**CSC-455: Mobile Application Development**

**General Information**

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| **Course Number** | CSC-455 |
| **Credit Hours** | 2+1 (Theory Credit Hour = 2, Lab Credit Hours = 1) |
| **Contact Hours** | 2-3 |
| **Prerequisite** | None |

**Course Objectives**

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| The Android App Development course aims to equip students with a comprehensive understanding of mobile application development on the Android platform. Throughout the course, participants will delve into the fundamentals of Android programming, mastering key concepts such as UI design, event handling, and data storage. Students will gain hands-on experience in creating interactive and user-friendly applications, incorporating features like multimedia integration, location-based services, and connectivity to web services. The course also emphasizes the importance of optimizing apps for diverse devices and screen sizes, ensuring a seamless user experience. By the end of the program, participants will have developed a practical skill set, enabling them to design, build, and deploy their own Android applications, and they will be well-versed in the latest tools and best practices within the ever-evolving Android development landscape. |

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| **CLO No.** | **Course Learning Outcome** | **Bloom Taxonomy** |
| CLO-1 | Understand different architectures & framework for Mobile Application development. | C1 (Knowledge) |
| CLO-2 | Develop mobile applications using current software development environments | C3 (Apply) |
| CLO-3 | Compare the different performance tradeoffs in mobile application development. | C2 (Understand) |

**Course Content**

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| **Session No.** | **Week No.** | **Topic** | **Suggested Readings (Chapters)** |
| 01-03 | 01 | 1. Introduction to Android 2. Installation of Android Studio 3. Understanding Android Architecture and Runtime Environment 4. Building Android First App (Hello World!) | Book Chapter (1, 2) and Lecture Notes |
| 04-06 | 02 | 1. **Introduction to Layouts**    1. Constraint Layout    2. Relative Layout    3. Linear Layout    4. GridView    5. Table Layout 2. Working with weight and gravity propery 3. **Introduction to Widgets**    1. TextView    2. EditText    3. Button | Lecture Notes |
| 07-09 | 03 | 1. Introduction to Jetpack Compose    1. What is Jetpack Compose?    2. Why use Jetpack Compose    3. Comparison with traditional UI frameworks (XML-based layouts, etc.) 2. Getting Started with Jetpack Compose  * Setting up a new project * Basics of Composable functions * Anatomy of a Composable function  1. UI Components in Jetpack Compose  * Text * Button * Image * TextField * Checkbox, RadioButton, Switch, etc. * Customizing components with modifiers | Book Chapter (2, 3) and Lecture Notes |
| 10-12 | 04 | 1. Layouts in Jetpack Compose  * Understanding the different layout types (Column, Row, Box, etc.) * Nesting layouts * Using modifiers to control layout behavior  1. State Management in Jetpack Compose  * Introduction to state in Jetpack Compose * Using mutable state variables * State hoisting * ViewModel and LiveData integration | Book Chapter (3, 4, 5) and Lecture Notes |
| 12-15 | 05 | 1. Working with Intents 2. **Explicit Intent**    1. Creating apps with multiple activities 3. **Implicit Intent**    1. Camera    2. Media player 4. Working with Intent Filter 5. Navigation in Jetpack Compose  * Navigation basics * Navigation components * Passing data between screens * Deep linking and navigation graphs |  |
| 16-18 | 05 | 1. Understanding the state preferences 2. Understanding state of an application, How to maintain it, and how to restore it. 3. Create app based state preferences 4. Create activity based shared preferences | Book Chapter (7) and Lecture Notes |
| 19-21 | 06 | 1. Working with File storage 2. Reading / Writing files 3. Reading files from Raw and Online 4. Lists and other widgets 5. Working with Android Built In Database (SQLite) | Book Chapter (15) and Lecture Notes |
| 22-24 | 07 | 1. Handling User Input  * Basics of handling user input (clicks, gestures, etc.) * Handling form input  1. **Coroutines**    1. Types of coroutines and its running | Book Chapter (7, 8) and Lecture Notes |
| **Mid Exam** | | | |
| 25-27 | 08 | 1. Services and its types 2. **Foreground Services**    1. Creating a service    2. running a service as forground 3. **Threads** | Book Chapter (5) and Lecture Notes |
| 28-30 | 09 | 1. **Working with UI Notifications** 2. **WorkManager**    1. Creating Worker Class    2. Creating a Work Request       1. OneTimeRequest       2. PeriodicWorkRequest    3. Adding Constraints    4. Queuing work requests    5. Getting Response and results | Book Chapter (11) and Lecture Notes |
| 31-33 | 10 | 1. Content Providers 2. Reading Content Providers 3. Creating Content Provider | Book Chapter (09) and Lecture Notes |
| 34-36 | 11 | 1. **Working with Network based apps**    1. OkHTTP    2. Creating Request with OkHTTP    3. Sending and Receiving response 2. JSON and XML parsing | Book Chapter (05, 09) and Lecture Notes |
| 37-39 | 13 | 1. **Introduction to flutter**    1. Importance 2. **Introduction to Dart**    1. Writing dart code 3. Installation flutter framework + Android Studio or VS Code 4. Creating new project 5. Setting up virtual device 6. Hello World Flutter 7. Introduction to Flutter Widgets 8. Material App | Book Chapter (9) and Lecture Notes |
| 40-42 | 14 | 1. **Widget**    1. Scaffold Widget    2. Image Widget    3. Container Widget    4. Icon Widget    5. Column and Row Widget    6. Card Widget    7. Buttons       1. Floatting app button       2. Raised button       3. Dropdown Button       4. Outline button       5. Button bar       6. Popup button    8. Inputs    9. Checkboxes    10. Radio buttons    11. Slider 2. Layouts | Book Chapter (12) and Lecture Notes |
| 43-45 | 15 | 1. Dialogs 2. Routers 3. State Management    1. Ephemeral State | Book Chapter (19) and Lecture Notes |
| **Final Exams** | | | |

**CLO Mappings**

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|  | **SO IDs** | | | | | | | | | | | |
| **CLO ID** | **GA1** | **GA2** | **GA3** | **GA4** | **GA5** | **GA6** | **GA7** | **GA8** | **GA9** | **GA10** | **GA11** | **GA12** |
| CLO 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Reference Material**

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| 1. Professional Android 4 Application Development by Reto Meier 2. Instructor’s notes 3. Head First To Android Development (by Orie’lly) |