Program Name : **Computer Engineering Program Group**

Program Code : **CO/CM/IF/CW**

Semester : **Sixth**

Course Title : **Mobile Application Development**

Course Code : **22617**

1. RATIONALE

Android application development is one of the rising and growing trend in the industry of mobile. This course examines the principles of mobile application design and covers the necessary concepts which are required to understand mobile based applications and develop Android based Applications in particular. After completing this course students will design and build a variety of real-time Apps using Android.

2. COMPETENCY

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Create simple Android applications.**

3. COURSE OUTCOMES (COs)

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following ***industry oriented*** COs associated with the above mentioned competency:

a) Interprete features of Android operating system.
b) Configure Android environment and development tools.
c) Develop rich user Interfaces by using layouts and controls.
d) Use User Interface components for android application development.
e) Create Android application using database.
f) Publish Android applications.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme			Credit (L+T+P)	Examination Scheme													
				Theory							Practical						
L	T	P		Paper Hrs.	ESE		PA		Total		ESE		PA		Total		
					Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	
3	-	4	7	3	70	28	30*	00	100	40	25#	10	25	10	50	20	

***(*):** Under the theory PA; Out of 30 marks, 10 marks of theory PA are for micro-project assessment to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for the assessment of the UOs required for the attainment of the COs.*

***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **ESE** -End Semester Examination; **PA** - Progressive Assessment.*

5. COURSE MAP (with sample COs, PrOs, UOs, ADOs and topics)

This course map illustrates an overview of the flow and linkages of the topics at various levels of outcomes (details in subsequent sections) to be attained by the student by the end of the course, in all domains of learning in terms of the industry/employer identified competency depicted at the centre of this map.

