

Course Outline



Tel: +44 (0) 118 979 4000 Fax: +44 (0) 118 979 4000

Email: training@ptr.co.uk Web: www.ptr.co.uk

Java Programming

Course Description:

Intensive and hands-on, the course emphasizes on the Java 6.0 language syntax and then moves into the object-oriented features of the language. Students will then use several of the provided API packages, such as I/O streams, collections, Swing GUI programming, threads, and accessing a database with JDBC.

This course is for Programmers moving to object-oriented programming using Java.

Pre-requisites:

Professional programming experience in C, C++ or C# is required. Knowledge of Object-Oriented concepts is also required.

Course Content:

- **Introduction to Java Applications**
 - Introduction
 - A First Program in Java: Printing a Line of Text
 - Modifying Our First Java Program
 - Displaying Text with printf
 - Another Java Application: Adding Integers
 - Memory Concepts
 - Arithmetic
 - Decision Making: Equality and Relational Operators
 - (Optional) Software Engineering Case Study: Examining the Requirements Document

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Course Outline



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- **Introduction to Classes and Objects**
 - Introduction
 - Classes, Objects, Methods and Instance Variables
 - Declaring a Class with a Method and Instantiating an Object of a Class
 - Declaring a Method with a Parameter
 - Instance Variables, set Methods and get Methods
 - Primitive Types vs. Reference Types
 - Initializing Objects with Constructors
 - Floating-Point Numbers and Type double
 - (Optional) GUI and Graphics Case Study: Using Dialog Boxes
 - (Optional) Software Engineering Case Study: Identifying the Classes in a requirements Document

- **Control Statements: Part 1**
 - Introduction
 - Algorithms
 - Pseudocode
 - Control Structures
 - if Single-Selection Statement
 - if ... else Double-Selection Statement
 - while Repetition Statement
 - Formulating Algorithms: Counter-Controlled Repetition
 - Formulating Algorithms: Sentinel-Controlled Repetition
 - Formulating Algorithms: Nested Control Statements
 - Compound Assignment Operators
 - Increment and Decrement Operators
 - Primitive Types
 - (Optional) GUI and Graphics Case Study: Creating Simple Drawings
 - (Optional) Software Engineering Case Study: Identifying Class Attributes

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- **Control Statements: Part 1**
- **Control Statements: Part 2**
 - Introduction
 - Essentials of Counter-Controlled Repetition
 - for Repetition Statement
 - Examples Using the for Statement
 - do ... while Repetition Statement
 - switch Multiple-Selection Statement
 - break and continue Statements
 - Logical Operators
 - Structured Programming Summary
 - (Optional) GUI and Graphics Case Study: Drawing Rectangles and Ovals
 - (Optional) Software Engineering Case Study: Identifying Objects' States and Activities
- **Methods: A Deeper Look**
 - Introduction
 - Program Modules in Java
 - static Methods, static Fields and Class Math
 - Declaring Methods with Multiple Parameters
 - Notes on Declaring and Using Methods
 - Method-Call Stack and Activation Records
 - Argument Promotion and Casting
 - Java API Packages
 - Case Study: Random-Number Generation
 - Generalized Scaling and Shifting of Random Numbers
 - Random-Number Repeatability for Testing and Debugging
 - Case Study: A Game of Chance (Introducing Enumerations)

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- **Methods: A Deeper Look**
 - Scope of Declarations
 - Method Overloading
 - (Optional) GUI and Graphics Case Study: Colors and Filled Shapes
 - (Optional) Software Engineering Case Study: Identifying Class Operations

- **Arrays**
 - Introduction
 - Arrays
 - Declaring and Creating Arrays
 - Examples Using Arrays
 - Case Study: Card Shuffling and Dealing Simulation
 - Enhanced for Statement
 - Passing Arrays to Methods
 - Case Study: Class GradeBook Using an Array to Store Grades
 - Multidimensional Arrays
 - Case Study: Class GradeBook Using a Two-Dimensional Array
 - Variable-Length Argument Lists
 - Using Command-Line Arguments
 - (Optional) GUI and Graphics Case Study: Drawing Arcs
 - (Optional) Software Engineering Case Study: Collaboration Among Objects

- **Classes and Objects: A Deeper Look**
 - Introduction
 - Time Class Case Study
 - Controlling Access to Members
 - Referring to the Current Object's Members with the this Reference
 - Time Class Case Study: Overloaded Constructors
 - Default and No-Argument Constructors
 - Notes on Set and Get Methods

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- **Classes and Objects: A Deeper Look**
 - Composition
 - Enumerations
 - Garbage Collection and Method finalize
 - static Class Members
 - static Import
 - final Instance Variables
 - Software Reusability
 - Data Abstraction and Encapsulation
 - Time Class Case Study: Creating Packages
 - Package Access
 - (Optional) GUI and Graphics Case Study: Using Objects with Graphics
 - (Optional) Software Engineering Case Study: Starting to Program the classes of the ATM System
- **Object-Oriented Programming: Inheritance**
 - Introduction
 - Superclasses and Subclasses
 - protected Members
 - Relationship between Superclasses and Subclasses
 - Creating and Using a CommissionEmployee Class
 - Creating a BasePlusCommissionEmployee Class without using Inheritance
 - Creating a CommissionEmployee – BasePlusCommissionEmployee Inheritance Hierarchy
 - CommissionEmployee – BasePlusCommissionEmployee Inheritance Hierarchy Using protected Instance Variables
 - CommissionEmployee – BasePlusCommissionEmployee Inheritance Hierarchy Using private Instance Variables
 - Constructors in Subclasses

