Carnegie Mellon University

Android Mobile Application Development

04-801 D2 Fall 2022 Mini-2

Class:
TTh 8:30-10:20 F203
6 units

Instructor:
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Office:
D206
TTh 10:30-12:00 or by appointment

Course Description

Android Mobile Application Development provides a comprehensive overview of developing Android mobile applications. The course will use a range of technologies, including the Android SDK, software development design patterns, and data storage models. To build robust apps that can be integrated into a broader IT infrastructure we will incorporate libraries, APIs, and data from myriad sources. The course will address the flow of data across the network, taking into account scalability considerations for both the client and the server components of apps. The course will also explore various interaction models and mobile interaction design principles.

The class is project-oriented, and students will complete a project utilizing a simplified version of the Agile methodology. The class will feature a combination of lectures and demonstrations. Selected research, tutorials, and related readings will contribute to class discussions and projects. Student progress is assessed by performance on weekly lab assignments, quizzes, and a semester-long project.

Objectives

Students will gain the knowledge and experience needed to become proficient Android app developers. Students will utilize the Android SDK and the Kotlin programming language to design and develop apps for the Android platform. Students will employ object-oriented programming design patterns, data relationships, and strategies for data storage in their course work. Students will incorporate libraries, APIs, and data from myriad sources to build robust apps. Throughout the course students will utilize various navigation models and mobile interaction design principles.

Outcomes

After completing this course, students will be able to do the following:

- Develop apps using the Android platform and SDK
- Employ multiple navigation models in developing Android apps
- Implement various persistent storage models, both local and in the cloud
- Incorporate libraries, programming interfaces, and data from various sources
- Explain advanced software development concepts in Kotlin
- Describe mobile interaction design principles

Pre-requisites

Basic software development experience with proficiency in at least one modern programming language and modern programming concepts. If you have any questions, please come speak with me.

Topical Outline

- Software Development
    - Object-Oriented programming design patterns
    - Model View Controller architectural pattern
    - Mobile Interface and Interaction Design principles
    - Android Software Developer's Kit
        - Frameworks
        - Application lifecycle
        - Memory Management
        - Adaptive layouts

  - Kotlin for Android development
- Navigation models
  - Navigation architecture for multi-view apps
  - Data modeling and flow
- Data persistence
  - local/client
  - server/cloud
- Leveraging external libraries
- Utilizing application programming interfaces (APIs)
  - Custom and provided content providers
  - Integrate data from outside sources
- Asynchronous programming

Required Materials
You will need a reliable laptop computer running Android Studio Dolphin 2021.3.1 on Windows 8/10, Mac OSX 10.14 (Mojave) or higher, or any 64-bit Linux distribution that supports Gnome, KDE, or Unity DE; GNU C Library (glibc) 2.31 or later. You will also need 8 GB RAM or more, minimum 8 GB of available disk space, and 1280 x 800 minimum screen resolution.

More details/options http://developer.android.com/sdk/index.html#Requirements

Readings will be assigned for each class from various online resources.

Each student will be asked to set up a GitHub repo for this class and assignments will be turned in by publishing them to your repo. For those not familiar with GitHub, we will go over how to setup and use it before the first assignment is due.

Class Resources

All class information is available on Canvas at https://canvas.cmu.edu/courses/31825. This includes the class schedule, assignments, and resources. It is your responsibility to check Canvas regularly to keep up with the class and complete all assignments. All class notes and examples are available on GitHub at https://github.com/aileenjp/Fall22_AndroidMobileAppDev .

We will be using Slack, a communication and collaboration tool that is used throughout the high-tech industry, for communication in the class. Please accept the Slack invitation to the workspace AndroidMobileAppDev_fall22 as that is where ALL class communication will take place.

Workload

This course is very technical and challenging and requires a great deal of time and commitment. As a six unit course, there are four hours per week of scheduled in-class time. Students should also plan on spending two hours per week of outside class work for every hour in class. For this class, that translates to 8 hours/week of work outside of class, accumulating to 12 hours/week spent on this course. I welcome any students that are concerned about the time commitment or find themselves struggling to please talk to me personally.

Attendance

This is a fast-paced course with new topics covered every class and each new concept building on top of previous ones. Attendance and class participation are important components of the course. You are responsible for all material and announcements made in class. Do not expect me to catch you up for classes you've missed -- that's your responsibility.

In extreme situations such as major illnesses, death in the family (or close friends), religious observances (see below), or school related absences, please talk or email me **before** your absence.

You are encouraged to be an active participant in class by asking relevant questions, sharing your thoughts, and working with fellow students. You are expected to spend all class time working on class-related work. Class time should not be used for any other classes or activities.

Grading

Grades will be posted on Canvas https://canvas.cmu.edu/courses/31825.

