language

Course Objectives:

- To learn primitive constructs of JAVA programming language.
- To understand Object Oriented Programming Features of JAVA.
- To gain knowledge on: packages, multithreaded programming and exceptions.

Course Outcomes:

CO	At the end of the course, students should be able to . . .	Blooms' Level
CO1	: Demonstrate proficiency in writing simple programs involving branching and looping structures.	L2
CO2	: Construct object-oriented solutions using classes, objects, and methods.	L3
CO3	: Develop programs using inheritance, packages, and interfaces.	L3
CO4	: Make use of exception handling and multithreading in solving complex problems	L3
CO5	: Apply concepts of autoboxing, enumerations, and generics in program development.	L3
CO6	: Choose a suitable IDE tool to design, develop, and debug Java programs.	L6

Blooms' Taxonomy:

L1	L2	L3	L4	L5	L6
Remembering	Understanding	Applying	Analyzing	Evaluating	Creating



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Program Outcomes:

PO1	:	Engineering knowledge	PO7	:	Ethics
PO2	:	Problem analysis	PO8	:	Individual and Collaborative Team work
PO3	:	Design/development of solutions	PO9	:	Communication
PO4	:	Conduct investigations of complex problems	PO10	:	Project management and finance
PO5	:	Engineering Tool Usage	PO11	:	Life-Long Learning
PO6	:	The Engineer and The World			

Program Specific Outcomes:

PSO1:	Adapt, Contribute innovative ideas in the field of Artificial Intelligence and Machine Learning
PSO2:	Enrich the abilities to qualify for Employment, Higher studies and Research in various domains of Artificial Intelligence and Machine Learning such as Data Science, Computer Vision, Natural Language Processing with ethical values
PSO3:	Acquire practical proficiency with niche technologies and open source platforms to become Entrepreneur in the domain of Artificial Intelligence and Machine Learning

CO-PO-PSO Mapping:

CO	Program Outcomes													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	2	1	1	-	1	1	-	-	-	1	1	2	3	2
CO2	2	1	1	-	1	1	-	-	-	1	1	2	3	3
CO3	2	2	1	-	1	1	-	-	-	1	1	2	3	3
CO4	2	2	1	-	2	1	-	-	-	1	1	2	2	2
CO5	2	2	1	-	2	1	-	-	-	1	1	3	2	2
CO6														
Target	2.0	1.0	1.0		1.0	1.0				1.0	1.0	2.2	2.6	2.4

CO-PO Mapping justification

CO	PO / PSO	Correlation Weightage	Justification
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CO1	PO1	2	Applies fundamental engineering and computing knowledge to understand the basic concepts covered in the course.
	PO2	1	Provides basic ability to identify and analyze problems using the concepts learned.
	PO3	1	Supports the development of simple solutions by applying fundamental course concepts.
	PO5	1	Provides basic exposure to the use of appropriate modern tools and technologies relevant to the course.
	PO6	1	Creates basic awareness of the application of course knowledge in societal and professional contexts.
	PO10	1	Develops basic technical communication skills through presentation and interpretation of solutions and results.
	PO11	1	Introduces basic principles related to planning, organization, and management of technical activities.
	PSO1	2	Applies core program-specific knowledge to understand and solve problems related to the discipline.
	PSO2	3	Strongly supports the application of specialized program knowledge and techniques relevant to the course.
	PSO3	2	Supports the application of program-specific skills for solving practical problems.
CO2	PO1	2	Applies engineering and computing fundamentals to understand and solve course-related problems.
	PO2	1	Enables basic analysis and interpretation of problems using appropriate principles.
	PO3	1	Supports the formulation of simple solutions to identified problems.
	PO5	1	Provides basic exposure to relevant computational tools and techniques for problem solving.
	PO6	1	Develops awareness of the societal relevance and implications of engineering solutions.
	PO10	1	Supports effective communication and presentation of technical concepts and results.
	PO11	1	Provides basic understanding of planning and management aspects while carrying out technical activities.
	PSO1	2	Applies program-specific concepts and techniques to solve discipline-related problems.
	PSO2	3	Has a strong contribution toward applying specialized tools, methods, and knowledge of the program.



