

KAUR'S CODING ACADEMY

Java Backend Development

Module-wise Teacher Syllabus

A complete Java backend syllabus from Java fundamentals to Core Java, Advanced Java, JSP/Servlet, Spring, Spring Boot, Hibernate, microservices and interview preparation.

Course	Audience	Suggested Duration	Final Output
Java Backend Development	College students, backend learners and professionals	90 classes / 8 to 10 months	Java backend project with OOP, collections, JDBC, JSP/Servlet, Spring Boot, Hibernate and microservices overview

Teacher Note

This is a deep backend track. Use coding practice heavily, explain concepts through real-life examples and keep one ongoing backend project from JDBC onward.

Learning Outcomes

- Understand Java fundamentals, JDK/JRE/JVM, variables, operators, conditions, loops and functions.
- Apply OOP concepts: classes, objects, constructors, inheritance, polymorphism, abstraction and encapsulation.
- Use arrays, strings, exceptions, collections, Java 8 features, file I/O and JDBC.
- Build web applications with JSP/Servlet and backend APIs with Spring Boot.
- Understand Hibernate ORM, microservices architecture and interview preparation topics.

Document Use

This PDF is made for teachers to plan classes module by module. Each module includes topic names, teaching points, class practice and revision work.

Complete Module Index

The table below gives a quick view of what will be taught in this course.

Module	Topic Name	Main Things Teacher Will Cover
1	Introduction to Java	JDK, JRE and JVM, Why Java was developed, Features of Java, Application areas, and more
2	Java Installation and IDE Setup	Install Java on Windows, Path variable setup, Java version check, Text editors and IDEs, and more
3	Identifiers, Keywords, Variables and Data Types	Identifiers and naming convention, Keywords, Variables and literals, Primitive data types, and more
4	Operators and Type Casting	Arithmetic operators, Relational operators, Logical operators, Assignment operators, and more
5	Conditional Statements	if statement, if-else, nested if, if-elseif-else, and more
6	Loops, Functions and User Input	For loop, While loop, Do-while loop, Enhanced for loop overview, and more
7	OOP Basics - Classes and Objects	Why OOP is used, Features of OOP, Class and object syntax, Constructors, and more
8	Inheritance and Polymorphism	Inheritance concept, Types of inheritance, super keyword, final keyword, and more
9	Abstraction, Interface and Encapsulation	Encapsulation, Getters and setters, Abstract class, Abstract method, and more
10	Packages, Access Modifiers and Nested Types	Packages and package types, Access modifiers, Static nested class, Non-static nested class, and more
11	Arrays and Strings	Array overview, Types of arrays, Array operations, Jagged arrays, and more
12	Exception Handling	What are exceptions?, Types of exceptions, Checked and unchecked exceptions, try, catch, finally, and more
13	DBMS, SQL and JDBC	DBMS overview, Relational vs NoSQL databases, SQL basics, Creating tables, and more
14	Multithreading	Multitasking, Multiprocessing vs multithreading, Main thread, Creating child threads, and more
15	Collections Framework	Collections overview, List, Set, Queue and Map, ArrayList and LinkedList, HashSet, TreeSet and LinkedHashSet, and more
16	Iterator, Comparator, Comparable and Java 8	Iterator and ListIterator, foreach loop, Comparator, Comparable, and more
17	File I/O, Serialization and Deserialization	Why streams are needed, Byte stream, Character stream, Read and write operations, and more
18	JSP and Servlet Basics	Servlet basics, JSP overview, Servlet lifecycle, Handling GET and POST, and more
19	Session Management and Web Security	HTTP sessions, Cookies, Session tracking, URL rewriting, and more
20	Spring Framework	Why Spring is used, Spring architecture, Loose vs tight coupling, Dependency Injection, and more
21	Spring Boot Fundamentals	First Spring Boot application, @SpringBootApplication, Executable JAR, Directory structure, and more
22	Spring Boot Web, JPA and Repositories	Spring Web MVC flow, Embedded server, Filters and servlets registration, Spring Data JPA, and more
23	Spring Security, Actuator and Cloud Concepts	Spring Security overview, Authentication and authorization, Actuator endpoints, Spring Cloud concept, and more
24	Hibernate ORM	ORM overview, Hibernate advantages, Configuration and mapping, One-to-one, one-to-many, many-to-one and many-to-many, and more
25	Microservices Architecture	Monolithic vs microservices, Service boundaries, Service registry, API gateway, and more