Grading in this course is based on the following components:

- Attendance and participation 10%
- Project 45%
- Labs 30%
- Quizzes 15%

Grading Criteria

The grading standard used for this class is as follows:

A: excellent work – far beyond minimal requirements
B: above average work – went beyond minimal requirements
C: average/competent work – met minimal requirements
D: below average work – did not meet minimal requirements
F: unsatisfactory work

Grading Rubric

Labs are graded based on their completeness (meets the assignment's requirements) and technical proficiency (works correctly).
Projects are graded based on meeting their minimum viable product goals, user interaction and design, and technical execution.

Note: I do not give out A's easily. Doing the absolute minimal amount of work is a C. A's and B's are reserved for students who push themselves and explore new areas in their work, going beyond minimal work. I take your grades very seriously and will do the best that I can to give you a fair and accurate grade. I know many students believe they deserve an A for the course if they do the minimally accepted work, but I don't.

Late work

All assignments are due in your GitHub repo by the due date posted in Canvas. Please make sure your assignments are clearly labeled so they are easy for me to identify. Late assignments will be penalized 10% per 24-hour period that it's late.

In case of an emergency, students must notify me if you will miss an assignment deadline before the due date to discuss special arrangements.

Computing Devices Policy

Laptops and mobile computing devices can be a great asset to learning, but they can also be a source of distraction and actually impair the learning environment. During class laptops and mobile computing devices should only be used for class related activities. Students should not email, text, message, check social media, play games, surf the web, or work on assignments or projects for other courses during class. Please disable and sign out of all messaging systems on your computer during class. Additionally, the use of cell phones or other devices is prohibited during class. If you are found to be engaging in these activities during course time, Instructors reserve the right to ask you to leave the classroom. If you have an emergency situation that requires access to your cell phone please come talk to me before class starts.

Code Plagiarism

I encourage students to work together on assignments, but I expect the work turned in to be your own and produced exclusively for this course. So work together, talk, brainstorm, troubleshoot, but make sure that the assignments you turn in

were created by you. Reusing projects from another class or commercial work, even if revised, is not acceptable for projects in this course unless you get previous approval from me.

The web is a great resource, and searching for help, answers, and inspiration is very useful, so take advantage of it. You can adapt ideas and concepts you learn online to be part of your projects, but your projects must be written entirely by you, and you should be able to explain all of the code you use in a project. If your project uses code snippets from other sources they should not exceed 20% of your project's code and you should be able to explain how that code works. Turning in a project that doesn't meet this guideline will result in an F for the entire project.

Any material from other sources including code snippets or concepts, must be fully documented by citing the sources in your program in the comments section. Copying material directly out of a book, web site, or from another person without properly citing them is considered plagiarism and will be dealt with in accordance with the Academic Integrity Policy (see below) and the Academic Disciplinary Action Procedures for Graduate Students. Carelessness in documenting sources, even if not technically plagiarism, will be penalized as I deem appropriate. If you are uncertain about how or whether to document sources, please consult me. Please check with me if you are unclear on the line between adaptation and plagiarism.

Policies

Academic Integrity

Honesty and transparency are important features of good scholarship. On the flip side, plagiarism and cheating are serious academic offenses with serious consequences. If you are discovered engaging in either behavior in this course, you will earn a failing grade on the assignment in question, and further disciplinary action may be taken.

If you have questions about my integration of the university's policy into this course, please do not hesitate to ask: my aim is to foster an environment where you can learn and grow, while ensuring that the work we all do is honest and fair. For more information about Carnegie Mellon's standards with respect to academic integrity please take the time to read the University's discussion guide for promoting academic integrity at http://www.cmu.edu/academic-integrity/ In addition, you can find the University's full Policy on Academic Integrity at http://www.cmu.edu/policies/documents/Academic Integrity.htm

Diversity and Inclusion

It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

Disability Services

If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the Office of Disability Resources, I encourage you to contact Olga Gikundiro Buki gbuki@andrew.cmu.edu.

Student Wellness

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Olga is here to help, Olga Gikundiro Buki gbuki@andrew.cmu.edu. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The mission of Carnegie Mellon University is to cultivate a transformative educational experience for its students that is committed to promoting and safeguarding their personal health and well-being. In addition, the mission is to create a collaborative environment open to the free exchange of ideas, where research, creativity, innovation, and entrepreneurship can flourish and where individuals can achieve their full potential. It is the policy of Carnegie Mellon University to maintain an academic and work environment that promotes the confidence to work, study, innovate and perform without fear of sexual misconduct. Such misconduct diminishes individual dignity, is contrary to the values of the university and is a barrier to fulfilling the university's mission. It will not be tolerated at Carnegie Mellon University. Carnegie Mellon's Interim Sexual Misconduct Policy can be found here https://www.cmu.edu/policies/administrative-and-governance/sexual-misconduct/index.html

By enrolling, and remaining enrolled in this class, you signify your awareness and understanding of the policies contained within this syllabus and your agreement to conduct yourself in accordance with these policies.