

# **MOBILE APPLICATION DEVELOPMENT**

## **Course Syllabus**

### **1. General Information**

**Course name:** Mobile Application Development

**Course code:** INT1449\_CLC

**Number of credits:** 3

### **2. Objectives**

#### **Knowledge:**

The aim of this course is to provide learners with important knowledge about the characteristics of programming environments on mobile devices, understand programming languages compatible with mobile devices with different operating systems and to equip the ability to build applications and services on mobile devices.

#### **Skills:**

The aim of this course is to equip learners with skills in:

- applying the learned processes and techniques for developing a mobile application for Android and for mobile Cross Platform.
- developing and delivering a mobile application.

#### **Attitude:**

Learners are required to attend the classes and complete assignments/projects.

### **3. Abstracts**

This course introduces learners to basic knowledge about the basic concepts, classification, history, basic characteristics of mobile devices, mobile programming environment and the process & techniques of development of mobile application. On completion of this course learners will be able to follow the mobile application project as well as to develop a mobile application from requirement to delivery.

### **4. Teaching and learning methods**

- Lectures: 30h
- Exercises: 0h
- Projects: 08h
- Lab: 07h
- Individual reading : 0h

### **5. Prerequisites:**

## 6. Learning outcomes

After studied this courses, learner could:
[LO1]: Apply the principles of software engineering, testing, debugging and documentation to mobile application development
[LO2]: Design and implement user interfaces and basic functions for mobile applications using Android Studio and Java
[LO3]: Use various APIs and libraries to access device features, such as sensors, camera, location and maps
[LO4]: Publish and distribute mobile applications on Google Play Store and other platforms

## 7. Assignment criteria

Learning outcomes	Assignment criteria
[LO1]: Apply the principles of software engineering, testing, debugging and documentation to mobile application development	Chapter 1 Chapter 2 Chapter 4
[LO2]: Design and implement user interfaces and basic functions for mobile applications using Android Studio and Java	Chapter 1 Chapter 2 Chapter 3
[LO3]: Use various APIs and libraries to access device features, such as sensors, camera, location and maps	Chapter 2 Chapter 3
[LO4]: Publish and distribute mobile applications on Google Play Store and other platforms	Chapter 1 Chapter 4

## 8. Outlines

### Chapter 1: Overview of mobile application development

- 1.1. Introduction to mobile device
  - 1.1.1. Concept of mobile device
  - 1.1.2. Classification of mobile device
  - 1.1.3. History of formation and development of mobile device
  - 1.1.4. Mobile Application Market
  - 1.1.5. Basic characteristics of mobile device
- 1.2. Introduction to mobile eco-system
  - 1.2.1. Operators
  - 1.2.2. Networks
  - 1.2.3. Devices
  - 1.2.4. Platforms
  - 1.2.5. Operating systems
  - 1.2.6. Application frameworks
  - 1.2.7. Applications
  - 1.2.8. Services
- 1.3. Introduction to Process of mobile application development
  - 1.3.1. Concept
  - 1.3.2. Requirement analysis
  - 1.3.3. Planning

- 1.3.4. Development
- 1.3.5. Testing
- 1.3.6. Delivery
- 1.4. Introduction to mobile operating system
  - 1.4.1. Concept
  - 1.4.2. Classification
  - 1.4.3. Basic characteristics
- 1.5. Introduction to programming languages for mobile applications
  - 1.5.1. C++
  - 1.5.2. Java
  - 1.5.3. C#
  - 1.5.4. Kotlin
- 1.6. Set up a mobile application programming environment (Android)
  - 1.6.1. Concept of Android operating system
  - 1.6.2. Basic characteristics of Android operating system
  - 1.6.3. Architecture of the Android operating system
  - 1.6.4. Android application components
- 1.7. Basic knowledge of mobile application programming language (Java)
  - 1.7.1. Character set, keywords, names
  - 1.7.2. General structure
  - 1.7.3. Concept, classification of data types
  - 1.7.4. Variables, constants, operations
  - 1.7.5. Input, output and control
  - 1.7.6. Class, object
  - 1.7.7. Inheritance and polymorphism
  - 1.7.8. Standard library
- 1.8. Process of programming mobile applications
  - 1.8.1. Initialize the application
  - 1.8.2. Write a program
  - 1.8.3. Build a program
  - 1.8.4. Run a program and debug
- 1.9. Create first Android Application, Run and Debug

