College of Health Solutions
Arizona State University

BMI 310: App Development for Clinical and Population Health

Spring | 2024

Course Description: App Development for Clinical and Population Health

This course aims to provide students with the foundational skills and knowledge required to develop Android applications tailored to the field of biomedicine. Through hands-on projects and interactive learning, students will learn how to create mobile apps that address specific challenges and opportunities in healthcare and biomedical research.

Credit Hours: 3

Course Format: in-person

Prerequisites: None

Course meeting time and location: Tuesdays and Thursdays 12:00pm to 1:15pm at Downtown campus - AZCNTR325

Course Access: Although this class is presented in-person, you may still be expected to log into Canvas, the Learning Management System (LMS). This requires a computer, a stable internet connection, and in some cases a webcam and microphone.

Your ASU courses can be accessed by both my.asu.edu and myasucourses.asu.edu; bookmark both in the event that one site is down.

INSTRUCTOR INFORMATION

Instructors

Name: Asiful Arefeen
Email address: aarefeen@asu.edu
Office hours: TBD, including both in-person and virtual office hours, See Canvas for details
Preferred method of contact: email

Name: Hassan Ghasemzadeh
Office/room: HFC Room 306F
Email address: Hassan.Ghasemzadeh@asu.edu
Office hours: TBD, including both in-person and virtual office hours, See Canvas for details.
Preferred method of contact: email

Teaching Assistant

Name: Naga Sai Krishna Reddy Vintha
Email address: nvintha1@asu.edu
Office hours: TBD, including both in-person and virtual office hours
Preferred method of contact: email
Zoom link: https://asu.zoom.us/j/6065833631

COURSE BASICS

Course Objectives and Expected Learning Outcome

By the end of the course, you will be able to:

1. Understand fundamental concepts of Android development and its relevance to biomedicine.
2. Design and develop Android applications that cater to biomedical needs and utilize relevant libraries, APIs, and tools for biomedically focused app development.
3. Implement features that involve data management, analysis, and visualization relevant to biomedicine.
4. Apply debugging and testing techniques to ensure app functionality and reliability.

Alignment with other outcomes: N/A

Does this class have an Honors contract? No

NOTE: You must make the Disability Resource Center, DRC, aware if you require accommodations due to a disability. Review the **ASU Policies** section for more information.

Course Modules

1. **Introduction**
    a. - Introduction to Android Applications
        i. Overview of the Android platform and its ecosystem
        ii. Understanding the role of mobile apps in biomedicine
    b. Introduction to Kotlin
        i. Object Oriented Programing Basics
        ii. Kotlin basics (Data types, interfaces, functions, lambdas)
    c. Introduction to Android Studio IDE
        i. Installation of tools
        ii. Run and debugging app
        iii. Testing and emulator
        iv. Build Hello world App
2. **App Fundamentals**
    a. Exploring the structure of Android apps - (activities, layouts, resources)
    b. Lifecycle

    c. Layers (Domain, Data, UI)
    d. User interface design principles for biomedical apps
3. **Connectivity**
    a. Android permissions
        i. requesting permissions
        ii. managing permissions
    b. Connect to internet
    c. Consume android sensor data (GPS)
4. **Data Persistence**
    a. Store data locally
    b. Integrating APIs for biomedical data retrieval and storage
    c. Secure handling of sensitive patient information
5. **UI/UX**
    a. Basic UI principles and layouts
    b. Accessibility considerations for medical applications
    c. Designing intuitive user interfaces for biomedical apps
6. **Data Visualization for Biomedical applications**
    a. Introducing basic data visualization techniques
    b. Incorporating charts, graphs, and visual elements into apps
    c. Case studies of apps addressing medical data visualization challenges
7. **Interfacing with Biomedical Sensors**
    a. Connecting Android apps with external biomedical sensors
    b. Processing and interpreting sensor data
    c. Real-time health monitoring and feedback applications
8. **Ethical and Regulatory Considerations**
    a. Discussing ethical concerns in healthcare app development
    b. Compliance with medical data privacy regulations (HIPAA, GDPR, etc.)
    c. Privacy, security, and responsible handling of biomedical data

Textbook, Special materials and extracurricular activities

Special materials and technology: None
Extracurricular activities: None

Assignment Types

Description of different assignments, projects, exam with grades/percentage of grades:

- Programming Assignments (~8-10) 60%
- Individual Project (1) 20%
- Exam (1) 20%

The programming assignments in this course are crafted with a primary objective: to deepen your understanding of the concepts covered and equip you with the skills to develop Android applications effectively. As you delve into these assignments, you will be challenged to apply theoretical knowledge in practical scenarios, solidifying your grasp on programming concepts, design principles, and Android development best practices.

Through hands-on practice, you will gain valuable experience addressing real-world challenges, refining your problem-solving skills, and learning to design solutions that meet industry standards. Emphasis is placed on writing clean, maintainable code, adhering to coding standards, and fostering creativity in application design. These assignments also encourage collaborative learning, providing opportunities for peer discussions and teamwork simulation. Your success in these tasks is measured not only by the final output but also by your ability to document your code, implement thorough testing strategies, and iterate on your solutions based on constructive feedback. Consider these assignments not just as assessments but as integral components of your journey towards becoming a proficient Android developer. Embrace the challenges, seek collaboration, and use these opportunities to continuously enhance your coding practices and application development skills. The student is expected to work individually, outside the class on the assignment.

The final project is like a big puzzle that brings together everything you have learned in the assignments. You will be working on it by yourself, and it is a chance to show off all the cool things you have picked up during the course. The project covers a mix of concepts from the assignments, and it is your time to shine by creating your own Android app. Think of it as a final challenge where you get to use all the skills you have learned, solve problems on your own, and make something awesome. It is not just a test – it is a chance for you to prove you can be a great Android developer all by yourself.

