

VANIER COLLEGE — FACULTY of SCIENCE AND TECHNOLOGY

COMPUTER SCIENCE DEPARTMENT

APPLICATION DEVELOPMENT 2 (MOBILE) 420-431-VA

Course Title:	Application Development 2	Teacher:	Sakkaravarthi Ramanathan
Course #:	420-431-VA	Office:	D-525
Section:	00001 & 00002	Hours:	By appointment
Ponderation:	2-3-4 (Theory-Lab-Homework)	Phone:	514.744.7500 x 7895
Pre-requisite:	420-301-VA, 420-331-VA	E-mail:	MIO (Messaging in Omnivox)
Semester:	Fall 2023	Weekly Schedule:	As per advertised on LEA

COURSE DESCRIPTION

This course is an introduction to the design and implementation of mobile applications. Dart Programming language will be introduced and Flutter will be used to develop the applications including phone emulators. Topics covered in this course include, Dart programming, Flutter: UI design, dialog boxes, event-driven programming, custom widgets, SQLite databases, menus, REST-based APIs and JSON, Web Calls, Design patterns, location-based services, and quick introduction to multimedia, graphics and animation.

COURSE'S ROLE IN THE PROGRAM

- This course is an introduction to the design and implementation of mobile applications. Students apply object-oriented programming principles to develop, implement, test and deploy a fully functional application. Students are expected to work on individual assignments as well as a team project using version control and project management tools.
- At the end of the term, students present their projects and demonstrate their applications to the class.
- The material covered in this course is a fundamental base for later courses, such as Game Programming 2, Ethical Hacking, Internet of Things, and Web Services.

COMPETENCIES RELATED TO THIS COURSE

The competency 00SR will be developed and finalized in this course. The competency was introduced in the courses 420-301-VA Programming Patterns and 420-331-VA Application Development 1: Desktop

COURSE-LEVEL LEARNING OUTCOME

Based on provided design specifications, students build desktop applications, implement GUIs (Graphical User Interface), and contribute to a team project.

KEY LEARNING OUTCOMES

- Designing, building, testing and deploying mobile applications
- Understanding the functionalities of applications, their lifecycle, configuration files and components
- Implementing the User Interface (UI) - components, layouts, event handling and screen orientation
- Applying database knowledge with CRUD (Create, Retrieve, Update, Delete) operations
- JSON parsing and accessing online APIs (Application Programming Interface)

REQUIRED SOFTWARE TOOLS

- DART programming skills
- OS: Windows 10
- Android Studio IDE (most recent version),
- Android Software Development Kit (SDK), it is embedded in Android Studio installer. You don't need to install it separately.
- Flutter and Dart plugin
- Distributed version control system.
- Task breakdown using an online project management tool which includes an issue tracking capability (e.g., GitLab, GitHub and Bitbucket)
- Development methodologies (e.g., Agile, DevOps) using various tools such as Kanban, GitLab, Trello and Slack
- Continuous Integration (CI) tools such as GitLab CI or TravisCI (as time allows)

COURSE MATERIALS

Textbook: No specific book is recommended.

Online Resources: APIs documentation and tutorials will be provided to students throughout the semester.

<https://dart.dev/guides/language/language-tour>

<https://docs.flutter.dev/>

<https://pub.dev/>

In-class Notes: will be also provided throughout the semester.

TEACHING METHODS

The course ponderation is 2-3-4. Lecture of two hours per week for learning new concepts in mobile programming topics; three hours per week for applying these concepts and Lab exercises in the computer lab; and finally, 4 hours per week to do homework (to practice the examples given in class). It is mandatory to attend the first week classes to get used to the tools and to the teaching approach.

TERM PROJECT – LEARNING INTEGRATION ASSESSMENT (LIA)

The holistic learning of the course will be evaluated through the term project in which a team of 2/3 students should design and implement a mobile application from scratch. The app selected should cover a challenging task. At the end of the term, each team need to submit a project report, present their ideas and also demonstrate the app to the teacher/class. More detailed project instructions will be given later through LEA.