## **Chapter 2: Basic Android application programming**

- 2.1. Programming mobile application lifecycle management
  - 2.1.1. Mobile application lifecycle
  - 2.1.2. Programming mobile application lifecycle management
- 2.2. Activities and Intents
  - 2.2.1. Understanding Activities
  - 2.2.2. Linking Activities using Intents
  - 2.2.3. Calling Built-in Applications using Intents
  - 2.2.4. Displaying notification
- 2.3. Interface programming
  - 2.3.1. Understanding Android User Interface
  - 2.3.2. Learn different interface layouts: Frame, Relative, Linear, Table, Grid, Constraint
  - 2.3.3. Design Interface with Views and ViewGroup
  - 2.3.4. Displaying pictures and menu with View
  - 2.3.5. Fragment, RecyclerView, CardView
- 2.4. Data management
  - 2.4.1. Shared Preferences

- 2.4.2. Read and write with file
- 2.4.3. Relational database
- 2.4.4. Content providers
- 2.4.5. Google Firebase
- 2.5. Case Study: Create Android applications with basic interface and features, with data management

### **Chapter 3: Advanced Android application programming**

- 3.1. Messaging and networking
  - 3.1.1. SMS messaging
  - 3.1.2. Sending email
  - 3.1.3. Wifi
  - 3.1.4. Bluetooth
  - 3.1.5. NFC
- 3.2. Location-based services
  - 3.2.1. Displaying map
  - 3.2.2. Getting location data
- 3.3. Audio, video, and using the camera
  - 3.3.1. Audio
  - 3.3.2. Video
  - 3.3.3. Camera
- 3.4. Hardware sensors
  - 3.4.1. Sensors manager
  - 3.4.2. Monitoring device's movement and orientation
- 3.5. Processing JSON data for application
  - 3.5.1. Read and parse JSON strings
  - 3.5.2. Generate JSON string
  - 3.5.3. Data exchange between server and application via JSON string
- 3.6. Publishing Android application
  - 3.6.1. Preparing for publishing
  - 3.6.2. Deploying APK files
- 3.7. Case Study: Create Android application with advanced features

### **Chapter 4: Developing cross-platform applications**

- 4.1. Concept, classification of multi-platform mobile applications
- 4.2. Introduction to cross-platform mobile application development frameworks
- 4.3. Introducing Flutter and Building cross-platform applications using Flutter
- 4.4. Case Study: Create cross-platform mobile applications using Flutter

## **9. Required Textbooks**

- [1]. Wei-Meng Lee. *Beginning Android 4 Application Development*. John Wiley & Sons, Inc, 2012.

## **10. Suggested Textbooks**

- [2]. Brian Fling. *Mobile design and development*. O'Reilly Media, 2009.
- [3]. Reto Meier. *Professional Android 4 Application Development*. John Wiley & Sons, Inc, 2012.

## 11. Schedule

Main contents	Duration	Specific contents
<b>Chapter 1 Overview of mobile application development</b>	8h lecture 2h project 2h lab	1.1. Introduction to mobile device 1.2. Introduction to mobile eco-system 1.3. Introduction to Process of mobile application development 1.4. Introduction to mobile operating system 1.5. Introduction to programming languages for mobile applications 1.6. Set up a mobile application programming environment (Android) 1.7. Basic knowledge of mobile application programming language (Java) 1.8. Process of programming mobile applications 1.9. Create first Android Application, Run and Debug
<b>Chapter 2: Basic Android application programming</b>	8h lecture 2h project 2h lab	2.1. Programming mobile application lifecycle management 2.2. Activities and Intents 2.3. Interface programming 2.4. Data management 2.5. Case Study: Create Android applications with basic interface and features, with data management
<b>Chapter 3: Advanced Android application programming</b>	10h lecture 2h project 2h lab	3.1. Messaging and networking 3.2. Location-based services 3.3. Audio, video, and using the camera 3.4. Hardware sensors 3.5. Processing JSON data for application 3.6. Publishing Android application 3.7. Case Study: Create Android application with advanced features
<b>Chapter 4: Developing cross-platform applications</b>	4h lecture 2h project 1h lab	4.1. Concept, classification of multi-platform mobile applications 4.2. Introduction to cross-platform mobile application development frameworks 4.3. Introducing Flutter and Building cross-platform applications using Flutter 4.4. Case Study: Create cross-platform mobile applications using Flutter

## 12. Grading Policy

<b>Grading method</b>	<b>Percentage</b>
- Attendance	10%
- Exercises	20%
- Mid-term projects/exams	20%
- Final examination (lab)	50%