



TECHNOCATION FREELANCING TRAINING INSTITUTE & SOFTWARE HOUSE

# Professional Kotlin Programming Course Outline

## Module 1: Introduction to Kotlin

- Overview of Kotlin & Its Features
  - Installing & Setting Up Kotlin (IntelliJ IDEA, Android Studio, Command Line)
  - Writing & Running Your First Kotlin Program
  - Kotlin vs. Java: Key Differences
  - Understanding JVM, Kotlin Native, & Kotlin Multiplatform
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## Module 2: Kotlin Fundamentals

- Variables & Data Types (`val`, `var`, `Int`, `Double`, `Boolean`, `String`)
  - Type Inference & Type Casting
  - Operators in Kotlin (Arithmetic, Logical, Bitwise, Comparison)
  - String Manipulation & Interpolation
  - Working with Null Safety (`?`, `!!`, `?..`, `?:`)
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## Module 3: Control Flow & Decision Making

- Conditional Statements (`if`, `else`, `when`)
  - Looping Constructs (`for`, `while`, `do-while`)
  - Using Ranges & Iterators in Loops
  - Exception Handling (`try-catch-finally`, `throw`)
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## Module 4: Object-Oriented Programming (OOP) in Kotlin

- Understanding Classes & Objects
  - Constructors & Initializers
  - Inheritance, Polymorphism & Abstraction
  - Interfaces vs. Abstract Classes
  - Data Classes & Companion Objects
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## Module 5: Functions & Functional Programming in Kotlin

- Defining Functions & Default Arguments
  - Higher-Order Functions & Lambda Expressions
  - Inline Functions & Anonymous Functions
  - Scope Functions (`apply`, `let`, `run`, `with`, `also`)
  - Extension Functions & Operator Overloading
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## Module 6: Collections & Generics in Kotlin

- Lists, Sets, & Maps (`mutableListOf()`, `hashMapOf()`)
  - Iterating Over Collections (`forEach`, `map`, `filter`)
  - Working with Sequences for Performance Optimization
  - Understanding Generics in Kotlin
  - Creating Generic Classes & Functions
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## Module 7: Coroutines & Asynchronous Programming

- Introduction to Kotlin Coroutines
  - Working with `suspend` Functions & `async/await`
  - Coroutine Scope, Dispatchers, & Jobs
  - Using `Flow` for Reactive Streams
  - Error Handling in Coroutines
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## Module 8: File Handling & I/O Operations

- Reading & Writing Files in Kotlin
- Working with Streams & Buffers

- Serialization & Deserialization (JSON, XML)
  - Using Kotlin with External APIs
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## **Module 9: Android App Development with Kotlin**

- Introduction to Android Development with Kotlin
  - Creating an Android Project in Android Studio
  - Working with Activities, Fragments, & Intents
  - Handling UI with Jetpack Compose & XML Layouts
  - Using ViewModel, LiveData & Room Database
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## **Module 10: Backend Development with Kotlin & Ktor**

- Introduction to Ktor Framework for Web Development
  - Creating REST APIs with Kotlin
  - Handling Requests & Responses in Ktor
  - Connecting Kotlin Backend to a Database (PostgreSQL, MySQL)
  - Deploying Kotlin Web Applications
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## **Module 11: Advanced Kotlin Topics**

- Reflection & Annotations in Kotlin
  - DSL (Domain Specific Language) Creation
  - Dependency Injection with Koin & Dagger
  - Testing & Debugging Kotlin Applications
  - Performance Optimization in Kotlin
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## **Module 12: Real-World Projects & Deployment**

- Building an Android App (To-Do List, Weather App, Chat App)
- Developing a REST API with Ktor
- Implementing an E-Commerce Backend in Kotlin
- Publishing an Android App to Google Play Store
- Deploying Kotlin Applications to AWS & Firebase