Module	Topic Name	Main Things Teacher Will Cover
26	Project Work and Interview Preparation	Backend capstone planning, Code practice, Complex programming questions, Common Java interview topics, and more

Detailed Module-wise Teaching Plan

Teachers should first explain the concept in simple language, then demonstrate code, then allow students to practice and customize the output.

Module 1: Introduction to Java

Topics to be Covered	What Teacher Will Explain / Demonstrate
- JDK, JRE and JVM - Why Java was developed - Features of Java - Application areas - History of Java - Platform independence - Different Java platforms	- Explain JVM architecture and platform independence - Discuss Java use in backend, Android and enterprise systems - Compare JDK/JRE/JVM clearly
Class Practice / Student Output	Homework / Revision
- Draw JDK/JRE/JVM relationship - Write first Java program overview - Discuss Java use cases	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 2: Java Installation and IDE Setup

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Install Java on Windows - Path variable setup - Java version check - Text editors and IDEs - Eclipse, IntelliJ, VS Code - Project structure	- Demonstrate installation and path setup - Show compiling/running Java program - Explain IDE project folders
Class Practice / Student Output	Homework / Revision
- Install Java and IDE - Create first project - Run Hello World program	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 3: Identifiers, Keywords, Variables and Data Types

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Identifiers and naming convention - Keywords - Variables and literals - Primitive data types - Memory idea - Type ranges overview	- Explain data storage in simple terms - Demonstrate variable declaration and initialization - Show naming rules and common mistakes
Class Practice / Student Output	Homework / Revision
- Create variables of all data types - Print values - Practice naming convention	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 4: Operators and Type Casting

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Arithmetic operators - Relational operators - Logical operators - Assignment operators - Widening casting - Narrowing casting - Type conversion practice	- Explain operators with examples - Demonstrate automatic and manual casting - Show risks of narrowing conversion
Class Practice / Student Output	Homework / Revision
- Solve operator programs - Practice type casting - Create bill/marks calculator	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 5: Conditional Statements

Topics to be Covered	What Teacher Will Explain / Demonstrate
- if statement - if-else - nested if - if-elseif-else - Switch statement - Logic building with conditions	- Explain decision making with flowcharts - Demonstrate grade and eligibility examples - Show switch for menu-driven programs
Class Practice / Student Output	Homework / Revision
- Build grade calculator - Create menu program using switch - Solve logic questions	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 6: Loops, Functions and User Input

Topics to be Covered	What Teacher Will Explain / Demonstrate
- For loop - While loop - Do-while loop - Enhanced for loop overview - Flowcharts - Taking input from user - Methods/functions	- Explain loop selection - Demonstrate scanner input - Show method creation and calling
Class Practice / Student Output	Homework / Revision
- Create multiplication table - Solve pattern programs - Write reusable methods	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 7: OOP Basics - Classes and Objects

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Why OOP is used - Features of OOP - Class and object syntax - Constructors - this keyword - Static and non-static variables	- Explain class/object with real-life examples - Demonstrate constructor use - Show static vs instance data
Class Practice / Student Output	Homework / Revision
- Create Student class - Add constructor and methods - Create multiple objects	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 8: Inheritance and Polymorphism

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Inheritance concept - Types of inheritance - super keyword - final keyword - Method overloading - Method overriding - Upcasting and downcasting - Polymorphism types	- Explain parent-child relationship - Demonstrate overriding and overloading - Show runtime polymorphism with examples
Class Practice / Student Output	Homework / Revision
- Create inheritance example - Practice method overriding - Use upcasting in program	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 9: Abstraction, Interface and Encapsulation

