Java Programming Language

Course Duration

- **Total Duration:** 70–90 Hours
- **Theory:** 40%
- **Practical / Lab:** 60%

Prerequisites

- Basic Computer Fundamentals
- Basic Programming Concepts (C / Python – helpful but not mandatory)
- Understanding of OOP concepts (intro level)

Module 1: Introduction to Java (6 Hours)

- History and Features of Java
- Java Platform (JDK, JRE, JVM)
- Java Program Structure
- Compilation and Execution Process
- Bytecode and Platform Independence
- Data Types and Variables
- Keywords and Identifiers

Module 2: Operators and Control Statements (8 Hours)

- Operators
  - Arithmetic
  - Relational
  - Logical
  - Assignment
  - Unary
  - Ternary
- Control Statements
  - if, if-else, nested if
  - switch
- Looping
  - for
  - while
  - do-while
- break and continue

Module 3: Arrays and Strings (8 Hours)

- One-Dimensional Arrays
- Multi-Dimensional Arrays
- Array Class
- String Class

- StringBuffer and StringBuilder
- String Methods and Comparisons

Module 4: Object-Oriented Programming Concepts (10 Hours)

- Class and Object
- Constructors
- this Keyword
- Access Modifiers
- Encapsulation
- Inheritance
- Polymorphism
- Method Overloading
- Method Overriding
- super Keyword

Module 5: Packages and Interfaces (6 Hours)

- Packages
- Access Protection
- Interfaces
- Multiple Inheritance using Interfaces
- Abstract Classes vs Interfaces

Module 6: Exception Handling (6 Hours)

- Types of Errors
- Exceptions Hierarchy
- try, catch, finally
- throw and throws
- Custom Exceptions
- Best Practices

Module 7: Multithreading (8 Hours)

- Thread Lifecycle
- Creating Threads
- Thread Class vs Runnable Interface
- Thread Synchronization
- Inter-Thread Communication
- Deadlock (Overview)

Module 8: File Handling and I/O Streams (8 Hours)

- File Class
- Byte Streams
- Character Streams
- Buffered Streams
- Serialization and Deserialization

- Reading and Writing Files

Module 9: Java Collections Framework (8 Hours)

- Collection Framework Overview
- List
    - ArrayList
    - LinkedList
- Set
    - HashSet
    - TreeSet
- Map
    - HashMap
    - TreeMap
- Iterator and Comparable

Module 10: JDBC (Java Database Connectivity) (6 Hours)

- Introduction to JDBC
- JDBC Architecture
- Drivers
- Connecting Java with Database
- CRUD Operations
- PreparedStatement

Module 11: GUI Programming   (6 Hours)

- AWT Basics
- Swing Components
- Event Handling
- Layout Managers

Module 12: Advanced Java Overview (6 Hours)

- Servlets and JSP (Introduction)
- MVC Architecture
- Introduction to Spring Framework
- REST API Basics

Module 13: Mini Projects & Practice (10 Hours)

Project Ideas:

- Student Management System
- Library Management System
- Banking Application
- Multithreaded Chat Application
- Database-Driven CRUD Application

Learning Outcomes

After completing the course, students will be able to:

- Write structured and object-oriented Java programs
- Understand JVM internals and memory management
- Use collections and multithreading effectively
- Build database-connected applications
- Prepare for Java interviews and certifications