

**Introduction to Java Application Development**

**Course Number:** JAV-422  
**Duration:** 5 days

**Overview**

This Java Application Development Fundamentals training course introduces Java programming and object-oriented (OO) development principles. Attendees learn newer Java features, including the Java 9+ module structure, common APIs like Java Collections Framework and JDBC/JPA, and the Java release cycle and Long Term Support (LTS) releases. This Java course is current to Java 11-17.

**Prerequisites**

All attendees must have working knowledge of a modern programming language; no Java experience is needed.

**Materials**

All Java training students receive comprehensive courseware.

**Software Needed on Each Student PC**

* A recent version of Windows, macOS, or Linux with at least 8 GB RAM
* JDK 11 or later
* The Java tool the students are likely to use after the class (Eclipse or IntelliJ IDEA are recommended)
* Other free software - please contact us if you have purchased this class

**Objectives**

* Understand Java’s importance, uses, strengths and weaknesses
* Understand the release cycle and Long Term Support (LTS) releases
* Understand Java language basics
* Write, compile, and run Java programs
* Use the Java shell (JShell - Java 9+) for interactive programming
* Understand the Object Model and Object Oriented Programming
* Understand and use classes, inheritance, polymorphism
* Create well-designed classes and use them in your Java programs
* Use composition and delegation to create objects from other objects
* Understand and use packages to organize code
* Understand and use Java 9 modules
* Understand interfaces, their importance, and their uses
* Use interfaces to implement abstraction
* Learn good Java coding style
* Create well-structured Java programs
* Compile and execute programs with the JDK development tools and with an Integrated Development Environment (IDE) of your choice
* Use the core Java libraries (java.lang, java.util)
* Understand and use exceptions for error handling
* Understand the basics of using JDBC and JPA, and use them to access databases from Java
* Use the Java Collections Framework, including the new API introduced in Java 9-11
* Use other new features, such as type inference
* Use the new features of Java 11-17, as well as important advanced features of earlier Java versions
* Understand and use basic I/O streams (Optional)

**Outline**

* Java Overview
  + Language and Platform Features
  + A Simple Java Program
  + The Java Release Cycle
  + Program Lifecycle
  + The Java SE Development Kit (JDK)
  + Hello World: A Simple Application
* Class and Object Basics
  + The Object Model and Object-Oriented Programming
  + Classes, References, and Instantiation
  + Adding Data to a Class Definition
  + Adding Methods (Behavior)
  + Exploring Types and Object Instances
  + Introducing your IDE
  + Writing and Using a Class Definition with Fields and Methods
* More on Classes and Objects
  + More about Methods
  + Encapsulation and Access Control, public and private Access
  + Constructors and Initialization
  + static Members of a Class
  + Accessor Methods
  + Encapsulation / Access Protection
  + Writing and Using Constructors
  + Static Members (Optional)
* Flow of Control
  + Branching: if, if-else, switch
  + Iteration: while, do-while, for, break, continue
  + Data Validation
* More about Classes and Objects
  + Type-safe Enums
  + Wrapper Classes
  + Java 8+ Date/Time Support
  + Working with References
  + Formatted Output
  + Using Enums
  + Working with Dates and Times
  + Using the Debugger
* Strings, Arrays, and Dates/Times
  + String, StringBuffer, StringBuilder
  + Arrays, Primitive Arrays, Arrays of Reference Types
  + Varargs
  + Using Strings and Arrays
* Packages and Modules
  + Package Overview Using Packages to Organize Code
  + Creating Packages, Package Statements, and Required Directory Structure
  + Import Statements
  + Classpath
  + Java Modules Overview
  + Defining Modules, Requires, and Exports
  + Module Path and Classpath Differences and Coexistence
  + Using Packages
  + Using Java Modules
* Composition and Inheritance
  + Using Composition to Deal With Complexity
  + Composition/HAS-A, Delegation
  + Using Inheritance to share a Commonality
  + IS-A, extends Inheriting Features
  + Constructor Issues
  + Overriding Methods, @Override, Using Polymorphism
  + Abstract Classes
  + Working with Composition (Optional)
  + Using Inheritance
  + Polymorphism
* Interfaces
  + Defining and Implementing Interfaces
  + Using Interfaces
  + Default Methods and Static Methods
  + Using Interfaces to Remove Implementation Dependencies
  + Using Default and Static Methods
* Exceptions
  + Exceptions and the Exception Hierarchy
  + Throwing Exceptions and Checked Exceptions
  + Try and Catch
  + Handling Exceptions
  + Try and catch
  + Program Flow with Exceptions
  + Multicatch, Finally, Try-with-resources
  + Throwing Exceptions
  + Checked Exceptions
* Java Collections and Generics
  + The Collections Framework and its API
  + Collections and Java Generics
  + Collection, List, Set, Map
  + Autoboxing
  + Collections of Object (non-generic)
  + Using ArrayList, HashSet, and HashMap
  + For-each Loop
  + Processing Items With an Iterator
  + More About Generics
  + Using Collections and Generics
* Database Access with JDBC and JPA
  + JDBC Overview
  + JDBC Defined Types
  + Example of JBDC Usage
  + JPA Architecture and Programming View
  + Mapping Entity Classes with Annotations
  + Persistence Unit, EntityManagerFactory, and EntityManager
  + Working with JPA (Find by primary key and inserts)
  + Mapping an Entity Class
  + Using JPA
  + Insert/Query Demo
* I/O Streams (Optional)
  + I/O Streams Overview
  + Readers and Writers
  + Exception Handling
  + Byte Streams
  + Working with Files
  + NIO, Paths, Files
  + Reading and Writing Files
  + Using Byte Streams (Optional)
* Additional Language Features (Optional)
  + Functional Interfaces and Lambda Expressions
  + Switch Expressions
  + Other Java Features
  + Working with Lambdas
* Conclusion