Course Syllabus

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CS5254 Spring 2022 Syllabus

Course: CS5254 | Mobile Application Development
Instructor: Gregory Kulczycki (Dr. K)
DLI: Prof. Mark Oliva
Grader: TBD
Contact: The best way to contact us is via Piazza, as we will be checking it regularly (within 24 hours on weekdays and 48 hours on weekends). Note that you can post private messages in Piazza, but I suggest you keep them public if you can. Dr. K's VT PID is gregwk.
Office Hours: Office hours will be held by request via Zoom.

Course Description

This course covers languages and technologies needed to develop applications for modern mobile devices. We discuss mobile infrastructure and a range of mobile devices, though the programming portion of the course will focus on mobile phones, and the Android platform in particular. We learn the principles of interactive graphical user interfaces for mobile devices. We look at the protocols and standards for using mobile device features such as sensors, networking, location, camera, and audio. We also discuss mobile app architecture, performance considerations, and asynchronous programming. Finally, we discuss the principles and technologies for mobile security. CS5044 is a prerequisite for this course.

Course Textbook

The primary text we will use is **Android Programming: A Big Nerd Ranch Guide, 4th edition**. The book is **not** available on O'Reilly Media (https://www.oreilly.com/). Consider purchasing an electronic version of this book. At the time of writing (January 2022), a Kindle copy of the book can be purchased through Amazon (https://www.amazon.com/Android-Programming-Ranch-Guide-Guides-ebook-dp-B07XVLNGX1/dp/B07XVLNGX1/ref=dp_ob_title_def) at about $30 and a watermarked PDF version is available through for about $30 from the InformIT (https://www.informit.com/store/android-programming-the-big-nerd-ranch-guide-9780135245125).

System Requirements – 16GB* of RAM

We will be using Android Studio for assignments in this course and the Android Emulator. Android Studio is memory intensive. It has recommended requirements of 8GB of RAM and the Emulator has memory requirements beyond that. Therefore we ask you to ensure that your system has at least 16GB of RAM.

If your computer has less than that, it is possible that you will see odd behavior (and certainly slow behavior) in Android Studio and your Emulator, and that could make it difficult or impossible for us to help you if you have a problem.

*I set up Android Studio and emulator on my M1 MacBook Air with 8GB RAM and so far it is working great. In general, M1 with 8GB RAM has been reported to run similar to Intel with 16GB RAM

Course Objectives

Upon completion of the course, students should be able to do the following:

- Implement a mobile application such as a game or a web client that uses the mobile device's sensors, networking, location, camera and/or audio.
- Design an interactive graphical user interface for a mobile application.
- Apply asynchronous programming techniques in the implementation of a mobile application.
- Explain fundamental distinctions and similarities between mobile apps, web applications, and standard applications.
- Discuss mobile application security issues such as confidentiality, integrity, and authentication.
- Discuss performance considerations in mobile application development.

Course Structure

The course will be held entirely on-line. Each week, students are expected to do the following.

- Listen to the recorded lectures and tutorials
- Do the reading assignments
- Take the reading quizzes
- Work on programming assignments
- Participate in online discussions (if any)
- Complete required assessments (if any)

Live Q&A Sessions

Live, online Q&A sessions will be held on Tuesdays from 8-9:30pm Eastern time. Attendance will *not* be mandatory. However, all sessions will be recorded and students are responsible for viewing the recordings if they cannot attend.

Course Requirements

Prerequisites

We will be using the Kotlin programming language for this course, but we do not not expect you to already be familiar with it. We *do* expect you to have a good working knowledge of the **Java** language upon entering the class. This includes a strong working knowledge of classes like Strings, Arrays, and the major classes in the Java collection framework. It also includes being comfortable with concepts

such as inheritance, interfaces, javadocs, and unit testing. In many ways, Kotlin is similar to Java and we will often explain Kotlin language features in terms of their Java equivalents. If you are an MIT student, you should have received a B or higher in CS5044 before taking this course.

System Requirements

We will be using Android Studio for assignments in this course and the Android Emulator. Android Studio and the Android Emulator are both memory intensive. Therefore you should have access to a system with **16GB of RAM** to successfully complete your assignments.