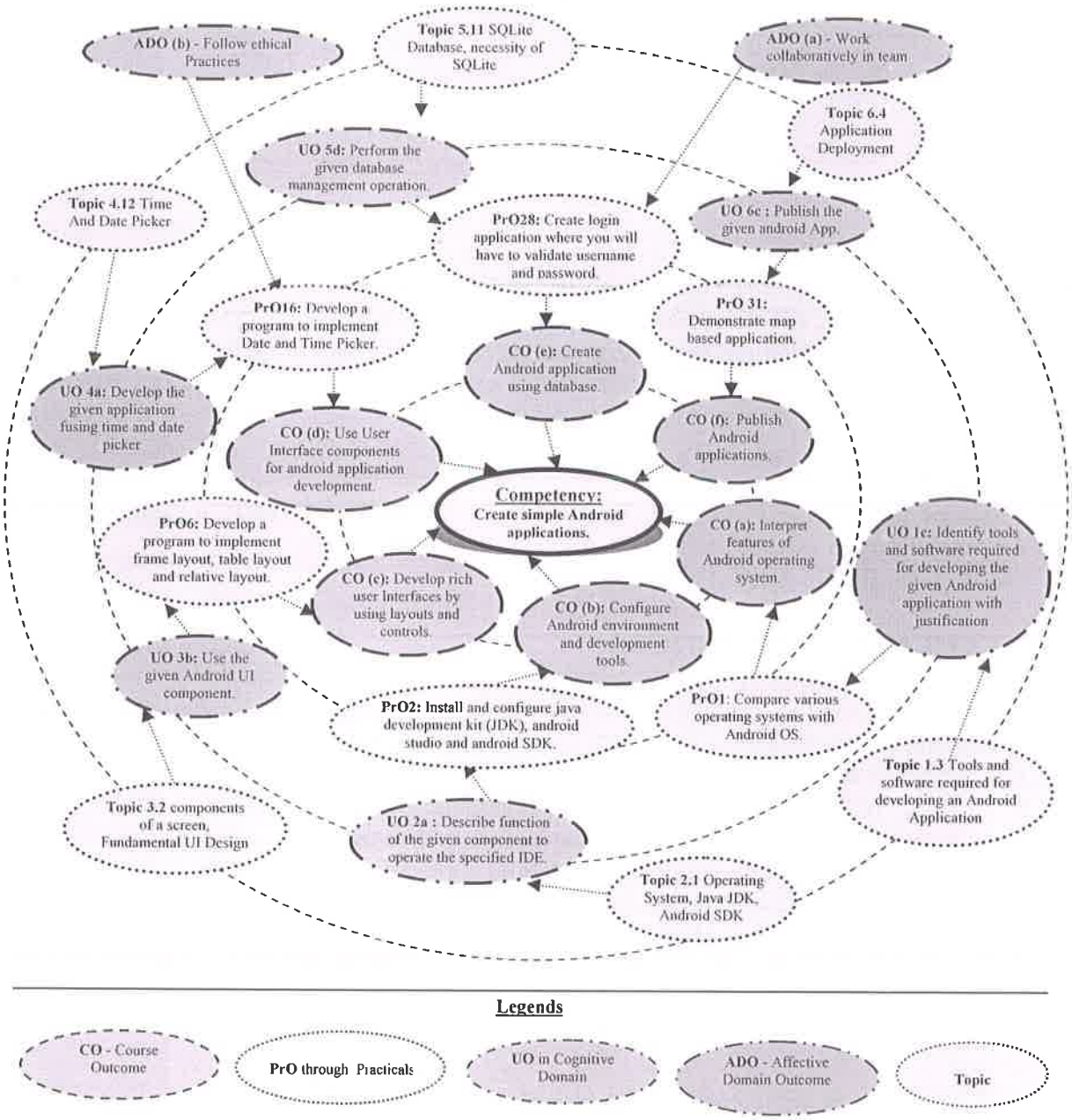

Figure 1 - Course Map

6. SUGGESTED PRACTICALS/ EXERCISES

The practicals in this section are PrOs (i.e. sub-components of the COs) to be developed and assessed in the student for the attainment of the above stated competency.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Compare various operating systems with Android OS.	I	2
2	Install /configure java development kit (JDK), android studio and android SDK.	II	2*
3	Configure android development tools (ADT) plug-in and create android virtual device.	II	2*
4	Develop a program to display Hello World on screen.	III	2*
5	Develop a program to implement linear layout and absolute layout.	III	2*

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
6	Develop a program to implement frame layout, table layout and relative layout.	III	2*
7	Develop a program to implement Text View and Edit Text.	IV	2*
8	Develop a program to implement Auto Complete Text View.	IV	2
9	Develop a program to implement Button, Image Button and Toggle Button.	IV	2*
10	Develop a program to implement login window using above UI controls.	IV	2*
11	Develop a program to implement Checkbox.	IV	2*
12	Develop a program to implement Radio Button and Radio Group.	IV	2*
13	Develop a program to implement Progress Bar.	IV	2*
14	Develop a program to implement List View, Grid View, Image View and Scroll View.	IV	2*
15	Develop a program to implement Custom Toast Alert.	IV	2*
16	Develop a program to implement Date and Time Picker.	IV	2*
17	Develop a program to create an activity.	V	2*
18	Develop a program to implement new activity using explicit intent and implicit intent.	V	2*
19	Develop a program to implement content provider.	V	2
20	Develop a program to implement service.	V	2
21	Develop a program to implement broadcast receiver.	V	2*
22	Develop a program to implement sensors.	V	2*
23	Develop a program to build Camera.	V	2*
24	Develop a program for providing Bluetooth connectivity.	V	2*
25	Develop a program for animation.	V	2
26	Perform Async task using SQLite.	V	2*
27	Create sample application with login module. (Check username and password) On successful login, Change TextView "Login Successful". And on login fail, alert user using Toast "Login fail".	V	2*
28	Create login application where you will have to validate username and password till the username and password is not validated, login button should remain disabled.	V	2*
29	Develop a program to: a) Send SMS b) Receive SMS	VI	2*+2*
30	Develop a program to send and receive e-mail.	VI	2*
31	Deploy map based application. Part I	VI	2*
32	Deploy map based application. Part II	VI	2*
	Total		**66**

Note

i. *A suggestive list of PrOs is given in the above table. More such PrOs can be added to attain the COs and competency. The practicals marked as '*' are compulsory, so that the student reaches the 'Application Level' of Bloom's Taxonomy' as generally required by the industry.*

ii. *The 'Process' and 'Product' related skills associated with each PrO are to be assessed according to a suggested sample given below:*