A team of three students (max) would be considered as a team. There will be three deliverables

- Deliverable #0: Team members present their app idea (PowerPoint) and design the prototype of the application.

The power point presents the title of the project, team members, description of the project, number of screen flows, chosen database, presenting GitHub link, mock-up that depicts the entire navigation of the app

- Deliverable #1: 40% of the application should be implemented and delivered

Team should demonstrate the app with complete UI interface with 40% of the functional features (user registration, login, sign up, authentication, Database connectivity, dashboard menu)

- Deliverable #2: Finally, the remaining 60% of app design must be implemented and delivered

The features in this build must include API calls, CRUD operation, JSON web calls, etc. Moreover, the app will enable multiple users' login. Finally, team should run the app on real device and emulator at the same time

There will be a final report that summarizes the entire development process that include the prototype, functional and non-functional requirements, use-case diagram, database connectivity, API calls, user stories, test cases. The report precisely defines the individual's role and responsibilities in the project development process.

LIA – Evaluation Criteria

The following criteria is suggested for the evaluation of the project:

- In the project design and implementation:
 - o Compliance with the design guidelines.
 - o Proper configuration of the development platform.
 - o Proper use of design patterns.
 - o Selection of efficient data structures and algorithms.
 - o Appropriate design of User Interface.
 - o Proper validation of data inputs.
 - o Appropriate testing measures.
 - o Correct resolution of identified errors and issues.
 - o Reasonable consideration of user feedback.
 - o Distribution and management of tasks among team members.
 - o Seeking guidance when faced with difficulties.
 - o Equal individual contribution in version control logs

Evaluation	Weight	Description/Topics	Tentative Dates
Assignment 1	10%	Dart Programming tasks and creating a flutter application based on the description provided	Week 3
Assignment 2	10%	Flutter: Implement a mobile user-interface, adding multiple screens, customized widgets, Send data between interfaces, menus, Dashboards, CRUD, API, JSON	Week 10
Exam 1	25%	Problem solving using Dart as a programming language, using different data structures e.g., list, HashMap, etc.	Week 8
Exam 2	25%	Dart and Flutter: UI, Data communication, animation, widgets, API calls, notifications, alarms, schedules, localization, accessibility, Dashboards, CRUD, API, JSON	Week 13
Group project	30%	<p>Term Project – Learning Integration Assessment</p> <p>Deliverable 0: 3%</p> <ul style="list-style-type: none"> Project Description (innovation) – 1 % Mock-up design – 2 % <p>Deliverable 1: 10%</p>	<p>Week 5</p> <p>Week 11</p>

		<ul style="list-style-type: none"> • UI Interface (material design, screen flow) – 2% • Database connection (backend connection) – 2% • CRUD operations – 2 % • Landing page (Home screen)– 2% • Menu implementation (displaying the data) – 2 % <p>Deliverable 2: 15 %</p> <ul style="list-style-type: none"> • Completed UI interface (Entire Navigation flow of minimum 10 screens) – 3% • API calls (JSON, Async calls) – 3% • Notification manager – 3% • Location awareness – 3% • Running on emulator – 3% <p>Final report: 2%</p> <ul style="list-style-type: none"> • Project Aim and description • Functional and non-functional requirements • User stories • Test cases • Individual's role and responsibilities 	<p>Week 15</p> <p>Week 15</p>
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- Students will be informed of the exact date of each test at least one week in advance.
- **To pass the course, students must obtain: 1) an overall passing grade and 2) a passing grade on the average of the tests (that is, 60% or higher).**
- Late assignments are **NOT** accepted. Please do not send your late assignments by MIO. No makeup test will be given if students miss an exam, but students with justifiable absences (such as an emergency medical condition) must submit a medical note.
- Students handing in medical notes that are found to be fraudulent will face severe sanctions as stated in the Student Code of Discipline. The professional unsuitability policy could also be used to sanction the student.

