# Complete Java Micro-Syllabus

This micro-syllabus is designed to provide a structured approach to mastering Java, covering everything from core concepts to advanced topics like JVM internals, Spring Boot, and multithreading. It is divided into foundational, intermediate, and advanced levels.

## 1. Foundational Level

✔ Introduction to Java

✔ Installation and Setup (JDK, IDEs like IntelliJ, Eclipse, VS Code)

✔ Basic Syntax: Variables, Data Types, Operators

✔ Control Flow: If-else, Loops, Switch-case

✔ Functions & Methods (Pass by Value, Pass by Reference)

✔ Exception Handling: Try-Catch, Finally, Throws, Custom Exceptions

✔ Java Input/Output (Scanner, BufferedReader, File Handling)

## 2. Object-Oriented Programming (OOP)

✔ Classes and Objects

✔ Constructors and Destructors

✔ Inheritance (Single, Multilevel, Hierarchical, Multiple via Interfaces)

✔ Polymorphism (Method Overloading, Method Overriding)

✔ Abstraction (Abstract Classes, Interfaces)

✔ Encapsulation

✔ Static and Final Keywords

✔ Inner Classes and Anonymous Classes

## 3. Data Structures & Algorithms (DSA)

✔ Arrays (1D, 2D, Multi-dimensional)

✔ Strings (Immutable, StringBuilder, StringBuffer)

✔ Linked Lists (Singly, Doubly, Circular)

✔ Stacks and Queues (Using Arrays and Linked Lists)

✔ Recursion & Backtracking

✔ Sorting Algorithms (Bubble, Selection, Merge, Quick, Heap)

✔ Searching Algorithms (Linear Search, Binary Search)

✔ HashMaps and HashSets (Implementation & Use Cases)

✔ Trees (Binary Tree, Binary Search Tree, AVL, Red-Black)

✔ Graph Algorithms (BFS, DFS, Dijkstra, Kruskal, Prim's)

✔ Dynamic Programming (Knapsack, LCS, LIS, Fibonacci)

## 4. Advanced Java Concepts

✔ Multithreading (Thread Class, Runnable Interface, Synchronization)

✔ Concurrency & Parallelism (Executor Framework, Fork-Join)

✔ Java Collections Framework (List, Set, Map, Queue)

✔ Streams API & Functional Programming (Lambda, Stream Operations)

✔ Reflection API (Metadata, Annotations, Class Loaders)

✔ JVM Internals (Heap, Stack, Garbage Collection, Class Loaders)

## 5. Database & Backend Development

✔ JDBC (Connecting Java with Databases)

✔ Hibernate (ORM Framework)

✔ Spring Boot Basics (Dependency Injection, REST API, MVC Pattern)

✔ Spring Data JPA & Hibernate

✔ Security (JWT, OAuth)

## 6. Web & App Development with Java

✔ Java Servlets and JSP

✔ RESTful APIs using Spring Boot

✔ Full-Stack Java Development with React/Angular & Spring Boot

✔ Mobile App Development using Android Studio (Java)

## 7. DevOps & Cloud Deployment

✔ Deploy Java Applications on AWS, Heroku, Railway, or Render

✔ Docker & Kubernetes for Java Applications

✔ CI/CD with GitHub Actions, Jenkins

## 8. Java for Competitive Programming & Hackathons

✔ Optimizing Java Code for Speed & Memory Usage

✔ Understanding Java Memory Model & Garbage Collection

✔ Using Java Libraries like Apache Commons, Guava, and Lombok

✔ Building Fast APIs for Hackathons

🎯 By completing this syllabus, you will master Java from basics to advanced concepts, including backend development, DSA, and hackathon preparation. Happy coding! 🚀