

Training: Capstone Courseware
104 Intermediate Java Programming

TRAINING TERMS

2025-06-23 | 5 days | Virtual Classroom

TRAINING GOALS:

Version 8.0

This course teaches programming in the Java language -- i.e. the **Java Standard Edition** platform. It is intended for students with previous Java experience or training, who already know the fundamentals of the Java architecture and basic procedural programming. This course provides in-depth coverage of object-oriented concepts and how to apply them to Java software design and development. We then move from these basic skills into key parts of the **Java SE Core API**, including collections and logging, and introduces features of functional programming, new to the language as of **Java 8**, including functional interfaces, lambda expressions, and streams.

This revision of the course targets the Java 8 language and Core API.

Students come to Java from a wide range of backgrounds, and this course is designed to be as flexible as possible over the upper end of that range. Specifically:

- Experienced C and C++ programmers will find this course a very good fit and if anything will find that they complete it in a little less than the full five-day timeline.
- Those with experience in languages less like Java, such as Visual Basic, ASP and other Web-scripting languages, and other pseudo-object-oriented languages may need more time in the early going, and this course covers its introductory topics in good depth and offers many optional and "challenge" labs to support this.
- Less experienced programmers or those coming from non-structured languages -- such as COBOL, PL/1, or 4GL tools -- will probably not cover the whole course in a week, and may want to pursue an abbreviated version at a slower pace. This too is quite feasible, but this audience may also want to consider course 102 [Introduction to Java Programming](#), for a more relaxed pace through the early material.

Learning Objectives

- Chiefly, learn to program effectively in the Java language.
- Understand Java as a purely object-oriented language, and implement software as systems of classes.
- Implement and use inheritance and polymorphism, including interfaces and abstract classes.

- Design appropriate exception handling into Java methods, and use the logging API appropriately.
- Use Java as a functional language, making appropriate choices of tools including inner classes, functional interfaces, method references, and lambda expressions.
- Use the Stream API for efficient processing of data sets.

CONSPECT:

- Chapter 1. Review of Java Fundamentals
 - The Java Architecture
 - Forms for Java Software
 - Three Platforms
 - The Java Language
 - Numeric Types
 - Characters and Booleans
 - Enumerations
 - Object References
 - Strings and Arrays
 - Conditional Constructs
 - Looping Constructs
 - Varargs
- Object-Oriented Software
 - Complex Systems
 - Abstraction
 - Classes and Objects
 - Responsibilities and Collaborators
 - UML
 - Relationships
 - Visibility
- Classes and Objects
 - Java Classes
 - Constructors and Garbage Collection
 - Naming Conventions and JavaBeans
 - Relationships Between Classes
 - Using this
 - Visibility
 - Packages and Imports

- Overloading Methods and Constructors
- JARs
- Inheritance and Polymorphism in Java
 - UML Specialization
 - Extending Classes
 - Using Derived Classes
 - Type Identification
 - Compile-Time and Run-Time Type
 - Polymorphism
 - Overriding Methods
 - The @Override Annotation
 - Superclass Reference
- Using Classes Effectively
 - Class Loading
 - Static Members
 - Statics and Non-Statics
 - Static Initializers
 - Static Imports
 - Prohibiting Inheritance
 - Costs of Object Creation
 - Strings and StringBuffer
 - Controlling Object Creation
 - Understanding Enumerated Types
 - Stateful and Behavioral Enumerations
- Interfaces and Abstract Classes
 - Separating Interface and Implementation
 - UML Interfaces and Realization
 - Defining Interfaces
 - Implementing and Extending Interfaces
 - Abstract Classes
- Collections
 - Dynamic Collections vs. Arrays
 - UML Parameterized Type
 - Generics
 - Using Generics
 - The Collections API

- The Collection and List Interfaces
- The ArrayList and LinkedList Classes
- Looping Over Collections: Iterable
- Collecting Primitive Values: Auto-Boxing
- Using Wildcards with Generic Types
- Iterators and the Iterator Interface
- Maps and the Map Interface
- Sorted Collections
- The SortedSet and SortedMap Interfaces
- The Collections Class Utility
- Algorithms
- Conversion Utilities
- Exception Handling and Logging
 - Reporting and Trapping Errors
 - Exception Handling
 - Throwing Exceptions
 - Declaring Exceptions per Method
 - Catching Exceptions
 - The finally Block
 - Catch-and-Release
 - Chaining Exceptions
 - try-with-resources
 - Logging
 - The Java SE Logging API
 - Loggers
 - Logging Levels
 - Handlers
 - Configuration
 - Best Practices
- Nested Classes
 - Nested Classes
 - Static Classes
 - Inner Classes
 - Relationship with the Outer Object
 - Local Classes
 - Enclosing Scope

- Anonymous Classes
- Functional Programming
 - Passing Behavior as a Parameter
 - Inner Classes
 - Functional Interfaces
 - Built-In Functional Interfaces
 - Lambda Expressions
 - Scope and Visibility
 - Deferred Execution
 - Method References
 - Creational Methods
 - Designing for Functional Programming
 - Default Methods
- Streams
 - The Stream Processing Model
 - Streams
 - Relationship to Collections
 - Advantages and Disadvantages
 - Iterating, Filtering, and Mapping
 - Primitive-Type Streams
 - Aggregate Functions and Statistics
 - Sorting
 - Generating, Limiting, and Reducing
 - Finding and Matching
 - Grouping
 - Flattening and Traversing
 - Sequential vs. Parallel Processing

REQUIREMENTS:

Students must be able to write, compile, test, and debug simple Java programs, using structured programming techniques, strong data types, and flow-control constructs such as conditionals and loops. Course 102 is ideal preparation for this course.

Difficulty level



CERTIFICATE:

The participants will obtain certificates signed by Capstone Courseware.

TRAINER:

Authorized Capstone Courseware Trainer.