

1. Course Number and Title:

CMP 456 – Mobile Application Development

2. Credits Hours

3-2-3

3. Prerequisite and/or Co-Requisite:

Prerequisites: CMP 257 (Web Application Programming) or COE 421L (Computer Systems Engineering Laboratory) or COE 312 (Software Design for Engineers)

4. Name and Contact Information of Instructor:

Name: Dr. Tamer Shanableh

Office: ESB-2046

Email: tshanableh@aus.edu

Phone: (06) 515-2506

Office Hours: Posted on ilearn

5. Course Description (Catalog Description):

Covers mobile application development with emphasis on object-oriented programming. Includes the following topics: mobile software development kits (SDK); user interactions and event handling; persistent work, background processing and notifications; mobile persistence storage; multi-user apps with authentication and cloud storage; management of location-based data; and pre-trained models for app development with machine learning.

6. Textbook, and other Supplemental Material

Textbook:

- Dawn Griffiths and David Griffiths, *Head First Android Development: A Learner's Guide to Building Android Apps with Kotlin*, 1st edition, O'Reilly Media, 2021.

Other supplemental materials:

- Laurence Moroney, *AI and Machine Learning for On-Device Development*, 1st edition, O'Reilly Media, 2021

7. Learning outcomes:

Upon completion of the course, students will be able to:

1. Design graphical user interfaces for mobile apps.
2. Implement event handling to respond to user interactions.
3. Develop apps with persistent work using background processing and notifications.
4. Build multi-user apps using Firebase cloud databases.
5. Create SQLite databases to manipulate, query, and display data.
6. Use mobile GPS and maps to create location-aware apps.
7. Integrate machine learning tasks into mobile apps using pre-trained models.

8. Teaching and Learning Methodologies:

Methods include three one-hour lectures and one two-hour lab per week, weekly lab assignments and a project.

9. Course Topics and Schedule (regular semester):

Topic/Activity	Weeks
Introduction and Android Studio IDE	Week #1

Introductory XML GUI interfaces and layouts	Week #2
Advanced XML GUI interfaces and layouts	Week #3
Activity life cycle and intents	Week #4
Menus and shared preferences	Week #5
Event handling for buttons, checkboxes, radio groups spinners and lists	Week #6
Asynchronous tasks	Week #7
Background processing; WorkManager and Async tasks with notifications	Week #8
Firebase authentication and cloud databases	Week #9
SQLite databases, cursors and custom adapters	Week #10
GPS location data and maps API	Week #11
Kotlin programming	Week #12
App development with Kotlin	Week #13
App development with pre-trained machine learning models	Week #14
Project demos	Week #15
Final Exam	Week #16

10. Schedule of Laboratory and other Non-Lecture Sessions (regular semester):

Assignment	Due Date (tentative)
Lab 1 – Introduction to Android studio and developing a simple app	Week #2
Lab 2 – Developing an app with GUI and event handing	Week #3
Lab 3 – Activity life cycle and shared preferences	Week #4
Lab 4 – Menus, intents and multi activities	Week #5
Lab 5 – Apps with multithreading	Week #6
Lab 6 – WorkManager and Async tasks with notifications	Week #7
Lab 7 - Firebase setup and authentication	Week #8
Lab 8 – Firebase cloud databases	Week #9
Lab 8 – Apps with SQLite database functionality	Week #10
Lab 9 – Google Maps and GPS	Week #11
Lab Exam	Week #12
Lab 10 – Kotlin first app	Week #13
Lab 11 –App development with pre-trained machine learning models	Week #14

Project:

Students are asked to work in pairs to develop an Android App of their choice or one specified by the professor. The app cannot be used to claim credit in other courses or senior design projects. The app must be approved by the professor by email or in person. The app shall include, where possible, the following features: Firebase authentication and cloud database, shared preferences, menus, multithreading, more than one activity, Google Maps and notifications. The students will submit a working app with a report containing the code and XML interfaces. The students will also submit a user guide and demo the app using physical mobiles or emulators. The assessment is based on the above submissions and demo.

11. Out-of-Class Assignments with Due Dates :

Assignment	Due Date
Project submission and demo	Weeks #14 and #15 respectively

12. Student Evaluation:

Assessment	Weight	Due Date (tentative)
Labs	5%	Cf. Section 10
Lab Exam	10%	Week #12
Project and demo	10%	Submission and demo: Weeks #14 and #15 resp.
Quizzes	15%	Weeks #3, #5, #7, #11
Midterm Exam	25%	Week #9
Final Exam	35%	Week #16

13. Assessment Instruments:

Assessment	Course Learning Outcomes
Labs	O1–O7
Lab Exam	O5, O6
Project and demo	O1–O6
Quizzes	O1–O3, O5
Midterm Exam	O1–O3
Final Exam	O1–O7

14. Contribution of Course to Program Outcome:

This course contributes to the accomplishment of the following program outcomes:

BSCS Program Outcomes	Emphasis in this course	Course Learning Outcomes
(1) Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.	●	O3, O4, O5
(2) Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.	●	O1–O6
(3) Communicate effectively in a variety of professional contexts.		
(4) Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.		
(5) Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.		
(6) Apply computer science theory and software development fundamentals to produce computing-based solutions.	●	O3–O7

Emphasis: ● High; ◐ Medium; ○ Low; Blank – Nothing Specific Expected

BSCoE Program Outcomes	Emphasis in this course	Course Learning Outcomes
(1) Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	●	O2–O7
(2) Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and	○	O1

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welfare, as well as global, cultural, social, environmental, and economic factors		
(3) Communicate effectively with a range of audiences		
(4) Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts		
(5) Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives		
(6) Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions		
(7) Acquire and apply new knowledge as needed, using appropriate learning strategies		

Emphasis: ● High; ◐ Medium; ○ Low; Blank – Nothing Specific Expected

15. Letter Grade Policy:

Total (T)	Letter Grade
$90 \leq T$	A
$85 \leq T < 90$	A-
$80 \leq T < 85$	B+
$75 \leq T < 80$	B
$70 \leq T < 75$	B-
$65 \leq T < 70$	C+
$60 \leq T < 65$	C
$50 \leq T < 60$	C-
$40 \leq T < 50$	D
$T < 40$	F