SPLI

- The final report evaluation will be taken into consideration for the quality of discipline-specific vocabulary, documentation, and communication skills

Assignments

Every assignment should be completed Individually and he/she is responsible for understanding the concepts. Teacher will ask the student to demonstrate the assignment.

Week by week tentative breakdown

[illegible]

6	Flutter (Dicee App)	2
	Expanded Widgets, adding Dart to our UI for functionality, stateless vs. stateful widgets Labs: Creating flutter apps based on the lesson.	3
7	Flutter (Xylophone App)	2
	Working with sound files and playing multiple sounds, refactoring code, playing videos in the app Labs: Creating flutter apps based on the lesson.	3
8	Exam 1	
9	Flutter (Quizzler App)	2
	SQLite, CRUD operations, Dart OOP in action in a Flutter application, adding more functionalities to the apps using Dart Labs: Creating flutter apps based on the lesson.	3
10	Flutter (BMI App)	2
	GestureDetector Widget, Navigation between screens, customizing widgets, Flutter slider Assignment 2:	3
11	Flutter (Clima App)	2
	Stateful widget lifecycle methods, API calls, JSON parsing, showing a spinner, getting the location of the device Labs: Creating flutter apps based on the lesson.	3
12	Flutter (Flash App)	2
	Connecting to Firebase database, Flutter animations, User authentication, ListView Labs: Creating flutter apps based on the lesson.	3
13	Team Project	2
	Exam 2	3
14	Flutter State Management (Todoey App)	2
	Intro to state management, Flutter App Architecture Patterns, Provider Package, ListView Builder, Callbacks	3
15	Project	2

Attendance requirements

1. Students are responsible for all course material, information covered during the class and lab even if they are absent. It is student's responsibility to be aware of anything discussed in class that is considered being important for the course.
2. Students' presence at both lectures and labs is strongly recommended.

Academic Resources

Students should make use of the resources available at Student Services, the Learning Centre, and Academic Advising.

College Policies

It is the student's responsibility to be familiar with and adhere to the Vanier College Academic Policies. The complete policies can be found on the Vanier College website, under Policies. Students should pay particular attention to the following two policies: the Institutional Policy on the Evaluation of Student Achievement (IPESA) and Cheating and Plagiarism. A brief summary of each is included below.

Institutional Policy on the Evaluation of Student Achievement (IPESA)

This policy aims to ensure the fairness and equity of the evaluation of student achievement at Vanier College, in coherence with the program approach, competency-based education, and the College's mission and values. The IPESA aims to clarify the structures and means that ensure the fair and equitable evaluation of student achievement, including the conditions for learning, assessment, and certification. It also aims to clarify the roles and responsibilities of all stakeholders, as well as the processes for complaints and appeals. The full version of IPESA can be found following this link <https://www.vaniercollege.qc.ca/bylaws-policies-procedures/institutional-policy-on-the-evaluation-of-student-achievement-ipesa/>.

Cheating and Plagiarism

(Policy number 7210-31): Any form of cheating or plagiarism will result in a grade of zero on the test or assignment. In addition, a letter from the teacher will be placed in your file. A repeated offence may lead to even more serious consequences. Please consult the Vanier Student Writing Guide, the Vanier College Catalogue, the Student Handbook, and your teacher for more information. The full version of the cheating and plagiarism policy can be found following this link <https://www.vaniercollege.qc.ca/bylaws-policies-procedures/cheating-and-plagiarism/>

Recourse and complaints

If you have a problem that you have been unable to resolve by talking with your teacher, you may wish to enlist the help of the Faculty Mediation Committee. The committee member names and contact information are available in Student Services or through the office of the Faculty Dean. Detailed information is found in section 5 of the IPESA. Contact information can be found below.

Main Contact Information

- Student Advocate: Chelsea McVetty (MIO)
- Program and Department Coordinators: Charbel Khawand (elkhawac) & Alex Steinheuser Vilvert (vilverta)
- Faculty Dean: Haritos Kavallos (kavalloh)
- Academic Advisors: <https://www.vaniercollege.qc.ca/advising/contact-us/>