

KOENIG SOLUTIONS • COURSE OUTLINE

Building Cross-Platform MAUI Apps with Bluetooth, GPS, and Device Sensors

Learn to build cross-platform MAUI apps with advanced layouts, MVVM, APIs, Bluetooth LE, GPS, sensors, and secure deployment.

5 Days

DURATION

59

TOPICS

12

HANDS-ON ACTIVITIES

COURSE OVERVIEW

This course covers advanced MAUI project architecture, navigation patterns, and adaptive layout design, followed by advanced control usage, MVVM best practices with dependency injection, and dynamic theming. It then addresses CollectionView-based data presentation, API integration with caching and pagination, and real-time updates through SignalR and push notifications. Later modules cover SQLite data storage with encryption, Bluetooth LE device communication, and GPS and sensor integration, before concluding with CommunityToolkit.MVVM, app security, performance optimization, and deployment automation.

WHO THIS COURSE IS FOR

Mobile App Developers

.NET Developers

MAUI Developers

Software Engineers

Application Architects

PREREQUISITES

- Knowledge of Mobile Application Development

LEARNING OBJECTIVES

- Implement advanced navigation patterns including Shell and deep linking
- Design adaptive layouts using Grid and FlexLayout
- Apply MVVM best practices with dependency injection and async commands
- Create dynamic themes and style resources for cross-platform apps
- Build high-performance list UIs with advanced CollectionView features
- Integrate APIs with caching, pagination, and offline support
- Implement Bluetooth LE communication for sensor data exchange
- Integrate GPS and device sensors for location-based features

59 Topics

DAY 1 Advanced MAUI Structure & Layouts

OBJECTIVES

- Understand MAUI's single-project architecture and platform-specific customization
- Implement advanced navigation patterns including Shell and deep linking
- Design adaptive and performance-optimized layouts

01

MAUI Project Architecture

TOPICS

- Single project structure
- Platform-specific code integration (Android/iOS/Windows)
- Conditional compilation for platform logic

02

MAUI Pages & Navigation

TOPICS

Shell navigation and modal navigation · Deep linking and navigation parameters · Managing navigation state

03**2 Activities**

Advanced Layout Patterns

TOPICS

Complex Grid layouts · FlexLayout for adaptive design · Performance tips for complex layouts

DAY 2 Controls, MVVM Enhancements & Styling

OBJECTIVES

- Implement advanced MAUI control patterns for dynamic UI rendering
- Apply MVVM best practices with dependency injection and async commands
- Create dynamic themes and style resources for cross-platform consistency

01

Advanced Control Usage

TOPICS

- Custom controls with ControlTemplate
- DataTemplateSelectors for dynamic UI rendering
- Advanced event-to-command binding

02

MVVM Best Practices

TOPICS

- Dependency injection in MAUI MVVM
- ViewModel communication patterns (MessagingCenter, WeakReferenceMessenger)
- Async commands with cancellation support

03**2 Activities**

Advanced Styling & Theming

TOPICS

- Merged resource dictionaries for app-wide theming
- Dynamic theme switching (light/dark)
- Performance considerations in styles

DAY 3 Data Presentation & API Integration

OBJECTIVES

- Build high-performance list-based UIs with advanced CollectionView features
- Integrate APIs with caching, pagination, and offline support
- Implement real-time data updates using SignalR and push notifications

01

CollectionView Mastery

TOPICS

- Virtualization & lazy loading for large datasets
- Grouped & hierarchical data presentation
- Interactive items (swipe gestures, context menus)

02

API Integration & Data Management

TOPICS

Optimized HttpClient usage · API response caching & offline sync patterns · Handling API pagination & search filtering

03**2 Activities**

Real-Time Data in MAUI

TOPICS

Using SignalR for live updates · Push notifications integration (Firebase)

DAY 4

Local Storage & Hardware Integration

OBJECTIVES

- Manage local storage using SQLite with encryption and transactions
- Implement Bluetooth LE device communication for sensor data exchange
- Integrate GPS and device sensors for location-based functionality

01

SQLite Advanced Usage

TOPICS

ORM patterns with SQLite-net · Transactions & bulk operations · Data encryption for security

02

Bluetooth LE Integration

TOPICS

- **Advanced BLE features:** GATT profiles, characteristics
- Handling multiple device connections
- Streaming and parsing BLE data

03**3 Activities**

GPS & Sensor Integration

TOPICS

High-accuracy GPS data retrieval · Background location tracking & geofencing · Integrating accelerometer and gyroscope

OBJECTIVES

- Use CommunityToolkit.MVVM for faster and cleaner MVVM development
- Secure apps with SSL pinning and secure storage
- Optimize app performance and automate deployment workflows

01**CommunityToolkit.MVVM Advanced****TOPICS**

- Source generators for commands & properties
- AsyncRelayCommand with exception handling
- ValueConverters & Behaviors for complex UI logic

02**App Security & Performance****TOPICS**

Secure storage of sensitive data · SSL pinning for secure API communication · Profiling and memory leak detection

03**Optimized Deployment****3 Activities****TOPICS**

- App trimming & linking for reduced size
- Platform-specific build optimizations
- Continuous deployment with App Center / GitHub Actions

Practise What You Learn

#	MODULE	ACTIVITY
03	Advanced Layout Patterns	■ Create a Shell-based app with nested navigation ■ Build a responsive multi-column dashboard using FlexLayout/Grid
03	Advanced Styling & Theming	■ Implement a dynamic dashboard with DataTemplateSelector ■ Add light/dark mode switching with live theme change
03	Real-Time Data in MAUI	■ Build a grouped CollectionView with swipe-enabled items ■ Implement a paginated API client with caching and offline mode
03	GPS & Sensor Integration	■ Store encrypted data locally in SQLite ■ Connect to a BLE device and stream sensor data ■ Implement background GPS tracking with geofencing alerts
03	Optimized Deployment	■ Refactor app using CommunityToolkit advanced features ■ Implement SSL pinning for API security ■ Automate build and deployment to a test device

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

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Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

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