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- **Object-Oriented Programming: Inheritance**
 - Software Engineering with Inheritance
 - Object Class
 - (Optional) Software Engineering Case Study: Displaying Text and Images Using Labels
- **Object-Oriented Programming: Polymorphism**
 - Introduction
 - Polymorphism Examples
 - Demonstrating Polymorphic Behavior
 - Abstract Classes and Methods
 - Case Study: Payroll System Using Polymorphism
 - Creating Abstract Superclass Employee
 - Creating Concrete Subclass SalariedEmployee
 - Creating Concrete Subclass HourlyEmployee
 - Creating Concrete Subclass CommissionEmployee
 - Creating Indirect Concrete Subclass BasePlusCommissionEmployee
 - Demonstrating Polymorphic Processing, Operator instanceof and Downcasting
 - Summary of the Allowed Assignments Between Superclass and Subclass Variables
 - final Methods and Classes
 - Case Study: Creating and Using Interfaces
 - Developing a Payable Hierarchy
 - Declaring Interface Payable
 - Creating Class Invoice
 - Modifying Class Employee to Implement Interface Payable
 - Modifying Class SalariedEmployee for Use in the Payable Hierarchy
 - Using Interface Payable to Process Invoice s and Employee s Polymorphically

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- **Object-Oriented Programming: Polymorphism**
 - Declaring Constants with Interfaces
 - Common Interfaces of the Java API
 - (Optional) GUI and Graphics Case Study: Drawing with Polymorphism
 - (Optional) Software Engineering Case Study: Incorporating Inheritance into the ATM System

- **GUI Components: Part 1**
 - Introduction
 - Simple GUI-Based Input/Output with JOptionPane
 - Overview of Swing Components
 - Displaying Text and Images in a Window
 - Text Fields and an Introduction to Event Handling with Nested Classes
 - Common GUI Event Types and Listener Interfaces
 - How Event Handling Works
 - JButton
 - Buttons That Maintain State
 - JCheckBox
 - JRadioButton
 - JComboBox and Using an Anonymous Inner Class for Event Handling
 - JList
 - Multiple-Selection Lists
 - Mouse Event Handling
 - Adapter Classes
 - JPanel Subclass for Drawing with the Mouse
 - Key-Event Handling
 - Layout Managers
 - FlowLayout
 - BorderLayout
 - GridLayout

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- **GUI Components: Part 1**
 - Using Panels to Manage More Complex Layouts
 - JTextArea

- **Graphics and Java 2D**
 - Introduction
 - Graphics Contexts and Graphics Objects
 - Color Control
 - Font Control
 - Drawing Lines, Rectangles and Ovals
 - Drawing Arcs
 - Drawing Polygons and Polylines
 - Java 2D API

- **Exception Handling**
 - Introduction
 - Exception-Handling Overview
 - Example: Divide by Zero without Exception Handling
 - Example: Handling ArithmeticExceptions and InputMismatchExceptions
 - When to Use Exception Handling
 - Java Exception Hierarchy
 - finally Block
 - Stack Unwinding
 - printStackTrace , getStackTrace and getMessage
 - Chained Exceptions
 - Declaring New Exception Types
 - Preconditions and Postconditions
 - Assertions

- **Files and Streams**
 - Introduction
 - Data Hierarchy
 - Files and Streams
 - Class File

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- **Files and Streams**
 - Sequential-Access Text Files
 - Creating a Sequential-Access Text File
 - Reading Data from a Sequential-Access Text File
 - Case Study: A Credit-Inquiry Program
 - Updating Sequential-Access Files
 - Object Serialization
 - Creating a Sequential-Access File Using Object Serialization
 - Reading and Deserializing Data from a Sequential-Access File
 - Additional java.io Classes
 - Opening Files with JFileChooser

- **Recursion**
 - Introduction
 - Recursion Concepts
 - Example Using Recursion: Factorials
 - Example Using Recursion: Fibonacci Series
 - Recursion and the Method-Call Stack
 - Recursion vs. Iteration
 - Towers of Hanoi
 - Fractals
 - Recursive Backtracking
 - Internet and Web Resources

- **Searching and Sorting**
 - Introduction
 - Searching Algorithms
 - Linear Search
 - Binary Search
 - Sorting Algorithms
 - Selection Sort
 - Insertion Sort
 - Merge Sort

