

Course Outline

School:	Eng. Tech. & Applied Science
Department:	Information and Communication Engineering Technology (ICET)
Course Title:	Mobile Apps Development
Course Code:	COMP 304
Course Hours/Credits:	56
Prerequisites:	COMP 228
Co-requisites:	N/A
Eligible for Prior Learning, Assessment and Recognition:	Yes
Originated by:	ILIA NIKA
Creation Date:	Fall 2005
Revised by:	ILIA NIKA
Revision Date:	Summer 2025
Current Semester:	Fall 2025
Approved by:	

Clarence Cheung, Associate Dean/Dean,
Eng. Tech. & Applied Science

Students are expected to review and understand all areas of the course outline.

Retain this course outline for future transfer credit applications. A fee may be charged for additional copies.

This course outline is available in alternative formats upon request.

Acknowledgement of Traditional Lands

Centennial is proud to be a part of a rich history of education in this province and in this city. We acknowledge that we are on the treaty lands and territory of the Mississaugas of the Credit First Nation and pay tribute to their legacy and the legacy of all First Peoples of Canada, as we strengthen ties with the communities we serve and build the future through learning and through our graduates. Today the traditional meeting place of Toronto is still home to many Indigenous People from across Turtle Island and we are grateful to have the opportunity to work in the communities that have grown in the treaty lands of the Mississaugas. We acknowledge that we are all treaty people and accept our responsibility to honor all our relations.

Course Description

This course provides hands-on experience in developing and deploying native mobile applications on the Android platform using Kotlin. Students will build advanced user interfaces, handle events, access remote services, store and retrieve data, and integrate mapping features. The course introduces the development of AI-driven agents and leverages AI-assisted tools to enhance coding efficiency, debugging, and optimization. Utilizing Android Studio as the primary development tool, students will design, test, and deploy intelligent and dynamic mobile applications tailored to real-world scenarios.

External Standard Information (ESI)

N/A

Program Outcomes

Successful completion of this and other courses in the program culminates in the achievement of the Vocational Learning Outcomes (program outcomes) set by the Ministry of Colleges and Universities in the Program Standard. The VLOs express the learning a student must reliably demonstrate before graduation. To ensure a meaningful learning experience and to better understand how this course and program prepare graduates for success, students are encouraged to review the Program Standard by visiting <http://www.tcu.gov.on.ca/pepg/audiences/colleges/progstan/>. For apprenticeship-based programs, visit <https://www.skilledtradesontario.ca/about-trades/trades-information/>.

Course Learning Outcomes

The student will reliably demonstrate the ability to:

1. Distinguish various mobile application development technologies and examine the Android platform and development environment.
2. Build the UI of Android applications using the Jetpack Compose toolkit.
3. Discuss Kotlin programming language features relevant to Android development.
4. Apply structured Data Storage APIs to store data in a local database or a NoSQL cloud-hosted database.
5. Design, code, and test Android Applications that connect to internet resources, perform network operations on background threads and parse the information using various parsers.
6. Create Android Applications that apply Location, Maps, and Awareness APIs.
7. Develop and integrate AI agents in Android applications using large language models (LLMs) such as OpenAI's models or Gemini, as well as TensorFlow Lite, to enhance app functionality and user

- experience.
8. Discuss various Android APIs and best-practice patterns designed to support running background tasks and providing notifications to users.
 9. Deploy Android Applications and discuss security issues.

Essential Employability Skills (EES)

The student will reliably demonstrate the ability to*:

1. Communicate clearly, concisely and correctly in the written, spoken, and visual form that fulfills the purpose and meets the needs of the audience.
2. Respond to written, spoken, or visual messages in a manner that ensures effective communication.
3. Execute mathematical operations accurately.
4. Apply a systematic approach to solve problems.
5. Use a variety of thinking skills to anticipate and solve problems.

*There are 11 Essential Employability Skills outcomes as per the Ministry Program Standard. Of these 11 outcomes, the following will be assessed in this course.

New Essential Skills (NES)

The student will reliably demonstrate the ability to*:

5. Explore, gather, interpret and visualize industry-relevant data to effectively communicate analytical insights for evidence-based decision making.