S. No.	Performance Indicators	Weightage in %
1	Correctness of User Interface design	30
2	Correctness of business logic applied	40
3	Debugging ability	10
4	Correctness of answers to sample questions	10
5	On time submission	10
Total		**100**

The above PrOs also comprise of the following social skills/attitudes which are Affective Domain Outcomes (ADOs) that are best developed through the laboratory/field based experiences:

a) Work collaboratively in team
b) Follow ethical practices.

The ADOs are not specific to any one PrO, but are embedded in many PrOs. Hence, the acquisition of the ADOs takes place gradually in the student when s/he undertakes a series of practical experiences over a period of time. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

- 'Valuing Level' in 1st year.
- 'Organization Level' in 2nd year.
- 'Characterization Level' in 3rd year.

7. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

The major equipment with broad specification mentioned here will usher in uniformity in conduct of practicals, as well as aid to procure equipment by authorities concerned.

Sr. No.	Equipment Name with Broad Specifications	PrO. No.
1	Computer system (Any computer system which is available in laboratory with minimum 2GB RAM)	All
2	Any compatible open source tools (e.g. Android Studio/ Eclipse IDE, Any compatible web server, Any compatible database tool e.g. SQLite)	

8. UNDERPINNING THEORY COMPONENTS

The following topics/subtopics should be taught and assessed to develop UOs in cognitive domain for achieving the COs to attain the identified competency. More UOs could be added.

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
Unit – I Android and its tools	1a. Explain the given basic terms related to Android system. 1b. Explain with sketches Android architecture for the given application. 1c. Identify tools and software required for developing the given Android application with justification.	1.1 Introduction to Android, open handset alliance, Android Ecosystem. 1.2 Need of Android, Features Of Android 1.3 Tools and software required for developing an Android Application 1.4 Android Architecture

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
	1d. Explain significance of the given component in Android architecture.	
Unit– II Installation and configuration of Android	2a. Describe function of the given component to operate the specified IDE. 2b. Explain the given term related to virtual machine. 2c. Explain the given basic term related to Android development tools. 2d. Describe the features of given android emulator. 2e. Describe the steps to configure the given android development environment	2.1 Operating System, Java JDK, Android SDK 2.2 Android Development Tools(ADT) 2.3 Android Virtual Devices(AVDs) 2.4 Emulators 2.5 Dalvik Virtual Machine, Difference between JVM and DVM 2.6 Steps to install and configure Android Studio and SDK
Unit– III UI Components and Layouts	3a. Explain with relevant analogy the given Directory Structure. 3b. Describe the steps to use the given Android rich UI component. 3c. Describe the steps to use the given type of Layout. 3d. Develop the given basic Android application.	3.1 Control Flow, Directory Structure 3.2 Components of a screen, Fundamental UI Design 3.3 Linear Layout; Absolute Layout; Frame Layout; Table Layout; Relative Layout
Unit-IV Designing User Interface With View	4a. Develop rich user Interfaces for the given Android application. 4b. Develop Android application using the given view. 4c. Explain the significance of the given display Alert. 4d. Develop the given application using time and date picker.	4.1 Text View, Edit Text; Button, Image Button; Toggle Button; Radio Button And Radio Group; Checkbox; Progress Bar 4.2 List View; Grid View; Image View; Scroll View; Custom Toast Alert 4.3 Time And Date Picker
Unit –V Activity And Multimedia with databases	5a. Apply the given Intents and service in Application development. 5b. Use Fragment to generate the given multiple activities. 5c. Develop programs to play the given multimedia. 5d. Write the query to perform the given database management operation.	5.1 Intent, Intent_Filter 5.2 Activity Lifecycle; Broadcast Lifecycle 5.3 Content Provider; Fragments 5.4 Service: Features Of service, Android platform service, Defining new service, Service Lifecycle, Permission, example of service 5.5 Android System Architecture, Multimedia framework, Play Audio and Video, Text to speech, Sensors, Async tasks 5.6 Audio Capture, Camera 5.7 Bluetooth, Animation 5.8 SQLite Database, necessity of SQLite, Creation and connection