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Encapsulation - Getters and setters - Abstract class - Abstract method - Interface - Multiple inheritance through interface - Difference between abstraction and interface	- Explain hiding data and exposing methods - Demonstrate interface-based design - Compare abstract class and interface
Class Practice / Student Output	Homework / Revision
- Create BankAccount with encapsulation - Create interface implementation - Solve abstraction task	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 10: Packages, Access Modifiers and Nested Types

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Packages and package types - Access modifiers - Static nested class - Non-static nested class - Local class - Nested interface - Anonymous class	- Explain code organization with packages - Demonstrate public/private/protected/default - Show nested and anonymous class examples
Class Practice / Student Output	Homework / Revision
- Create packages - Practice access modifiers - Build anonymous class demo	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 11: Arrays and Strings

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Array overview - Types of arrays - Array operations - Jagged arrays - String class - String operations - StringBuffer and StringBuilder	- Explain arrays as fixed-size collections - Demonstrate string immutability - Compare StringBuffer and StringBuilder
Class Practice / Student Output	Homework / Revision
- Solve array questions - Practice string reverse/count - Use StringBuilder in program	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 12: Exception Handling

Topics to be Covered	What Teacher Will Explain / Demonstrate
- What are exceptions? - Types of exceptions - Checked and unchecked exceptions - try, catch, finally - throw and throws - Exception flow chart	- Explain runtime problems and safe handling - Demonstrate try/catch examples - Show checked vs unchecked cases
Class Practice / Student Output	Homework / Revision
- Handle divide-by-zero error - Create custom error scenario - Practice exception keywords	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 13: DBMS, SQL and JDBC

Topics to be Covered	What Teacher Will Explain / Demonstrate
- DBMS overview - Relational vs NoSQL databases - SQL basics - Creating tables - Insert, select, update and delete - JDBC need and connectivity	- Explain backend database connection - Demonstrate MySQL table operations - Show Java JDBC connection flow
Class Practice / Student Output	Homework / Revision
- Create database table - Connect Java with MySQL - Perform CRUD using JDBC	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 14: Multithreading

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Multitasking - Multiprocessing vs multithreading - Main thread - Creating child threads - Thread states - Thread synchronization - Daemon threads - Inter-thread communication - Deadlock overview	- Explain concurrent execution with real examples - Demonstrate thread creation - Show synchronization need
Class Practice / Student Output	Homework / Revision
- Create thread program - Practice synchronized method/block - Discuss deadlock scenario	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 15: Collections Framework

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Collections overview - List, Set, Queue and Map - ArrayList and LinkedList - HashSet, TreeSet and LinkedHashSet - Vector and Stack - Queue and Deque - HashMap, Hashtable, TreeMap	- Explain why collections are used over arrays - Demonstrate list/set/map differences - Show real data examples
Class Practice / Student Output	Homework / Revision
- Use ArrayList for student list - Use Set to remove duplicates - Use Map for key-value data	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 16: Iterator, Comparator, Comparable and Java 8

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Iterator and ListIterator - foreach loop - Comparator - Comparable - Java 8 features - Lambda expressions - Method references - Functional interface - Streams API	- Explain sorting user-defined objects - Demonstrate lambda and streams - Compare foreach loop and Stream API
Class Practice / Student Output	Homework / Revision
- Sort objects using Comparator - Use streams to filter data - Create lambda examples	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 17: File I/O, Serialization and Deserialization

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Why streams are needed - Byte stream - Character stream - Read and write operations - Serialization - Deserialization - File-based practice	- Explain file read/write in backend use cases - Demonstrate writing a file - Show object serialization concept
Class Practice / Student Output	Homework / Revision
- Create file writer program - Read data from file - Serialize and deserialize object	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 18: JSP and Servlet Basics

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Servlet basics - JSP overview - Servlet lifecycle - Handling GET and POST - Request and response objects - JSP elements and scripting	- Explain web application flow in Java - Demonstrate servlet lifecycle - Show form submission to servlet
Class Practice / Student Output	Homework / Revision
- Create servlet page - Handle form POST request - Display response in JSP	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 19: Session Management and Web Security

