



## **COURSE CONTENT**

## COURSE NAME

JAVA

## DURATION

35 DAYS

## COURSE OUTLINE

### SDLC & Agile:

#### Day 1

- What is SDLC
- SDLC Phases
- Requirement Phase
- Design Phase
- Development Phase
- Testing Phase
- Deployment Phase
- Maintenance Phase
- SDLC Methodologies

#### Day 2

- Introduction to Agile
- Agile 12 Principles
- Agile Manifesto
- Key Agile Concepts (User Stories, Product Backlog, Sprint Backlog, Sprint, Release)
- The Agile Team and Tools (Scrum Master, Product Owner, Scrum Team, Burndown/Burnup chart, Agile Board)
- Agile Rituals (Sprint Planning, Daily Stand-ups, Sprint Review, Retrospectives)
- Trello Board/ Jira
- Agile Real-life example

### Core JAVA and JEE

#### Day 3

- Introduction to Java and OOPS
- Java Tokens – Keywords, Identifiers, Comments
- Working with IDEs – Eclipse & IntelliJ Idea
- Operators & Control Statements

- Data Types, Literals, Type Conversion, Casting
- Variables and Types of Variables
- Modifiers – Access and Non-Access Modifiers

#### Day 4

- Conditional Statements- if, if-else, nested if-else, switch-case
- Looping Statements – for, for-each, while, do-while
- Control flow statements- break, continue

#### Day 5

- Introduction to Java class & Encapsulation
- Instance fields & static fields
- Instance methods & static methods
- Instance blocks & static blocks
- Inner classes and their types

#### Day 6

- Introduction to Constructors
- default & parameterized
- Constructor Overloading
- Method Overloading
- This & super keywords
- Constructor chaining

#### Day 7

- Introduction to Inheritance
- extends keyword
- IS-A & HAS-A Relationship
- Types of Inheritance – Single, Multi-level, Multiple
- Object class as superclass of all classes
- final keyword
- Method Overriding
- Method Overriding Rules

#### Day 8

- Introduction to arrays in Java
- Primitive arrays and reference arrays
- Limitations and operations of arrays

- Var-arg types
- Built-in java. util. Arrays class

### Day 9

- Introduction to Polymorphism
- Compile time Polymorphism
- Dynamic Polymorphism
- Abstraction in Java
- Abstract class
- Interfaces

### Day 10

- String Handling
- String, StringBuilder & StringBuffer classes
- String Immutability
- String methods
- toString internal working

### Day 11

- Exception Handling
- Types of errors – syntax errors, runtime errors, logical errors
- Checked and Unchecked exceptions
- Custom exceptions
- Diff between throw & throws
- Finally, keyword
- Try-with-resources
- Exception Propagation

### Day 12

- Introduction to Collections Framework
- Introduction to List interface
- ArrayList
- LinkedList
- Vector
- Stack
- Iterator & ListIterator
- Diff between ArrayList & LinkedList
- Diff between ArrayList & Vector

### Day 13

- Introduction to Set interface
- HashSet
- LinkedHashSet
- TreeSet
- Introduction to Map interface
- Different Map views
- HashMap
- LinkedHashMap
- TreeMap
- Hashtable classes
- Comparable & Comparator interfaces
- Internal working of HashMap

### Day 14

- Introduction to Java 8 Features
- Lambda Expressions
- Method References
- Functional interfaces
- Stream API

### Optional class

- Date & Time API

### Day 15

- Introduction to multithreading
- Process & Thread
- Thread class & Runnable interface
- Thread lifecycle
- Thread Synchronization
- Executor Framework

### Day 16

- Introduction to JDBC
- Connection
- Statement
- PreparedStatement

- ResultSet and its types
- JDBC DataSource

### **Spring Boot:**

#### **Day 17**

- Introduction to Spring Boot
- Spring Initializer
- Spring Boot Annotations
- Spring Boot Application Properties
- Intro to Spring Boot Starters
- Intro to Spring Boot Actuator
- Spring Boot Project with Maven & Gradle

#### **Day 18**

- Spring Boot REST API development
- Spring Boot REST Annotations
- Spring Boot Data JPA
- H2 in-memory database
- Spring Boot DevTools
- Spring Boot Swagger
- Handling Exceptions and Validations

### **GIT**

#### **Day 19 – Day 23**

##### **GIT Fundamentals**

- What is Version Control System (VCS)?
- Difference between Centralized VCS and Decentralized VCS
- Introduction to GIT
- Installing GIT

##### **Getting Started with GIT**

- Introduction to GIT CLI
- Basic Operations on GIT
  - Create Repository and Configure
  - Create Files - Stage & Commit
  - Internals of GIT -. GIT folder structure and GIT Objects

- View difference between revisions using GIT diff & GIT log
- GIT Ignore
- GIT Alias

### **Undoing Changes**

- Discarding changes
- Un-stage changes
- GIT Checkout
- Amend Commits
- GIT Revert
- GIT Reset