Texts and Other Resources

We will be relying heavily on **Android Programming: A Big Nerd Ranch Guide, 4th edition**. This books has some great tutorials on Android programming, and many of our programming assignments will be modeled on the projects in this book.

Other texts and online sources we will be drawing significantly from are the following.

- **Head First Android Development, 3rd edition** (https://learning.oreilly.com/library/view/head-first-android/9781492076513/). This book presents Android Development in a very accessible manner. Some folks like this approach and others have more trouble with it. That is one reason we will not rely on a single book. This book is also available on **O'Reilly Learning** (https://learning.oreilly.com/home/).
- Various videos from **LinkedIn Learning** (https://www.linkedin.com/learning/). (formerly Lynda.com). This is another great resource that you have access to as a Virginia Tech student. It is a library of video tutorials for you to browse, mostly regarding software and how to use it, but they are continually expanding to many technology-related subjects.
- **The Android Developers Site** (https://developer.android.com/index.html). This site has a wealth of information about developing Android applications.

Android Phone/Device

You do not need an Android phone or device for this course; all projects can be completed using Android Studio and an emulator. However, if you do want to install the applications you implement on a physical device, ask on Piazza and we and other students will likely be able to help you do that.

Technology and Skills

Working and reliable computer and Internet access is required as well as access to **Canvas** and **Zoom** (https://virginiatech.zoom.us/). For the programming assignments, installation of Java 8 and **Android Studio** (https://developer.android.com/studio/index.html) is required. Occasionally you will have viewing assignments for screencasts on **LinkedIn Learning** (https://www.linkedin.com/learning/). **Piazza** (https://piazza.com/) will be used for questions about programming assignments, but it will be fully accessible through Canvas. As this is an online course for Android development, you should be comfortable with using the technologies listed above and with using an Android device.

Mobile App Disclaimer

Though Canvas provides a mobile app which works well for the majority of course content, this course site is still best viewed via a desktop or laptop running a complete operating system, as opposed to a tablet or smartphone. Some interactive course elements may not be viewable via mobile devices, and it is certainly not recommended that you attempt to complete assignments or take graded quizzes or tests via mobile devices.

Participation

Students should expect to spend about eight to ten hours per week involved in the activities and completion of assignments for this course. If exceptional circumstances prevent the timely completion of any assignment, students should contact the instructor in advance and not after the completion date has passed.

Expectations

In the first week of class, students will be asked to sign the **expectations document (https://drive.google.com/file/d/1N9Zaa8j5iM5SHbgtz2l1uedXo4rCIRvK/view?usp=sharing)** . It outlines the expectations of the instructor and the students in an online environment.

Honor Code

The graded work in this class are all individual assignments, subject to the stipulations of the **Graduate Honor Code**. However, you are highly encouraged to collaborate with your classmates and instructors, as long as it is done entirely in the public in the online forums like Piazza or Canvas, so that all students may equally share and participate in the collaboration. Try not post specific implementations or solutions that would trivialize a significant portion of any assignment. You must not use or submit any work done by any other person, including any student from this or any previous semester. If you have any questions about what is or is not allowed, please contact the instructors immediately.

Every file created and submitted by any student is subject to examination, using both manual and automated means, for potential GHC violations, and every suspected violation will be forwarded directly to the Graduate Honor System, as required by the Code.

Assessments and Grading

The grade for this course is based on the following assessments. The midterm exam will be online. The final exam *may* be proctored.

8-10 weekly reading quizzes (timed, online) @ 10 points each	80 points
Midterm Exam (timed, online)	60 points
Final Exam (timed, online)	100 points

5 or 6 projects (about one every other week) @ 40 points each	200 points
A diagram slide related to mobile sensors.	20 points
4 discussions at 5 points each	20 points

Grading for the course is based on the distribution of credit shown in the table. Rubrics will be given for specific project and the presentation. For project worth 40 points, the standard rubric will be 30 points for requirements and 10 points for code style. But details will vary from project to project. For the video presentation, the standard rubric is 10 points for content, 10 points for slides, and 10 points for delivery.

Final letter grades for the course will be determined using the following grading scale, based on the percentage of possible points achieved.

A	≥ 93%
A-	≥ 90%
B+	≥ 87%
B	≥ 83%
B-	≥ 80%
C+	≥ 77%
C	≥ 73%
C-	≥ 70%

Communication and Discussions

As this course is asynchronous, discussion boards will be the primary way we communicate. We will use Canvas for some types of discussion and Piazza for others.