Unit	Unit Outcomes (UOs) (in cognitive domain)	Topics and Sub-topics
		of the database, extracting value from cursors, Transactions.
Unit –VI Security and Application Deployment	6a. Explain the given location based service. 6b. Write the steps to customize the given permissions for users. 6c. Explain features of the given android security service. 6d. Write the steps to publish the given android App.	6.1 SMS Telephony 6.2 Location Based Services: Creating the project, Getting the maps API key, Displaying the map, Displaying the zoom control, Navigating to a specific location, Adding markers, Getting location, Geocoding and reverse Geocoding, Getting Location data, Monitoring Location. 6.3 Android Security Model, Declaring and Using Permissions, Using Custom Permission. 6.4 Application Deployment: Creating Small Application, Signing of application, Deploying app on Google Play Store, Become a Publisher, Developer Console

***Note**: To attain the COs and competency, above listed UOs need to be undertaken to achieve the 'Application Level' of Bloom's 'Cognitive Domain Taxonomy'.*

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Android and its tools	04	02	02	-	04
II	Installation and configuration of Android	06	02	02	02	06
III	UI Components and Layouts	08	02	02	04	08
IV	Designing User Interface With View	10	02	02	08	12
V	Activity and Multimedia with databases	18	02	06	12	20
VI	Security and Application Deployment	18	02	06	12	20
Total		**64**	**12**	**20**	**38**	**70**

***Legends:** R=Remember, U=Understand, A=Apply and above (Bloom's Revised taxonomy)*
***Note**: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of LOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various

outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

a) Prepare journal of practical.
b) Undertake micro-projects.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) ***'L' in item No. 4*** does not mean only the traditional lecture method, but different types of teaching methods and media that are to be employed to develop the outcomes.
c) About ***15-20% of the topics/sub-topics*** which is relatively simpler or descriptive in nature is to be given to the students for ***self-directed learning*** and assess the development of the COs through classroom presentations (see implementation guideline for details).
d) With respect to item No.10, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
e) Use different Audio Visual media for Concept understanding.
f) Guide student(s) in undertaking micro-projects.
g) Demonstrate students thoroughly before they start doing the practice.
h) Ensure use of latest version of tools.
i) Encourage students to refer various web sites to have detail understanding of JSP and related concepts.
j) Encourage students to refer different web-applications to have deeper understanding of web-applications.
k) Observe continuously the performance of students in laboratory.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project are group-based. However, in the fifth and sixth semesters, it should be preferably be ***individually*** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than ***16 (sixteen) student engagement hours*** during the course. The student ought to submit micro-project by the end of the semester to develop the industry oriented COs.

A suggestive list of micro-projects is given here. Similar micro-projects could be added by the concerned faculty:

a) Develop an android application on traffic surveying.
b) Develop an android application on online shopping.
c) Develop an android application for making a calculator.
d) Develop an android application for game.

Guidelines For Developing Micro Projects:

(Implement Following Relevant Guidelines For Micro Projects)

i. Must implement concepts of Advance java.
ii. Must publish the sample application on play store.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication
1	Android	Dixit, Prasanna Kumar	Vikas Publications, New Delhi 2014, ISBN: 9789325977884
2	Pro Android 5	Maclean David, Komatineni Satya, Allen Grant	Apress Publications, 2015, ISBN: 978-1-4302-4680-0
3	Android Programming for Beginners	Hortan, John	Packet Publication, 2015, ISBN: 978-1-78588-326-2

14. SOFTWARE/LEARNING WEBSITES

a) https://www.tutorialspoint.com/android
b) http://developer.android.com/guide/index.html.
c) http://developer.android.com/reference/packages.html
d) http://developer.android.com/guide/components/fundamentals.html
e) http://developer.android.com/guide/topics/ui/index.html
f) http://developer.android.com/guide/topics/ui/declaring-layout.html
g) https://www.tutorialspoint.com/android/android_advanced_tutorial.pdf