Guide2Code - Kotlin Programming Roadmap

🟢 **Phase 1: Beginner Level**

📚 **Topics to Learn:**

1. Introduction to Kotlin (Setup, IDEs, First Program)
2. Variables & Data Types (Nullable & Non-Nullable Types)
3. Control Flow (if-else, when, loops)
4. Functions & Lambdas (Higher-Order Functions, Inline Functions)
5. Collections (Lists, Sets, Maps, Iterators)
6. Object-Oriented Programming (Classes, Objects, Constructors)
7. Exception Handling (try-catch, throw, finally)
8. File Handling (Reading & Writing Files)
9. Coroutines (Introduction to Asynchronous Programming)
10. Debugging & Logging (Logging, Breakpoints, Stack Trace)

🛠️ **Beginner Project Ideas:**

- **Simple Calculator** – Perform basic arithmetic operations
- **To-Do List App** – Create a simple task manager
- **Unit Converter** – Convert between different units (length, weight)
- **Basic Weather App** – Fetch and display weather data
- **Expense Tracker** – Track daily expenses using file storage

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🟡 **Phase 2: Intermediate Level**

📚 **Topics to Learn:**

1. Advanced Functions & Extension Functions
2. Data Classes & Sealed Classes
3. Lambda Expressions & Higher-Order Functions
4. Working with APIs (Retrofit, OkHttp)
5. Database Management (SQLite, Room Database)
6. Jetpack Components (ViewModel, LiveData, Navigation)

7. Dependency Injection (Dagger, Hilt, Koin)

8. Multithreading & Coroutines (Flows, Channels)

9. Working with Firebase (Authentication, Firestore, Storage)

10. Unit Testing & Debugging (JUnit, Mocking, Logging)

🛠️ Intermediate Project Ideas:

- **Notes App** – Store and manage notes using Room database

- **News App** – Fetch and display news articles via API

- **Weather Forecast App** – Show real-time weather data with Retrofit

- **Chat Application** – Implement a real-time chat with Firebase

- **E-commerce Product Catalog** – Display product lists with filtering

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🔴 Phase 3: Advanced Level

📚 Topics to Learn:

1. Advanced Coroutines (StateFlow, SharedFlow, Coroutine Scope)

2. Custom Views & Animations (Canvas, Motion Layout)

3. Advanced Dependency Injection (Dagger, Hilt, Koin)

4. Kotlin Multiplatform (KMP for Android, iOS, Web)

5. Jetpack Compose (Declarative UI for Modern Android Development)

6. Security & Encryption (Keystore API, Encryption Libraries)

7. Performance Optimization (Profiling, Memory Management)

8. Modular Architecture & Clean Code Principles

9. App Deployment & CI/CD (Play Store Deployment, GitHub Actions)

10. Machine Learning with Kotlin (TensorFlow Lite, ML Kit)

🛠️ Advanced Project Ideas:

- **AI-Powered Image Recognition App** – Implement ML Kit in Kotlin

- **Fitness Tracker App** – Step counter and workout planner

- **Stock Market Analyzer** – Analyze and visualize stock trends

- **Kotlin Multiplatform App** – Develop an app for Android & iOS