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	PSO3	3	Strongly develops program-specific practical and problem-solving competencies.
CO3	PO1	2	Applies fundamental engineering and domain knowledge to understand and solve technical problems.
	PO2	2	Analyzes problems and interprets information to arrive at appropriate solutions.
	PO3	1	Provides basic support for designing suitable solutions based on the analysis performed.
	PO5	1	Uses relevant modern tools and computational techniques for analysis and implementation.
	PO6	1	Creates awareness of the societal and professional implications of technical solutions.
	PO10	1	Develops the ability to communicate technical analysis and results effectively.
	PO11	1	Introduces planning and management considerations while implementing solutions.
	PSO1	2	Applies program-specific knowledge for analyzing and solving domain-related problems.
	PSO2	3	Strongly contributes to the use of specialized techniques and tools relevant to the program.
	PSO3	3	Strongly supports practical implementation and application of program-specific competencies.
CO4	PO1	2	Applies engineering and computing knowledge for understanding and implementing advanced course concepts.
	PO2	2	Analyzes technical problems and evaluates suitable approaches for solving them.
	PO3	1	Supports the development and implementation of appropriate solutions to identified problems.
	PO5	2	Uses appropriate modern engineering and computational tools for implementation and analysis.
	PO6	1	Provides awareness of professional and societal considerations associated with technical solutions.
	PO10	1	Supports effective documentation and communication of technical work and results.
	PO11	1	Develops basic planning and management skills in carrying out technical tasks.
	PSO1	2	Applies discipline-specific concepts to analyze and implement solutions to practical problems.



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	PSO2	2	Moderately contributes to the application of specialized program knowledge and tools.
	PSO3	2	Supports practical application of program-specific skills for developing technical solutions.
CO5	PO1	2	Applies engineering and domain knowledge to understand and solve advanced problems related to the course.
	PO2	2	Analyzes complex problems and identifies appropriate methods for obtaining solutions.
	PO3	1	Supports the development of suitable solutions based on identified requirements and constraints.
	PO5	2	Applies appropriate modern tools and technologies for analysis, implementation, and evaluation.
	PO6	1	Develops awareness of the societal and professional impact of engineering applications.
	PO10	1	Enables effective communication, interpretation, and presentation of technical outcomes.
	PO11	1	Supports basic project planning, organization, and management while carrying out technical activities.
	PSO1	3	Strongly applies program-specific knowledge and skills to solve practical and domain-oriented problems.
	PSO2	2	Applies specialized program tools and techniques to develop appropriate solutions.
	PSO3	2	Supports practical implementation and application of program-specific competencies.

Course Content (Syllabus)

Module 1	CH
An Overview of Java: Object-Oriented Programming (Two Paradigms, Abstraction, The Three OOP Principles), Using Blocks of Code, Lexical Issues (Whitespace, Identifiers, Literals, Comments, Separators, The Java Keywords). Data Types, Variables, and Arrays: The Primitive Types (Integers, Floating-Point Types, Characters, Booleans), Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, Introducing Type Inference with Local Variables. Operators: Arithmetic Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses. Control Statements: Java's Selection Statements (if, The Traditional switch), Iteration Statements (while, do-while, for, The For-Each Version of the for Loop, Local Variable Type Inference in a for Loop, Nested Loops), Jump Statements (Using break, Using continue, return).	09



Textbook 1: Chapter 2, 3, 4, 5 L3	RBT:
Module 2	
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection. Methods and Classes: Overloading Methods, Objects as Parameters, Argument Passing, Returning Objects, Recursion, Access Control, Understanding static, Introducing final, Introducing Nested and Inner Classes. Textbook 1: Chapter 6, 7 L3	08 RBT:
Module 3	
Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, Local Variable Type Inference and Inheritance, The Object Class. Interfaces: Interfaces, Default Interface Methods, Use static Methods in an Interface, Private Interface Methods. Textbook 1: Chapter 8, 9 L3	09 RBT:
Module 4	
Exceptions: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions. Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Obtaining a Thread's State. Textbook: Chapters 10, 11 L3	08 RBT:
Module 5	
Enumerations, Type Wrappers and Autoboxing: Enumerations (Enumeration Fundamentals, The values() and valueOf() Methods), Type Wrappers (Character, Boolean, The Numeric Type Wrappers), Autoboxing (Autoboxing and Methods, Autoboxing/Unboxing Occurs in Expressions, Autoboxing/Unboxing Boolean and Character Values). Generics: A Simple Generics Example, A Generic Class with Two Type Parameters, The General Form of a Generic Class.	08



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Textbook: Chapters 12, 14
L3

RBT:

Schedule of Instruction:

