Mobile App Development using Flutter and Dart

Module 1: Introduction to Cross Platform App Development

- Overview of App Development
- Review of various App Platforms – Android, iOS, Windows
- The Cost Challenge in developing apps for Multiple Platforms
- Introduction to Cross Platform App Development
- Advantages of Cross Platform App Development
    - Cost
    - One Codebase
    - Quick release
    - Common UI – easy for users
- Introduction to popular Cross Platform app Development Tools
    - Flutter
    - React Native, Ionic, Xamarin
- Introducing Flutter
- Advantages and Features of Flutter
- Understanding Flutter's Platform Adaptation

Module 2: Setting the Development Environment

- Downloading and Installing Android Studio
- Downloading and Installing Flutter SDK
- Setting up Emulators
- Quick Walkthrough with Android Studio IDE
- Using Other editors for Flutter
- Setting up Configurations
- Sample Program and Execution

Module 3: Dart – The Programming Language

- Learning about Dart
- The Dart and Flutter Connection
- Advantages and Features of Dart Language
- Dart Compared with Other OOPS Languages

- OOPS in Dart
- Understanding the Dart Programming style and elements
- Introduction to Dart Packages
- Creating a simple Dart Program
- Executing a Dart Program

Module 4: Dart - Essentials

- Variables, Data Types and Operators
- Handling Strings and Numbers
- Performing Arithmetic, Relational and Logical Operations
- Working with Collections
- Introduction to Dart Core Libraries
- Using Dart Libraries – dart:core, dart:math, dart:convert, dart:html, dart:io
- Handling Iterations and Decision Making
- Understanding Extension Methods
- Understanding Type Safe and Null Safety
- Learning the debugging and error handling features
- Introduction to Dart Packages

Module 5: Flutter – Getting Started

- Understanding the Flutter Architecture
- Learning the steps to build a Flutter App
- Understanding Templates and Scaffolding
- Building Blocks of Flutter – Widgets, Assets, Images, Box Constraints
- Introduction to Flutter Layouts
- Learning the Material Design
- Creating and running a simple App using Flutter

Module 6: Flutter UI and Layouts

- Understanding Widgets
    - Text Widgets
    - Row and Column Widget
    - Stack and Container Widget
    - Material App Widget
    - Understanding the key role of Widgets – everything is widgets in Flutter
- Learning Layouts in Flutter

        - Introduction to the Widgets Library and Material Library
        - Exploring the Standard and Material Widgets
        - Understanding the Layout Widget
        - Learning to Add Layout Widget
        - Understanding Visible Widget
        - Understanding Parent, Child and Children Properties
        - Understanding the Row and Column Patterns
        - Learning to Align Widgets
        - Learning to Nest Widgets in a Layout
        - More on Containers
        - Exploring Grid Views
        - Understanding List Views
        - Working with Tab Layouts
        - Working with Cards and Stack
        - Working with Constraints
- Building Responsive UI in Flutter
    - Introduction to Responsive Layout
    - Introduction to Adaptive Layout
    - Comparing Responsive and Adaptive Layout
    - Understanding the LayoutBuilder class
    - Understanding the MediaQuery method
    - Learning deep about Constraints

Module 7: Flutter – Developing App Interactivity

- Adding and handling Input Widgets like Text, Buttons, Checkbox, Radio buttons, Sliders, Form
- Creating and managing Forms
- Implementing Form Validations
- Understanding Widgets States
    - Understanding Stateful Widgets
    - Understanding Stateless Widgets
    - Exploring Class StatefulWidget and State
    - Handling Active and Inactive Widgets
    - Managing State
    - Handling Gestures
    - Parent Widget and Child Widget in Managing Widget State
- Handling AlertDialog
- Working with Assets and Images

        - Understanding Assets and Types of Assets
        - Loading Images
        - Managing Assets
        - Managing Platform Specific Assets
        - Handling the Launch Screen
    - Working with Charts and Tables

Module 8: Flutter – Handling Navigation and Routing

- Understanding Configuration files
- Understanding Navigation in Flutter
- Using the Imperative Method for Navigation
- Using the Declarative Method for Navigation
- Exploring Navigation and Routing
    - Understanding the MaterialPageRoute
    - Understanding the Navigator.Push()
    - Understanding the Navigator.Pop()
- Understanding and working with Named Routes
- Understanding and working with Deep Links
- Implementing Deep Linking on Android, iOS

Module 9: Flutter – Managing Data and Backend

- Understanding how data handled in Flutter
- Learning App State
    - Understanding the Declarative approach to manage App State
    - Advantages of the Declarative approach to manage App State
    - Other methods for managing App State
    - Understanding the Simple method for Managing App State
    - Introduction to the 'provider' package
    - Building a simple state based App
- Understanding and Managing HTTP requests
    - Introduction to the HTTP package
    - Exploring web server requests in Flutter
    - Understanding JSON
    - Understanding and working with JSON Serialization
    - Learning to use dart:convert

        - Learning Inline Serializing
- Introduction to Firebase
    - Firebase as a Backend Services
    - Exploring various features of Firebase
    - Understanding the Firebase Database

Module 10: Flutter – Animations

- Introduction to Animations in Flutter
- Understanding the Use Case for Animations
- Understanding Tween type of Animations
- Understanding Animations based on Physics
- Understanding Implicit Animations
- Learning about Explicit Animations
- Understanding and using the Animation Controller
- Learning and implementing various Animation Classes
    - Ticker Class
    - Animation Class
    - CurvedAnimation Class
    - Implementing HERO Animation
    - Understanding and implementing Staggered Animations

Module 11: Flutter – Advanced: Packages and Plugins

- Understanding Packages
    - Understanding Packages and Plugins
    - Learning more about Packages and Plugins
    - Comparing Packages and Plugins
    - Advantages of Packages
    - Learning to use Packages
    - Searching and Adding a Package to the Project
    - Understanding Package Dependencies
    - Resolving Package Conflicts
- Creating New Packages and Plugins
    - Understanding Package Types
    - Understanding Dart Packages and Plugin Packages
    - Creating and Implementing Packages
    - Handling Package Documentations
    - Publishing Packages

Module 12: Flutter – Advanced: Debugging, Testing, Hot Reload, Hot Restart

- Learning to Debug Flutter Apps
- Learning about DevTools for debugging
    - Starting with browser based Debugging
    - Understanding Source Level Debugger
    - Understanding and using Widget Inspector
- Working with Android Studio and IntelliJ for debugging
- Working with Flutter Inspector
- Using Breakpoints
- Troubleshooting common errors
- Handling Errors
- Working with Hot Reload
    - Understanding Hot Reload
    - Advantages of Hot Reload
    - Performing Hot Reload
- Working with Hot Restart
    - Understanding Hot Restart
    - Comparing Hot Reload and Hot Restart
    - Performing Hot Restart
- Understanding Testing
    - Learning the Testing methods for Flutter Apps
    - Understanding Unit Testing
    - Learning to Test Widgets
- Introduction to Integration Testing
    - Understanding Integration Testing
    - Using the 'integration_test' package
    - Understanding the 'flutter_driver' package
    - Executing Integration Testing

Module 13: Flutter – Advanced: Performance Optimization

- Understanding the importance of Performance
    - Learning why Performance is Important
    - Learning to optimize key parameters – Speed, Memory and App Size
    - Learning to optimize Rendering Performance or Animation Performance
    - Working with Performance Metrics

Module 14: Flutter – Advanced: Deploying Flutter Apps

- Understanding Deployment
- The pubsepc file
- Performing Build and Release
    - For Android
    - For iOS
- Deploying Flutter App
- Understanding Continuous Deployment