*There are 9 institutional New Essential Skills outcomes. Of these 9 outcomes, the following will be assessed in this course.

Global Citizenship and Equity (GC&E) Outcomes

N/A

Methods of Instruction

The instructional methods used in this course include interactive lectures on weekly topics, hands-on weekly lab sessions, live demonstrations, practical exercises, and independent lab assignments. For online programs, recordings of interactive sessions will also be made available. All course materials will be provided within the course shell in Luminate.

Text and Other Instructional/Learning Materials

The costs of textbooks or other learning material are available through the Centennial College Bookstore <https://www.bkstr.com/centennialprogressstore/shop/textbooks-and-course-materials>.

Text Book(s):

Reference books (both available on O'Reilly online <http://go.oreilly.com/centennial-college>):

Main Reference book:

Wangereka, H. Mastering Kotlin for Android 14, Copyright © 2024 Packt Publishing, ISBN: 978-1-83763-171-1

Sills B, Gardner B, Marsicano K, and Stewart C, Android Programming: The Big Nerd Ranch Guide, 5th edition, Publisher Big Nerd Ranch, LLC., 2022

Griffiths D., Griffiths D, Head First Android Development: A Learner's Guide to Building Android Apps with Kotlin, Third edition, Publisher: O'Reilly Media, Inc., ISBN: 9781492076520, Released November 2021

Online Resource(s):

Luminate course shell

Please see the weekly topical outline for any Additional Learning Resources required for your section of this course.

Evaluation Scheme

- ⇒ Test 1: Hands-On test covering Week 1 - 6 materials
- ⇒ Test 2: Hands-On test covering Week 7-13 materials and comprehensive topics from previous weeks
- ⇒ Assignment 1: Developing a Basic Android Application using Kotlin and Jetpack Compose with Multiple Activities
- ⇒ Assignment 2: Designing, Developing, and Architecting Interactive Android Applications with Material Design 3 and Advanced Features
- ⇒ Assignment 3: Building Robust Android Applications with Networking, Navigation, and Data Persistence
- ⇒ Assignment 4: Developing Native Android Apps using Jetpack Compose with Location, Mapping, and AI-driven Assistance

Evaluation Name	CLO(s)	EES Outcome(s)	NES Outcome(s)	GCE Outcome(s)	Weight/ 100
Test 1	1, 2	1, 2, 3, 4, 5	5		25
Test 2	4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5	5		25
Assignment 1	1, 2	1, 2, 4	5		8
Assignment 2	1, 2, 3	1, 2, 4, 5	5		12
Assignment 3	1, 4, 5	1, 2, 3, 4, 5	5		15
Assignment 4	2, 3, 5, 6, 7, 9	1, 2, 4, 5	5		15
Total					100%

If students are unable to write a test they should immediately contact their professor or program Associate Dean for advice. In exceptional and well documented circumstances (e.g. unforeseen family problems, serious illness, or death of a close family member), students may be able to write a make-up test.

All submitted work may be reviewed for authenticity and originality utilizing College approved plagiarism prevention software. Students who do not wish to have their work submitted to College approved plagiarism prevention software must, by the end of the second week of class, communicate this in writing to the instructor and make mutually agreeable alternate arrangements.

When writing tests, students must be able to produce official Centennial College photo identification or they may be refused the right to take the test or test results will be void.

Tests or assignments conducted remotely may require the use of online proctoring technology where the student's identification is verified and their activity is monitored and/or recorded, both audibly and visually through remote access to the student's computer and web camera. Students must communicate in writing to the instructor as soon as possible and prior to the test or assignment due date if they require an alternate assessment format to explore mutually agreeable alternatives.

Student Accommodation

The Centre for Accessible Learning and Counselling Services (CALCS) (<http://centennialcollege.ca/calcs>) provides programs and services which empower students in meeting their wellness goals, accommodation and disability-related needs. Our team of professional psychotherapists, social workers, educators, and staff offer brief, solution-focused psychotherapy, accommodation planning, health and wellness education, group counselling, psycho-educational workshops, adaptive technology, and peer support. Walk in for your first intake session at one of our service locations (Ashtonbee Room L1-04, Morningside Room 190, Progress Room C1-03, The Story Arts Centre Room 285, Downsview Room 105) or contact us at calcs@centennialcollege.ca, 416-289-5000 ext. 3850 to learn more about accessing CALCS services.