Class No	Topic	Date	RB T	C O	TLP
Module-1		An Overview of Java			
1	Introduction of course, vision and mission of department, course objectives discussion	07/09/2022	2	-	L
2	Object-Oriented Programming (Two Paradigms, Abstraction, The Three OOP Principles)		2	1	L
3	Using Blocks of Code, Lexical Issues (Whitespace, Identifiers, Literals, Comments, Separators, The Java Keywords)		2	1	L
4	Data Types, Variables, and Arrays: The Primitive Types (Integers, Floating-Point Types, Characters, Booleans), Variables.		2	1	Memory mapping
5	Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays.		2	1	L
6	Operators: Arithmetic Operators, Relational Operators, Boolean Logical Operators.		2	1	L
7	The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.		2	1	L
8	Control Statements: Java's Selection Statements (if, The Traditional switch), Iteration Statements (while, do-while.		3	1	Execution tracing using java online compiler
9	The For-Each Version of the for Loop, Local Variable Type Inference in a for Loop		3	1	Execution tracing using java online compiler
10	Nested Loops), Jump Statements (Using break, Using continue, return)		3	1	L
11	Students must solve 5 programs for the topics covered during the module.		3		Practice test
Module-2		Introducing Classes			



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Class No	Topic	Date	RB T	C O	TLP
12	Class Fundamentals, Declaring Objects, Assigning Object Reference Variables		2	2	L
13	Assigning Object Reference Variables		2	2	L
14	Introducing Methods, Constructors, the 'this' Keyword, and Garbage Collection		2	2	L
15	Overloading Methods, Using Objects as Parameters		3	2	Handson demonstration
16	Argument Passing, Returning Objects		3	2	L
17	Recursion		3	2	L
18	Introducing Access Control, Understanding static		3	2	L
19	Introducing final, Introducing Nested and Inner Classes		3	2	L
20	Students must solve 5 programs for the topics covered during the module.		3	2	Practice test
Module-3 Inheritance					
21	Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed		3	3	Interactive Visualization using Java Tutor
22	Method Overriding, Dynamic Method Dispatch		3	3	PPT
23	Using Abstract Classes, Using `final` with Inheritance		3	3	L
24	Local Variable Type Inference and Inheritance, The Object Class		3	3	L
25	Packages, Packages and Member Access		3	3	Hands on demonstration
26	Importing Packages ,Interfaces,		3	3	Hands on demonstration
27	Default Interface Methods		3	3	L
28	Use static Methods in an Interface		3	3	L
29	Private Interface Methods		3	3	L



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Class No	Topic	Date	RB T	C O	TLP
30	Students must solve 5 problems and analyse execution flow for the topics covered during the module.		3	3	Practice test
Module-4		Exceptions			
31	Exception-Handling Fundamentals, Exception Types		3	4	L
32	Uncaught Exceptions, Using try and catch, Multiple catch Clauses		3	4	Adversarial Bug Hunts
33	Nested try Statements, throw, throws		3	4	Hands on demonstration
34	finally, Java's Built-in Exceptions		3	4	L
35	Creating Your Own Exception Subclasses, Chained Exceptions		3	4	Real-World Domain Scenario Design
36	The Java Thread Model, The Main Thread		3	4	L
37	Creating a Thread, Creating Multiple Threads		3	4	PPT
38	Using isAlive() and join(), Thread Priorities, Obtaining a Thread's State		3	4	L
39	Students must solve 5 problems and analyse execution flow for the topics covered during the module.		3	3	Practice test
Module-5		Enumerations, Type Wrappers and Autoboxing			
40	Enumerations (Enumeration Fundamentals		5	3	PPT
41	The values() and valueOf() Methods)		5	3	PPT
42	Type Wrappers (Character, Boolean, The Numeric Type Wrappers)		5	3	Visual & Memory Profiling using javatutor
43	Autoboxing (Autoboxing and Methods		5	3	Handson demonstration
44	Autoboxing/Unboxing Occurs in Expressions, Autoboxing/Unboxing Boolean and Character Values).		5	3	L
45	A Simple Generics Example		5	3	L



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Class No	Topic	Date	RB T	C O	TLP
46	A Generic Class with Two Type Parameters		5	3	L
47	The General Form of a Generic Class		5	3	L
48	Students must solve 5 problems and analyse execution flow for the topics covered during the module.		3	3	Practice test