Piazza Discussion Boards

Piazza is really made for question-and-answer style forums. Typically assignment discussions are very active, so make sure you read these, especially if you are having difficulty with your assignment! The rules for these forums are that you can ask – and answer – general questions, but you cannot give direct solutions to questions or problems. Usually, there is no problem with this as long as you follow this simple rule: **Do not post code!**

Canvas Discussion Boards

There will be 4 graded discussions worth 4 points each near the end of every project. When they open, you will have one week to make at least one post to the discussion. If you make a post in the time limit, you will receive 4 points; if you do not, you will receive 0 points. So make sure you post! There will be suggested topics, but you can also choose your own as long as it is relevant to the material we covered in that project. Replies to other people's posts are also considered posts.

Netiquette

Please follow these simple rules to make online communication easier for everyone.

- If you have a question regarding an assignment, please post it to the appropriate discussion board. I will monitor these discussion boards, but if you do not get a satisfactory response there in an appropriate amount of time, feel free to email me at gregwk@vt.edu.
- Please be respectful in all correspondence in this course. In particular, refer to the **Core Rules of Netiquette** (http://www.albion.com/netiquette/corerules.html) for general guidelines of proper behavior.
- When making a post or sending an email, please sign the email with your first name (or what you prefer to be called) so that others know whom they are talking to. It is not always apparent from your email address.
- I will send out announcements through Canvas periodically. These will go to your VT email address, so make sure you monitor it.

Course Support

Technical Support

The instructor for this course does not provide technical support. For technical support assistance regarding any problems with Canvas, **please use the "Help" button** of Canvas that you see on the left sidebar. This will take you to the Canvas help folks, who will coordinate with VT if needed. For help with Zoom or e-mail, contact VT's 4Help center by using the **Help Request Form** (http://4help.vt.edu/) or by calling (540) 231-HELP (4357).

Accessibility

Presentation recordings will either be captioned or scripts will be available on request. Please note that this may not apply to recorded Q&A sessions or quick video notes made by the instructor. Documents and online reading material will be in a format where copying text is available.

- VT Accessibility Policy: **https://www.vt.edu/about/accessibility.html** (https://www.vt.edu/about/accessibility.html)
- Canvas Accessibility: **https://community.canvaslms.com/docs/DOC-2060** (https://community.canvaslms.com/docs/DOC-2060)

Privacy

The Canvas privacy policy can be found **here** (http://www.canvaslms.com/policies/privacy). The Piazza privacy policy can be found **here** (https://piazza.com/legal/privacy). And Virginia Tech's privacy policy – for tools such as Web-CAT – can be found **here** (http://www.vt.edu/about/privacy.html).

Accommodations for Special Needs

Any student who has been confirmed by the University as having special needs for learning must notify the instructor in the first week of the course. For more information please go to http://www.ssd.vt.edu/ (http://www.ssd.vt.edu/) .

Academic Support Services

For complete information on student services at Virginia Tech, please see http://www.dsa.vt.edu/students.php (http://www.dsa.vt.edu/students.php) .

Course Summary:

Date	Details	Due
Fri Apr 26, 2019	VT SPOT (https://canvas.vt.edu/calendar?event_id=919164&include_contexts=course_145416)	12am
Fri Apr 24, 2020	VT SPOT (https://canvas.vt.edu/calendar?event_id=919163&include_contexts=course_145416)	12am
Fri Apr 23, 2021	VT SPOT (https://canvas.vt.edu/calendar?event_id=919165&include_contexts=course_145416)	12am
	VT SPOT (https://canvas.vt.edu/calendar?event_id=919166&include_contexts=course_145416)	12am
	VT SPOT (https://canvas.vt.edu/calendar?event_id=919167&include_contexts=course_145416)	12am
Sun Jan 23, 2022	Expectations Document (https://canvas.vt.edu/courses/145416/assignments/1362964)	due by 11:59pm
	Project 0 - My First Mobile App (https://canvas.vt.edu/courses/145416/assignments/1362965)	due by 11:59pm
Tue Jan 25, 2022	Android Development (https://canvas.vt.edu/courses/145416/assignments/1362960)	due by 11:59pm