

Flutter Complete Syllabus (Basic to Expert)

University-Level | Internship & Industry Oriented | With Assignments & Mini Projects

Chapter 1: Introduction to Flutter

Detailed Topics:

- Mobile application development overview
- Flutter framework introduction
- Flutter architecture (Framework, Engine, Embedder)
- Flutter vs Native Android/iOS
- Flutter vs React Native
- Advantages and limitations of Flutter
- Flutter SDK and tools
- Flutter project structure
- Hot Reload vs Hot Restart

Assignments:

- Install Flutter SDK
- Run sample Flutter app
- Explore project structure

Mini Project: Hello Flutter App

Chapter 2: Dart Programming Fundamentals

Detailed Topics:

- Introduction to Dart language
- Variables and data types
- Operators and expressions
- Conditional statements
- Loops
- Functions and parameters
- Arrow functions
- Collections: List, Set, Map

Assignments:

- Write Dart programs using conditions and loops
- Implement List and Map operations

Mini Project: Dart Utility Console App

Chapter 3: Object Oriented Programming in Dart

Detailed Topics:

- Classes and objects
- Constructors and named constructors

- Inheritance
- Method overriding
- Abstract classes
- Interfaces
- Mixins
- Encapsulation

Assignments:

- Create class hierarchy
- Implement abstraction and inheritance

Mini Project: Student Management System

Chapter 4: Dart Advanced Concepts

Detailed Topics:

- Null safety
- Late variables
- Required keyword
- Asynchronous programming
- Future and async/await
- Streams (intro)
- Error handling

Assignments:

- Convert synchronous code to async
- Handle exceptions properly

Mini Project: Async Data Fetch App

Chapter 5: Flutter Widgets & UI Basics

Detailed Topics:

- Widget concept
- Widget tree
- StatelessWidget
- StatefulWidget
- Build method
- BuildContext
- MaterialApp and Scaffold

Assignments:

- Create UI using basic widgets
- Convert Stateless to Stateful widget

Mini Project: Counter App

Chapter 6: Layouts & Responsive Design

Detailed Topics:

- Row and Column
- Expanded and Flexible
- Stack and Positioned
- Wrap widget
- MediaQuery
- LayoutBuilder
- Responsive UI principles

Assignments:

- Create responsive layout for different screens

Mini Project: Responsive Profile UI

Chapter 7: User Input & Forms

Detailed Topics:

- TextField
- TextEditingController
- FocusNode
- Form widget
- Validation techniques
- Keyboard handling

Assignments:

- Create form with validations

Mini Project: Login & Registration App

Chapter 8: Lists, Scroll & UI Patterns

Detailed Topics:

- ListView
- ListView.builder
- GridView
- Custom list items
- Infinite scrolling basics

Assignments:

- Create dynamic list with ListView.builder

Mini Project: Product Listing App

Chapter 9: Navigation & Routing

Detailed Topics:

- Navigator push/pop
- Passing data between screens
- Named routes
- Navigation stack

- Route management best practices

Assignments:

- Implement multi-screen navigation

Mini Project: Multi-Screen App

Chapter 10: State Management Fundamentals

Detailed Topics:

- What is state
- Local vs global state
- setState usage
- Widget lifecycle methods
- Problems with setState

Assignments:

- Manage UI state using setState

Mini Project: Todo App (Local State)

Chapter 11: Local Storage

Detailed Topics:

- SharedPreferences
- Saving primitive data
- Session handling
- Logout and clearing data

Assignments:

- Implement auto-login functionality

Mini Project: Auto Login App

Chapter 12: SQLite Database

Detailed Topics:

- Introduction to SQLite
- sqflite package
- Database creation
- CRUD operations
- Database versioning
- Error handling

Assignments:

- Create SQLite database with CRUD

Mini Project: Notes App (SQLite)

Chapter 13: Floor Database (Room Equivalent)

Detailed Topics:

- Floor architecture
- Entity annotation
- Primary keys
- DAO
- Query annotations
- Database class
- Code generation
- Migrations
- Relationships

Assignments:

- Implement Floor database

Mini Project: Offline Notes App (Floor)

Chapter 14: REST API & Networking

Detailed Topics:

- REST API concepts
- HTTP methods
- http package
- Headers and tokens
- JSON parsing
- Error handling

Assignments:

- Fetch and display API data

Mini Project: API-Based News App

Chapter 15: State Management with Riverpod

Detailed Topics:

- Riverpod overview
- ProviderScope
- Provider types
- StateNotifier
- Async state handling
- Riverpod with API
- Riverpod with database

Assignments:

- Refactor app using Riverpod

Mini Project: Task Manager App

Chapter 16: Application Architecture

Detailed Topics:

- Separation of concerns
- Repository pattern
- MVVM architecture
- Clean architecture overview
- Dependency Injection (get_it)

Assignments:

- Refactor project using clean architecture

Mini Project: Production Architecture Refactor

Chapter 17: Performance Optimization

Detailed Topics:

- const widgets
- Reducing rebuilds
- RepaintBoundary
- Flutter DevTools
- Memory optimization

Assignments:

- Optimize existing app performance

Mini Project: Performance Optimized App

Chapter 18: Animations

Detailed Topics:

- Implicit animations
- Explicit animations
- AnimationController
- Tween
- Hero animation

Assignments:

- Implement basic animations

Mini Project: Animated UI App

Chapter 19: Firebase Integration

Detailed Topics:

- Firebase setup
- Authentication
- Firestore database

- Push notifications
- Security rules

Assignments:

- Integrate Firebase Auth

Mini Project: Firebase Auth App

Chapter 20: Testing, Debugging & Deployment

Detailed Topics:

- Debugging tools
- Common Flutter errors
- Unit testing
- Widget testing
- APK/AAB generation
- Play Store publishing

Assignments:

- Generate signed APK/AAB

Mini Project: Deployable Flutter App

Chapter 21: Advanced & Expert Topics

Detailed Topics:

- Isolates
- Background services
- Custom RenderObject (intro)
- Scalable app design
- Production bug fixing
- Code review practices

Assignments:

- Study production bugs and fixes

Mini Project: Scalable Flutter App