Topics to be Covered	What Teacher Will Explain / Demonstrate
- HTTP sessions - Cookies - Session tracking - URL rewriting - Servlet filters - Servlet listeners - Authentication and authorization - JSTL overview	- Explain maintaining login state - Demonstrate session and cookies - Show filter for protected pages
Class Practice / Student Output	Homework / Revision
- Build login session demo - Add logout - Use JSTL for simple iteration/condition	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 20: Spring Framework

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Why Spring is used - Spring architecture - Loose vs tight coupling - Dependency Injection - Maven and Gradle - Bean lifecycle - Bean scopes - IoC container - Spring MVC	- Explain dependency injection with real examples - Demonstrate bean creation and injection - Show MVC pattern in Spring
Class Practice / Student Output	Homework / Revision
- Create Spring project - Inject dependency - Build simple Spring MVC controller	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 21: Spring Boot Fundamentals

Topics to be Covered	What Teacher Will Explain / Demonstrate
- First Spring Boot application - @SpringBootApplication - Executable JAR - Directory structure - Starter parent - Application events - Application properties and YAML - Profiles	- Explain why Spring Boot is faster than manual Spring setup - Demonstrate first controller - Show properties and profiles
Class Practice / Student Output	Homework / Revision
- Create Spring Boot app - Run controller endpoint - Configure application.properties	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 22: Spring Boot Web, JPA and Repositories

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Spring Web MVC flow - Embedded server - Filters and servlets registration - Spring Data JPA - CrudRepository and JpaRepository - findBy methods - Custom queries	- Explain controller-service-repository flow - Demonstrate entity and repository - Show CRUD API with JPA
Class Practice / Student Output	Homework / Revision
- Create REST API - Connect database with JPA - Implement CRUD endpoints	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 23: Spring Security, Actuator and Cloud Concepts

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Spring Security overview - Authentication and authorization - Actuator endpoints - Spring Cloud concept - AOP overview - Project implementation	- Explain security filter chain conceptually - Show protected endpoint idea - Discuss monitoring with actuator
Class Practice / Student Output	Homework / Revision
- Secure one endpoint - Enable actuator endpoint - Discuss cloud-ready architecture	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 24: Hibernate ORM

Topics to be Covered	What Teacher Will Explain / Demonstrate
- ORM overview - Hibernate advantages - Configuration and mapping - One-to-one, one-to-many, many-to-one and many-to-many - Session and SessionFactory - Transactions - HQL and Criteria API - Caching - Lazy and eager loading	- Explain ORM as mapping Java objects to database tables - Demonstrate entity mapping - Show CRUD with Hibernate and transactions
Class Practice / Student Output	Homework / Revision
- Create Hibernate entity - Perform CRUD - Write one HQL query	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 25: Microservices Architecture

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Monolithic vs microservices - Service boundaries - Service registry - API gateway - Interservice communication - Distributed logging - Docker/Kubernetes overview - Cloud overview	- Explain why large systems split into services - Demonstrate architecture diagram - Discuss benefits and drawbacks
Class Practice / Student Output	Homework / Revision
- Design microservice architecture for e-commerce - Identify services and APIs - Prepare architecture explanation	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Module 26: Project Work and Interview Preparation

Topics to be Covered	What Teacher Will Explain / Demonstrate
- Backend capstone planning - Code practice - Complex programming questions - Common Java interview topics - Spring Boot project explanation - Resume/GitHub project readiness	- Review project and code quality - Practice interview-style questions - Train students to explain architecture and features
Class Practice / Student Output	Homework / Revision
- Build final backend project - Prepare interview notes - Submit GitHub/project demo	- Revise the class notes and complete a small improvement in the class project. - Write down two doubts or two new things learned in the module.

Final Review and Certification Checklist

- Student can explain the main concepts in simple words.
- Student has completed the required practice tasks and mini projects.
- Student can run the project, fix common errors and present the work confidently.
- For advanced courses, student should submit GitHub repository, screenshots and deployment link where possible.