Use of Dictionaries

Program or School Policies

N/A

Course Policies

N/A

College Policies

Students should familiarize themselves with all College Policies that cover academic matters and student conduct.

All students and employees have the right to study and work in an environment that is free from discrimination and harassment and promotes respect and equity. Centennial policies ensure all incidents of harassment, discrimination, bullying and violence will be addressed and responded to accordingly.

Academic Honesty

Academic honesty is integral to the learning process and a necessary ingredient of academic integrity. Forms of academic dishonesty include cheating, plagiarism, and impersonation, among others. Breaches of academic honesty may result in a failing grade on the assignment or course, suspension, or expulsion from the college. Students are bound to the College's AC100-11 Academic Honesty and Plagiarism policy.

To learn more, please visit the Libraries information page about Academic Integrity
<https://libraryguides.centennialcollege.ca/academicintegrity> and review Centennial College's Academic

Honesty Module:

https://myappform.centennialcollege.ca/centennial/articulate/Centennial_College_Academic_Integrity_Module_%202/story.html

Use of Lecture/Course Materials

Materials used in Centennial College courses are subject to Intellectual Property and Copyright protection, and as such cannot be used and posted for public dissemination without prior permission from the original creator or copyright holder (e.g., student/professor/the College/or third-party source). This includes class/lecture recordings, course materials, and third-party copyright-protected materials (such as images, book chapters and articles). Copyright protections are automatic once an original work is created, and applies whether or not a copyright statement appears on the material. Students and employees are bound by College policies, including AC100-22 Intellectual Property, and SL100-02 Student Code of Conduct, and any student or employee found to be using or posting course materials or recordings for public dissemination without permission and/or inappropriately is in breach of these policies and may be sanctioned.

For more information on these and other policies, please visit www.centennialcollege.ca/about-centennial/college-overview/college-policies.

Students enrolled in a joint or collaborative program are subject to the partner institution's academic policies.

PLAR Process

This course is eligible for Prior Learning Assessment and Recognition (PLAR). PLAR is a process by which course credit may be granted for past learning acquired through work or other life experiences. The PLAR process involves completing an assessment (portfolio, test, assignment, etc.) that reliably demonstrates achievement of the course learning outcomes. Contact the academic school to obtain information on the PLAR process and the required assessment.

This course outline and its associated weekly topical(s) may not be reproduced, in whole or in part, without the prior permission of Centennial College.

Semester:	Fall 2025	Professor(s) Name:	See Luminate course shell
Section Code:	ALL	Contact Information:	See Luminate course shell
Meeting Time & Location:	See myCentennial timetable	Delivery Method:	See myCentennial timetable

Topical Outline (subject to change):

ORIGINAL TOPICAL

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
1	Course Overview Introduction to Android Platform and Android Application Development	Lecture ppt slides Recorded Lecture for online sections.	Examine Android Platform. Discuss the differences between leading mobile operating systems. Explain Android Development Environment and Android Application Architecture. Write a simple Android application using Android Studio.	Interactive Lecture (recording provided for online sections) Interactive Lab Session Demonstration Hands-On Exercises		
2	Introduction to Kotlin Programming Language	Lecture ppt slides Recorded Lecture for online sections.	Review the basics of Kotlin programming language: <ul style="list-style-type: none">- Variables- Control structures- Functions- Classes- Collections- Set up Android Studio to use Kotlin and build apps Develop Android Apps Using Kotlin	Interactive Lecture (recording provided for online sections) Interactive Lab Session Demonstration Hands-On Exercises		
3	Mastering Jetpack Compose Layouts: Building Declarative UIs with Composable Functions and Layouts	Main Reference book, chapter 3 Lecture ppt slides Recorded Lecture for online sections.	Discuss the fundamental principles of Jetpack Compose and the differences between declarative and imperative UIs. Identify and explain the purpose and usage of composable functions in Jetpack Compose. Develop and implement UI components using composable functions, previews, and modifiers.	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab Session Hands-On Exercises	Lab Assignment 1: Developing a Basic Android Application using Kotlin and Jetpack Compose with Multiple Activities and	Week 3

