

Certificate Course in Advanced Java Programming

Course Duration: 2 Months

Course Overview

The **Certificate Course in Advanced Java Programming** is designed for learners who have a basic understanding of Core Java and want to advance their skills in **Java SE and Java EE technologies**. The course covers **advanced object-oriented programming, multithreading, collections framework, JDBC (Java Database Connectivity), networking, Swing GUI, and Java I/O**, along with **hands-on projects**.

This course equips students to **develop professional-grade applications**, including **desktop and database-driven applications**, and prepares them for **careers in software development, web development, and enterprise Java projects**.

Course Objectives

By the end of this course, learners will be able to:

1. Understand and apply **advanced Java programming concepts**.
 2. Develop **multithreaded and event-driven applications**.
 3. Work with **Java Collections Framework and Generics** to manage data efficiently.
 4. Connect Java programs with **databases using JDBC**.
 5. Build **graphical user interface (GUI) applications** using Swing.
 6. Apply **networking and file I/O** concepts in real-world applications.
 7. Prepare for **Java programming roles** in IT and software development.
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Course Outcomes

After completing this course, students will be able to:

1. Develop Java applications using **advanced OOP concepts** such as abstraction, encapsulation, inheritance, and polymorphism.
2. Implement **multithreading and synchronization** for concurrent programming.
3. Use **collections and generics** to store, retrieve, and manipulate data efficiently.
4. Connect Java programs to relational databases using **JDBC**.

5. Build **interactive desktop applications** using Swing components.
 6. Work with **networking, sockets, and file operations** in Java.
 7. Create **robust, real-world applications** for academic or professional projects.
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Course Syllabus (Module-Wise)

Module 1: Advanced OOP Concepts in Java

- Recap of Core Java OOP concepts
 - Abstract Classes & Interfaces
 - Inner Classes & Nested Classes
 - Packages and Access Modifiers
 - Java Annotations
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Module 2: Exception Handling & Assertions

- Advanced Exception Handling Techniques
 - Custom Exception Classes
 - try-with-resources Statement
 - Assertions in Java
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Module 3: Multithreading & Concurrency

- Introduction to Threads in Java
 - Thread Lifecycle and States
 - Creating Threads: Thread Class & Runnable Interface
 - Thread Synchronization & Inter-thread Communication
 - Thread Pools and Executors
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Module 4: Collections Framework & Generics

- Introduction to Collections Framework
- List, Set, Map, and Queue Interfaces

- Iterators and Enhanced For-Loop
 - Generics in Java – Type Safety and Reusability
 - Practical Examples Using Collections
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Module 5: File Handling & I/O Streams

- File Class, FileReader, FileWriter
 - BufferedReader & BufferedWriter
 - Byte Streams: InputStream, OutputStream
 - Object Serialization & Deserialization
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Module 6: JDBC (Database Connectivity)

- Introduction to JDBC & Database Concepts
 - Connecting to Databases (MySQL/Oracle)
 - Executing SQL Queries from Java
 - PreparedStatement, CallableStatement, ResultSet
 - Exception Handling in JDBC
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Module 7: Networking in Java

- Introduction to Networking Concepts
 - URL, Socket, ServerSocket Classes
 - TCP/IP & UDP Communication
 - Building Client-Server Applications
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Module 8: GUI Programming with Swing

- Introduction to Swing Components
- JFrame, JPanel, JButton, JLabel, JTextField
- Event Handling in Swing
- Layout Managers (BorderLayout, FlowLayout, GridLayout)

- Building Small GUI Projects
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Module 9: Mini Project & Assessment

- Student Management / Banking System / Inventory System
 - Implementation Using Advanced Java Concepts
 - Debugging and Testing
 - Final Assessment & Certification
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- ☒ **Teaching Methodology:** 70% Practical + 30% Theory
- ☒ **Outcome:** Students will be able to **develop professional desktop and database-driven Java applications** and gain **industry-ready skills in advanced Java programming**.