

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

Syllabus

Course Code	Course Name	L	T	P	C
Value Added Course	Advanced Java Programming – CRT Model	15	0	30	2

Course Objectives

- To understand the fundamentals of Java programming, syntax, and execution environment.
- To learn core Object-Oriented Programming (OOPS) concepts for building structured and reusable code.
- To apply loops, conditional statements, and functions to solve computational problems.
- To develop logical thinking through number crunching, array, matrix, and string-based programs.
- To strengthen problem-solving skills using Java for real-world and competitive programming scenarios.

UNIT 1: INTRODUCTION TO JAVA & PROGRAMMING BASICS (9)

Introduction to Java and its features – Java architecture (JDK, JRE, JVM) – Structure of a Java program – Compilation and execution process – Variables, data types, and type casting – Operators and expressions – Input and output using Scanner – Decision-making statements (if, if-else, switch) – Writing simple Java programs – Basic debugging and error handling.

UNIT 2: LOOPS & NUMBER CRUNCHING PROGRAMS (9)

Introduction to looping concepts – for, while, and do-while loops – Nested loops – Control statements (break, continue) – Number crunching programs such as factorial, Fibonacci series, prime number, palindrome, Armstrong number, reverse number, sum of digits – Pattern printing using loops – Logical thinking through iterative problem solving – Hands-on coding exercises.

UNIT 3: OBJECT-ORIENTED PROGRAMMING (OOPS) CONCEPTS (9)

Introduction to OOPS principles – Class and object concepts – Constructors and types – Encapsulation and data hiding – Inheritance and types – Polymorphism (method overloading and overriding) – Abstraction using abstract classes and interfaces – Real-world examples of OOPS – Writing modular and reusable Java programs.

UNIT 4: ARRAYS, MATRICES & FUNCTIONS (9)

Introduction to arrays – One-dimensional and two-dimensional arrays – Basic and mid-level array programs (sum, average, max/min, searching, sorting) – Matrix fundamentals – Matrix operations (addition, subtraction, transpose, multiplication) – Introduction to functions (methods) – User-defined methods and parameter passing – Problem-solving using arrays, matrices, and functions.

UNIT 5: STRINGS OPERATIONS PROBLEM-SOLVING TECHNIQUES (9)

Introduction to String class and string handling – String methods and immutability – String comparison and manipulation – Basic and mid-level string problems (reverse string, palindrome, word count, character frequency, capitalization) – Problem-solving strategies in Java – Algorithmic thinking and step-by-step solution design – Solving real-world logical problems – Combination of loops, arrays, strings, and OOPS – Mini case studies and coding challenges – Best practices for clean and efficient Java code.

Course Outcomes

At the end of the course, students will be able to:

CO1: Explain Java fundamentals, program structure, and execution flow using core syntax and control statements.

CO2: Apply loops and conditional logic to solve number crunching and pattern-based problems.

CO3: Implement Object-Oriented Programming concepts such as classes, inheritance, polymorphism and abstraction.

CO4: Develop solutions using arrays, matrices, functions, and string manipulation techniques.

CO5: Demonstrate strong problem-solving skills by designing efficient Java programs for real-world and logical challenges.

CO-PO Mapping and SDG Mapping

CO - PO Mapping

CO				PO4	PO5								PSO2
CO1	H	M	L	L	M	L	-	-	L	L	-	M	L
CO2	M	H	M	L	M	L	-	-	L	L	-	H	M
CO3	M	M	H	L	M	L	-	-	L	L	-	M	H
CO4	M	H	H	L	M	L	-	-	L	L	-	H	H
CO5	M	H	H	L	M	L	-	-	L	L	L	H	H

SDG Mapping

CO's	SDG mapping with CO's	
CO1	SDG 04 - Quality Education	-
CO2	SDG 04 - Quality Education	-
CO3	SDG 04 - Quality Education	SDG 09 - Industry, Innovation, and Infrastructure
CO4	SDG 04 - Quality Education	SDG 09 - Industry, Innovation, and Infrastructure
CO5	SDG 04 - Quality Education	SDG 09 - Industry, Innovation, and Infrastructure