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
			<p>Design and construct complex UI layouts using Column, Row, Box, and Lists in Jetpack Compose.</p> <p>Evaluate the efficiency and effectiveness of different layout structures in Jetpack Compose.</p> <p>Apply Jetpack Compose best practices to create responsive and maintainable user interfaces.</p>		Composable Layouts	
4	Creating Responsive and Accessible UIs for Android Apps	Main Reference book, chapter 4 Lecture ppt slides Recorded Lecture for online sections.	<p>Discuss the fundamental principles and features of Material Design 3.</p> <p>Identify and utilize various Material Design components to enhance user interfaces.</p> <p>Apply Material Design 3 color schemes to create visually appealing and consistent app themes.</p> <p>Design responsive UIs that adapt to large screens and foldable devices using WindowSizeClass.</p> <p>Implement accessibility features to ensure apps are usable by all users, including those with disabilities.</p>	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab Session Hands-On Exercises		
5	Advanced Android App Architecture and Development Practices	Main Reference book, chapter 5 Lecture ppt slides Recorded Lecture for online sections.	<p>Discuss the fundamental principles of app architecture and its importance in Android development.</p> <p>Implement the Model-View-ViewModel (MVVM) architecture to enhance code separation and maintainability.</p> <p>Explain the functionality and benefits of LazyColumn in Jetpack Compose.</p> <p>Create composable functions using LazyColumn to efficiently display lists.</p>	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab Session Hands-On Exercises		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
			<p>Utilize Jetpack libraries to streamline and enhance app development.</p> <p>Apply dependency injection to improve code modularity and testability.</p> <p>Migrate an Android project to Kotlin Gradle DSL and manage dependencies using version catalogs.</p>			
6	Networking and Accessing Internet Resources in Android Apps	<p>Main Reference book, chapter 6</p> <p>Lecture ppt slides</p> <p>Recorded Lecture for online sections.</p>	<p>Discuss the principles of asynchronous programming and Kotlin coroutines.</p> <p>Set up Retrofit for making network calls in Android applications.</p> <p>Analyze the basics of Kotlin coroutines and their benefits in handling asynchronous tasks.</p> <p>Implement network calls using Kotlin coroutines and Retrofit.</p> <p>Handle responses and errors effectively in network operations.</p>	<p>Interactive Lecture (recording provided for online sections)</p> <p>Demonstration</p> <p>Interactive Lab Session</p> <p>Hands-On Exercises</p>	<p>Lab Assignment 2: Designing, Developing, and Architecting Interactive Android Applications with Material Design 3 and Advanced Features</p>	Week 6
7	Mastering Navigation in Android Apps with Jetpack Navigation	<p>Main Reference book, chapter 7</p> <p>Lecture ppt slides</p> <p>Recorded Lecture for online sections.</p>	<p>Discuss the principles and components of Jetpack Navigation.</p> <p>Implement navigation between different Compose destinations.</p> <p>Pass arguments between destinations within an Android app.</p> <p>Design responsive navigation for foldables and large screens.</p> <p>Utilize the resizable emulator to test navigation on various screen sizes.</p>	<p>Interactive Lecture (recording provided for online sections)</p> <p>Demonstration</p> <p>Interactive Lab Session</p> <p>Hands-On Exercises</p>	<p>Test 1 Hands-On, covering week 1-6 topics.</p>	Week 7
8	Storing Data On Android Devices	<p>Main Reference book, chapter 8</p> <p>Lecture ppt slides</p>	Discuss the principles and benefits of using the Room library for local data storage in Android.	Interactive Lecture (recording provided for online sections)		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
		Recorded Lecture for online sections.	<p>Set up and configure the Room library in an Android project.</p> <p>Create entities, DAOs, and the database for storing data locally.</p> <p>Implement methods for saving, reading, updating, and deleting data using Room.</p>	Demonstration Interactive Lab Session Hands-On Exercises		
