

# Java programming language

## ***1. Introduction to Java***

- History and features of Java
- Java Virtual Machine (JVM), Java Runtime Environment (JRE), Java Development Kit (JDK)
- Setting up Java (JDK installation, IDEs like Eclipse, IntelliJ, BlueJ, NetBeans)
- First Java program (HelloWorld)
- Compilation and execution (javac, java)

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## ***2. Java Basics***

- Keywords, identifiers, literals
- Data types, variables, and constants
- Operators: Arithmetic, Relational, Logical, Assignment, Unary, Ternary
- Type casting and type promotion
- Input/Output using Scanner and System.out

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## ***3. Control Statements***

- Conditional statements: if, if-else, switch
- Looping: for, while, do-while
- Jump statements: break, continue, return

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## ***4. Arrays and Strings***

- One-dimensional and multi-dimensional arrays
  - Array initialization and traversal
  - String basics: creation, concatenation, comparison
  - String methods (length(), charAt(), substring(), equals(), etc.)
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### ***5. Classes and Objects***

- Defining a class and creating objects
- Data members and methods
- Constructors (default and parameterized)
- `this` keyword
- Method overloading

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### ***6. Object-Oriented Programming (OOP) Concepts***

- Encapsulation
- Inheritance (single and multilevel)
- `super` keyword
- Method overriding
- Polymorphism (compile-time and runtime)
- Abstraction (abstract classes and interfaces)

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### ***7. Packages and Access Modifiers***

- Creating and using packages
- Built-in packages (`java.util`, `java.io`)
- Access specifiers: `public`, `private`, `protected`, `default`

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### ***8. Exception Handling***

- Types of exceptions: Checked vs Unchecked
- `try`, `catch`, `finally`, `throw`, `throws`
- Multiple catch blocks
- Custom exceptions (*optional*)

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### ***9. File Handling (Basic)***

- File reading and writing using `FileReader`, `FileWriter`, `BufferedReader`, etc.



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- File class and common methods

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### 10. Basic Java Libraries

- Math, String, Arrays, Collections (*intro level*)
- Working with ArrayList (*optional for beginners*)

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### 11. Simple GUI using Swing (Optional)

- Basics of JFrame, JButton, JLabel
- Event handling basics

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### 12. Mini Projects / Assignments

- Simple Calculator
- Student grade system
- Bank account simulation
- Library/book management