### **GIT Branches**

- Overview on GIT branches and branching models
- Pros and Cons of branches
- Hands-On
  - Create branch & work on a branch
  - Merge Branch
- Dealing with conflicts on merge
- Parallel working on modules
- GIT Stash

### **Tags**

- Tag Concepts and when it is used
- GIT tag commands
- View tags
- Checkout tags

### **Working with Remote Repository**

- Setup GITHUB remote repository
- Cloning a remote Repository
- Synchronize with Remote using Push, Pull, Fetch and Rebase
- Possibility of locking files to avoid conflicts during check-in
- Working with Large Files in GIT

### **Remote Branching and Merging**

- Working with remote branch
- Synchronizing Remote branch with local branch

- Pull requests

### **Best practices with GIT**

- Branching models and best practices
- Ensure data integrity and avoid data losses
- Best practices in Synchronizing with remote repositories

### **Integration**

- Integration with Gerrit, Jenkins and Jira
- End to End Integrated workflow with sample web application
- Integration with IDE: Eclipse & Overview on other GUI tools

### **Advanced GIT commands**

- Introduction to Submodules
- Cherry-pick
- Rebase Interactive
- Creating patches in GIT

### **JUnit**

- Introduction to Unit Testing
- JUnit 5 – Unit Testing Framework
- Configuration & Installation
- How to define a unit test in JUnit
- JUnit Class Naming Conventions
- JUnit Method Naming Conventions
- Test Classes location in Java Project
- Static Imports & Unit Testing
- JUnit Lifecycle Methods
- Assertions & Assumptions
- Testing for Exceptions
- Testing Multiple Assertions
- Defining Timeouts in Test cases
- Disable Test Cases
- Dynamic Tests Using @TestFactory
- Parameterized Tests Using @ParameterizedTest
- Repeated Tests Using @RepeatedTest
- Grouping Tests Using @Nested



**Mockito:**

- Introduction to Mockito,
- Mock MVC
- Configuration & Setup
- Creating Mock objects with Mock API
- Configuring the return values of method calls on the mock objects
- Wrapping Java Objects with Spy
- Verify the calls on the mock objects
- Using @InjectMocks
- Capturing the arguments

**Microservices:****Day 24**

- Introduction to Microservices Architecture
- Advantages & Disadvantages
- Challenges of Microservices
- Microservices vs Monolithic Architecture
- Overview of Spring Cloud and its modules
- Creating a microservice application

**Day 25**

- Spring Cloud Eureka
- Spring Cloud Config Server
- Setting up Config Server
- Using Feign client for service invocation
- Client-Side Load Balancing with Ribbon

**Day 26**

- Eureka Naming Server
- Connecting microservice to eureka naming server
- Distributing calls using eureka and ribbon
- Introduction to API Gateway
- Zuul API gateway
- Implementing Zuul Logging Filter
- Executing a request through zuul api gateway

## Day 27

- Introduction to Circuit Breaker
- Spring Cloud Hystrix
- Introduction to Distributed Tracing
- Distributed tracing with Zipkin and Sleuth
- Connecting microservice to zipkin
- Introduction to Sprig Cloud Bus

## Apache Kafka:

## Day 28

- Introduction to Kafka
- What is Event Streaming?
- What can I use event streaming for?
- Apache Kafka is an Even Streaming platform. What does that mean?
- How does Kafka work in a nutshell
- Main Concepts & Terminology – event, producers, consumers, topics, topic partitions, replications
- Kafka APIs

## Day 29

- Kafka Installation
- Spring boot Kafka Producer Example
- Spring boot Kafka Consumer Example

## JPA

## Day 30

- Introduction to JPA
- JPA Architecture
- JPA Entity Lifecycle
- JPA Entity
- JPA Entity Manager
- JPA Hands-on

## Day 31

- JPA Mapping
- One-to-One Mapping

- One-to-Many Mapping
- Many-to-One Mapping
- Many-to-Many Mapping
- Introduction to JPQL
- JPA Criteria API

## **JUNIT 5**

### **Day 32**

- Introduction to Junit 5
- Junit 5 Architecture
- Configuration for using Junit 5
- How to define a test in Junit 5
- Junit class Naming Conventions
- Where should the test be located
- Static imports and unit testing

### **Day 33**

- Assertions and assumptions
- Testing for exceptions
- Testing multiple assertions
- Defining timeouts in tests
- How to disable tests
- Dynamic and parameterized tests
- Nested tests and test execution order
- Using @TempDir annotation

## **Sonarqube & PostgreSQL:**

### **Day 34**

- What is Code Quality
- What is SonarQube
- How SonarQube works
- Sonar Structure & CI
- SonarQube Features
- Installation of SonarQube
- Introduction to PostgreSQL Database
- Architecture Fundamentals
- Installation

- Creating & Accessing database

### **MongoDB Day 35**

- Introduction to MongoDB
- NoSQL vs RDBMS
- Install MongoDB
- MongoDB Data Modelling
- MongoDB Database, Collection
- CRUD Documents

### **Capstone Project: Customer Management System Technologies:**

- Java 8
- JDBC
- Spring Boot
- Spring Data JPA
- PostgreSQL