9	Architectural patterns in designing Android apps that store data on the device or a NoSQL cloud-hosted database.	Main Reference book, chapter 8 Lecture ppt slides Recorded Lecture for online sections.	<p>Discuss the importance of architectural patterns in designing Android apps that store data on the device or a NoSQL cloud-hosted database.</p> <p>Implement the MVVM architectural pattern for better code organization and maintenance.</p> <p>Utilize the repository pattern to abstract data access and management.</p>	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab Session Hands-On Exercises		
10	Handling Background Tasks	Main Reference book, chapter 8 Lecture ppt slides Recorded Lecture for online sections.	<p>Set up WorkManager for scheduling and managing background tasks.</p> <p>Develop background tasks for data synchronization and other operations.</p> <p>Test and ensure the reliability of background tasks.</p>	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab Session Hands-On Exercises	Lab Assignment 3: Developing Robust Android Applications with Networking, Navigation, and Data Persistence. Students should collaborate in pairs using the pair programming technique	Week 10
11	Location APIs and Maps in Android Apps	Main Reference book, chapter 9 Lecture ppt slides	<p>Discuss essential concepts of Maps and Location APIs in Android.</p> <p>Integrate Google Maps SDK to display</p>	Interactive Lecture (recording provided for online sections)		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
		Recorded Lecture for online sections.	<p>interactive maps in their applications.</p> <p>Retrieve and manage user location data while handling necessary permissions.</p> <p>Update and track real-time location changes, including implementing geofencing.</p> <p>Customize map appearance and manage user interactions with map events.</p> <p>Manage the lifecycle of map components for a seamless user experience.</p> <p>Implement advanced location-based features for enhanced app functionality.</p>	Demonstration Interactive Lab Session Hands-On Exercises		
12	Integrating AI Agents in Android Apps Using LLMs and TensorFlow Lite	Lecture ppt slides Recorded Lecture for online sections.	<p>Discuss the role of AI agents in enhancing Android app functionality and user experience.</p> <p>Integrate large language models (LLMs) such as OpenAI's models or Gemini into Android applications.</p> <p>Implement AI-driven features using TensorFlow Lite for on-device machine learning.</p> <p>Develop interactive and intelligent AI agents that respond to user inputs.</p> <p>Optimize AI models for performance and efficiency in mobile applications.</p> <p>Evaluate the impact of AI agents on user experience and app performance.</p>	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab Session Hands-On Exercises	<p>Lab Assignment 4: Developing Native Android Apps using Jetpack Compose with Location, Mapping, and AI-driven Assistance.</p> <p>Students should collaborate in pairs using the pair programming technique.</p>	Week 12
13	Publishing Your Android App: From Preparation to Google Play Release	Main Reference book, chapter 13 Lecture ppt slides Recorded Lecture for online sections.	<p>Prepare the Android application for release.</p> <p>Integrate analytics and crash reporting tools into their app.</p> <p>Disable logging and debugging features for</p>	Interactive Lecture (recording provided for online sections) Demonstration Interactive Lab		

Week	Topics	Readings/Materials	Weekly Learning Outcome(s)	Instructional Strategies	Evaluation Name and Weight	Evaluation Date
			<p>the release build.</p> <p>Internationalize and localize the app for different languages and regions.</p> <p>Enhance error messages and user feedback mechanisms.</p> <p>Test the app on multiple devices to ensure compatibility.</p> <p>Provide effective feedback channels for users.</p> <p>Optimize app size using the Android App Bundle.</p> <p>Enable minification and obfuscation for better performance and security.</p> <p>Release the app to the Google Play Store.</p> <p>Understand Google Play Store policies and guidelines for app releases.</p>	Session Hands-On Exercises		
14	Test 2	Week 7-13 materials	Develop Android Apps using various Android APIs.	Review test materials and complete the practice session	Test 2 Hands-On, covering week 7-13 topics.	Week 14