

# Kotlin Fundamentals

## Course Overview

- Introduction to the course
- Course Outline

## Module 1 - Introduction to Kotlin

- Kotlin History
- How Kotlin Program Work?
- Kotlin Environment and the JVM
- Android Studio Environment
- Setting up an Android Studio Project
- Kotlin Hello World program
- Kotlin Variables
- Kotlin Data Types
- Comments, Annotations
- Lab: Hello World in Kotlin using Android Studio

## Module 2- Control Flow Statements

- Introduction
- If statement
- If-else- statement
- When Statement and expression
- For Loops
- While Loops
- Do- While loops

- Jump Expressions
  - Break Statement
  - Continue Statement
  - Return statement

### **Module 3 - Kotlin Classes**

- Class definitions
- Constructors, named constructor parameters, default values
- Secondary Constructors
- Simple Properties
- Instance Creation
- Member Functions
- Function Named Parameters
- Function Default Parameters
- Functions returning Values
- Lab: Books and Bookshop app in Kotlin using Android Studio

### **Module 4: Objects, flow of control and Further Properties**

- Objects
- Flow of control
- Self reference: This
- Properties and their Types
- Property Visibility
- Property Declaration Modifiers
- Nullability
- Nullable Operators
- Lazy properties

- Instance Equality
- Curly Bracket Syntax
- Lab: Adding behavior to the Bookshop

## **Module 5 - Inheritance**

- Inheritance in Kotlin
- Implementing Inheritance
- Rule for overriding functions
- Overriding Properties
- Rules for Polymorphic variables
- Casting and Inheritance
- The super *variable*
- Constructors and Inheritance
- Lab: Defining Inheritance for Book class

## **Module 6 - Abstract classes and Interfaces**

- Abstract Classes
- Defining an Abstract Class
- Declaring abstract functions
- Extending an Abstract Class
- Interfaces in Kotlin
- Interface Definitions
- Implementing Interfaces
- Delegation
- Lab: Implementing abstract classes and interfaces

## **Module 7 - Further Classes**

- Four Types of Nested Classes
- Nested classes
- Member Inner Classes
- Anonymous Classes / Objects
- Inline classes
- Data Classes
- Data Classes and Destructuring Declarations
- Enumeration support
- Lab: Implementing Nested classes and Data classes

## **Module 8 - Containers and Generics**

- Arrays
- Collections Library
- Mutable and Immutable (read-only) collections
- Sets, Lists and Maps
- Pairs and Triples
- Collection iteration
- Lab 7: Working with Containers

## **Module 9 - Functions**

- What is Functional Programming?
- Kotlin as a Functional Language
- Defining Functions
- Function Objects
- Function Definitions
- Named Functions, Single Expression & Inline functions

- Anonymous Functions and Lambdas
- Callable References
- Closures
- Functions and Methods
- Lab: Functional Programming Implementation

## **Module 10 - Higher Order Functions and Extension Functions**

- Higher Order Functions Introduction
- Functions as Parameters
- Using Typealiases for function types
- Functions as Return types
- Collections & FP: foreach
- Scope functions (apply, let, also, run and with)
- Conditional functions (takeIf, takeUnless)
- Extensions
- Extension Functions and Extension properties
- Looping over Collections
- Sorting Collections
- Grouping, Folding, Reducing and Zipping Collections
- Lab: Processing containers using higher order

functions

## **Module 11 - Packages and Project Structuring**

- What is a Package?
- Kotlin Compiler
- Importing

- Kotlin Default Imports
- Visibility Modifiers
- Visibility Modifiers and Constructors
- Kotlin Modules

## **Module 12 - Exception Handling**

- Errors & Exceptions
- Exception types in Kotlin
- Part of the Exception Hierarchy
- Exception Handling
- Kotlin and Checked Exceptions
- Try-Catch Expressions
- Finally and returned values
- Defining New Exceptions
- Chained Exceptions