Practical Component of IPCC

Lab	Topic	Date	RB T	C O	Mode
1	Installation and use of IDE for Java. Writing simple Java programs to understand Java program development and execution model.		3	1	Handson
2	Sample Programs				
3	Develop a Java program to add TWO matrices of suitable order N		3	1	Handson
4	Develop a stack class to hold a maximum of 10 integers with suitable methods. Develop a Java main method to illustrate Stack operations		3	2	Handson
5	Create a Java class called Student with the USN, Name, Branch, Phone details as variables within it. Write a Java program to create N Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.		3	2	Handson
6	Develop a Java program to create a class named Shape. Create three sub classes, namely: circle, triangle and square. Each class has two member functions named draw and erase. Demonstrate the concepts of polymorphism by developing appropriate methods, defining member data, and implementing the main program		3	2	Handson
7	Develop a Java program to create an interface Resizable with methods <code>resizeWidth(int width)</code> and <code>resizeHeight(int height)</code> that allow an object to be resized. Create a class Rectangle that implements the Resizable interface and implements the resize methods		3	3	Handson
8	Develop a Java program to create a package named mypack and import & implement it in a suitable class		3	3	Handson



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Lab	Topic	Date	RB T	C O	Mode
9	Develop a Java program to raise a custom exception (user-defined exception) for DivisionByZero using try, catch, throw and finally		3	4	Handso n
10	Develop a program to create a class MyThread with a class constructor, call the base class constructor, using super and start the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently		3	4	Handso n
11	Develop a Java program using an enumeration called Department containing CSE, ISE, ECE, and MECH. Accept a department name as input and display the selected department using valueOf()		3	5	Handso n
12.	Develop a Java program to read the marks of three subjects as strings, convert them into wrapper objects, calculate the total and average using autoboxing/unboxing and display the result		3	5	Handso n
13.	Micro Project: A team of two to three students shall develop a project and submit a brief report for a specific task assigned by the course instructor based on the concepts covered in the syllabus		6	1-5	

Self-study hours:

For 4 credits: Self-study hours = 120 hours – Course delivery planned hours = ... hours

For 3 credits: Self-study hours = 90 hours – Course delivery planned hours = ... hours

For 2 credits: Self-study hours = 60 hours – Course delivery planned hours = ... hours

For 1 credit: Self-study hours = 30 hours – Course delivery planned hours = ... hours

SL#	Self-study content	Hours
1	Springboard course on: Java Programming Fundamentals	36
2	Solve problems on HackerRank using Java programming https://www.hackerrank.com/domains/java	10
Total hours		46

Textbooks:

T1	Herbert Schildt and Danny Coward, Java: The Complete Reference, 13th Edition, McGraw-Hill, 2024.
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Reference books:



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R1	Cay S. Horstmann, Core Java Volume I – Fundamentals, 14th Edition, Oracle Press, 2026.
R2	E. Balagurusamy, Programming with Java, 7th Edition, McGraw-Hill Education, 2024.

Web links and Video Lectures (e-Resources):

1.	Official Java documentation (Oracle): https://docs.oracle.com/javase/tutorial/
2.	Modern Java learning resources (Dev Java): https://dev.java/learn/
3.	Java Tutorial: https://www.w3schools.com/java/
4.	Programming examples and practice (GeeksforGeeks): https://www.geeksforgeeks.org/java/java/
5.	Infosys Springboard Course on Java Programming Fundamentals: https://infyspringboard.onwingspan.com/web/en/login
6.	HackerRank platform: https://www.hackerrank.com/domains/java
7.	Structured video lectures (NPTEL): (https://nptel.ac.in/courses/106105191/)

Assessment Schedule:

S.N	Assessment Type	Content	CO	Duration	Marks	Date
1.	IA-1	Module 1,2,3	1-3	1.5 hrs	50	
2.	IA-2	Module 3,4,5	3-5	1.5hrs		
IA Scaled down to					25	
IA Theory component					25	
3.	Assessment	-	-	-	0	
4.	Seminar/ <i>any planned activity</i>	-	-	-	0	
Assessment Total						
Total (IA + Assessment)						
5.	Lab record	Exp 1-12	1-6		15	
6.	Lab IA	Exp 1-12	1-6		10	
Practical Component Total					25	
Total (IA+ Practical)					50	
7.	Semester End Examination	Module 1-5	1-5	3 hrs	100	



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SEE Scaled down to	50	
Total (IA+ SEE)	100	

*RB – Text Book/Reference Book, *L – Interactive Lecture, V- Videos or any other mode, *RBT – Revised Blooms’ Taxonomy, L: T: P: C – Theory/Lecture: Tutorial: Practical/Drawing: Credits, SEE: Semester End Examination, CIE: Continuous Internal Evaluation*

Faculty In charge

Course Coordinator

HoD