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- **Searching and Sorting**
- **Data Structures**
 - Invariants
 - Introduction
 - Type-Wrapper Classes for Primitive Types
 - Autoboxing and Auto-Unboxing
 - Self-Referential Classes
 - Dynamic Memory Allocation
 - Linked Lists
 - Stacks
 - Queues
 - Trees
- **Generics**
 - Introduction
 - Motivation for Generic Methods
 - Generic Methods: Implementation and Compile-Time Translation
 - Additional Compile-Time Translation Issues: Methods That Use a Type Parameter as the Return Type
 - Overloading Generic Methods
 - Generic Classes
 - Raw Types
 - Wildcards in Methods That Accept Type Parameters
 - Generics and Inheritance: Notes
 - Internet and Web Resources
- **Collections**
 - Introduction
 - Collections Overview
 - Class Arrays
 - Interface Collection and Class Collections
 - Lists
 - ArrayList and Iterator

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- **Collections**
 - LinkedList
 - Vector
 - Collections Algorithms
 - Algorithm sort
 - Algorithm shuffle
 - Algorithms reverse , fill , copy , max and min
 - Algorithm binarySearch
 - Algorithms addAll , frequency and disjoint
 - Stack Class of Package java.util
 - Class PriorityQueue and Interface Queue
 - Sets
 - Maps
 - Properties Class
 - Synchronized Collections
 - Unmodifiable Collections
 - Abstract Implementations

- **Introduction to Java Applets**
 - Introduction
 - Sample Applets Provided with the JDK
 - Simple Java Applet: Drawing a String
 - Executing an Applet in the appletviewer
 - Executing an Applet in a Web Browser
 - Applet Life-Cycle Methods
 - Initializing an Instance Variable with Method init
 - Sandbox Security Model
 - Internet and Web Resources

- **Multithreading**
 - Introduction
 - Thread States: Life Cycle of a Thread
 - Thread Priorities and Thread Scheduling
 - Creating and Executing Threads

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- **Multithreading**
 - Runnable s and the Thread Class
 - Thread Management with the Executor Framework
 - Thread Synchronization
 - Unsynchronized Data Sharing
 - Synchronized Data Sharing—Making Operations Atomic
 - Producer/Consumer Relationship without Synchronization
 - Producer/Consumer Relationship: ArrayBlockingQueue
 - Producer/Consumer Relationship with Synchronization
 - Producer/Consumer Relationship: Bounded Buffers
 - Producer/Consumer Relationship: The Lock and Condition Interfaces
 - Multithreading with GUI
 - Performing Computations in a Worker Thread
 - Processing Intermediate Results with SwingWorker
 - Other Classes and Interfaces in `java.util.concurrent`

- **Networking**
 - Introduction
 - Manipulating URLs
 - Reading a File on a Web Server
 - Establishing a Simple Server Using Stream Sockets
 - Establishing a Simple Client Using Stream Sockets
 - Client/Server Interaction with Stream Socket Connections
 - Connectionless Client/Server Interaction with Datagrams
 - Client/Server Tic-Tac-Toe Using a Multithreaded Server
 - Security and the Network

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- **Networking**
- [Web Bonus] Case Study: DeitelMessenger Server and Client
- **Accessing Databases with JDBC**
 - Introduction
 - Relational Databases
 - Relational Database Overview: The books Database
 - SQL
 - Basic SELECT Query
 - WHERE Clause
 - ORDER BY Clause
 - Merging Data from Multiple Tables: INNER JOIN
 - INSERT Statement
 - UPDATE Statement
 - DELETE Statement
 - Instructions for installing MySQL and MySQL Connector/J
 - Instructions for Setting Up a MySQL User Account
 - Creating Database books in MySQL
 - Manipulating Databases with JDBC
 - Connecting to and Querying a Database
 - Querying the books Database
 - RowSet Interface
 - Java DB/Apache Derby
 - PreparedStatement s
 - Stored Procedures
 - Transaction Processing
- **Formatted Output**
 - Introduction
 - Streams
 - Formatting Output with printf
 - Printing Integers

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- **Formatted Output**
 - Printing Floating-Point Numbers
 - Printing Strings and Characters
 - Printing Dates and Times
 - Other Conversion Characters
 - Printing with Field Widths and Precisions
 - Using Flags in the printf Format String
 - Printing with Argument Indices
 - Printing Literals and Escape Sequences
 - Formatting Output with Class Formatter

- **Strings, Characters and Regular Expressions**
 - Introduction
 - Fundamentals of Characters and Strings
 - Class String
 - String Constructors
 - String Methods length , charAt and getChars
 - Comparing Strings
 - Locating Characters and Substrings in Strings
 - Extracting Substrings from Strings
 - Concatenating Strings
 - Miscellaneous String Methods
 - String Method valueOf
 - Class StringBuilder
 - StringBuilder Constructors
 - StringBuilder Methods length , capacity , setLength and ensureCapacity
 - StringBuilder Methods charAt , setCharAt , getChars and reverse
 - StringBuilder append Methods
 - StringBuilder Insertion and Deletion Methods
 - Class Character
 - Class StringTokenizer

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- **Strings, Characters and Regular Expressions**
- Regular Expressions, Class Pattern and Class Matcher

Course Duration:

5 Days

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