Note: While every effort is made to keep the course evaluation process consistent with what is in the initial syllabus, it is possible that slight changes may have to be made as the semester progresses. These changes will be communicated thoroughly to the students and although total points may potentially fluctuate, the percentages remain constant, meaning there is no intention of harm to the student's grades. Any changes to the course evaluation process will be posted on Canvas as part of an announcement; however, it is the student's responsibility to be aware of the points and their grade and be proactive in speaking to the instructor if there are questions or concerns. Students should not rely on Canvas or other students if they have a question on their grade in class, contact the instructor.

Grading Policy

Grade breakdown:

The following table shows the grade breakdown.

Letter grade	Numerical Equivalent
A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82

C+	77-79
C	70-76
D	60-69
E	< 60

Make-up work/late submission general policy:
A late penalty of 10% will be assessed for late submissions within the next 24 hours of the submission deadline. For submissions after 24 hours, allowance is made on a case-by-case basis. Students must coordinate with the instructor/TA for approval to be granted.

CLASS EXPECTATIONS

Attendance Policy

Some absences are excused in accordance with ASU policy. They include accommodations for religious practices, University sanctioned activities, and death of a family member. Read more about these policies in the **ASU Policies** section.

Number of excused absences (other than those excused by ASU for specific reasons): As many as you need and as few as you possibly can. Strive for perfect attendance! Each class is important for your learning so attend all to get the maximum experience for your education.

In the event the instructor fails to indicate a time obligation, the time obligation will be 15 minutes for class sessions lasting 90 minutes or less, and 30 minutes for class sessions lasting more than 90 minutes. Students may be directed to wait longer by someone from the academic unit if they know the instructor will arrive shortly.

Required Technology, Technical Support and Internet Outage Plan

Required Technology

1. Desktop or laptop computer, **current within the last 5 years**
    - *Note: Canvas does have an app that can be used with mobile devices, but the app is limited. Please access Canvas primarily through a desktop or laptop computer.*
    - Do not use a Chromebook or Netbook, since it cannot run Respondus, which is used for tests.
2. Stable, high-speed internet access
3. Web browser updated to the most recent version. Chrome is the preferred browser for Canvas.
4. Audio speakers and/or headphones attached or built-in to the computer
5. Webcam (external or internal with microphone)

6. Word processing software. (Students have access to Google Docs with their ASURite. In addition, Microsoft 365 is free to ASU Students)
7. Smartphone or other mobile device that can download apps.

Please inform the instructor if any of the above present a hardship for you. ASU may have some resources to help students in need.

Technical Support

You have access to 24/7 technical support. It is recommended to use Chrome when accessing Canvas.

Internet Outage Plan

Network and internet outages are never expected. Be prepared and have a plan in case you find yourself without internet.

Campus Network Outage and Technical Support

When access to Canvas is not available for an extended period of time (greater than one entire evening) you can reasonably expect that the due date for assignments will be changed to the next day (assignment still due by 11:59pm).

To monitor the status of campus networks and services, please visit the System Health Portal (http://syshealth.asu.edu/).

Technical Support

This course uses Canvas to deliver content. You can access Canvas through your MyASU portal.

To contact the help desk you have two options:

- For immediate assistance, call ASU at 1-855-278-5080.
- Visit the ASU Experience Center (https://uto.asu.edu/experiencecenter) to get personalized support through 24/7 live chat or by submitting your request online (https://my.asu.edu/service).

For more information on Canvas the following resources are suggested:

- Canvas Course Tour Video
- Canvas Student guide
- Digital Portfolios Help Resources
- Library Resources for Students
- Best Practices for Setting Course Notifications
- Canvas Student App - Download through Google Play (Android) or the App Store (iOS)
  - Android Guide
  - iOS Guide

Other useful links

- Undergraduate Academic Advising
- ASU Email Guide
- ASU Wireless Network

Add/Drop/Withdraw

Click here to access the University Registrar page where you can access grades, the academic calendar, and add/drop/withdrawal options among other things. NOTE: if you are considering withdrawing, please check with financial aid since it may be impacted by a withdrawal.

Student Success Tips:

Time Management

Your success in this class depends greatly on the time you spend on independent study and completion of assignments. In general, expect to spend a minimum of **3 hours** for **each** credit hour **per week** studying outside of class. So, for a 3 credit class set aside 9 hours per week for just that one class. Add on extra time around finals. How much time does that leave you for work, relaxation, and other commitments? Here are some resources to help you get organized and create a study plan.

Click here to calculate your available study time

Click here to discover how many hours you should be studying

Study Techniques

It's important that you attend all classes and complete all assignments to be successful in your College career. To support this, you should take a look your study habits. Consider *where*, *when,* and *how* you study. For example, trying to read a complex paper in a loud coffee shop may be too distracting for you to really understand the material. Waiting until the last minute to write a paper rarely yields good results. Take a look at the guide provided below for more suggestions to optimize your study time.

Click here to access a study guide

Active Reading

You will have to read a lot throughout your degree! It's common practice to highlight content as you read it to help remember it. Studies show, however, that this is not as effective as previously thought. A much better way to help you process and retain the information is to write down the important points and quiz yourself as you read. This is known as "active reading." Download the handout provided below to get started on this simple technique that can help you from day one at ASU.

Click here to access the active reading technique guide

Available Academic Resources

ASU has a wealth of resources to enable your success. Click here to check out the University Academic Success Programs website that includes information on the writing center, tutoring, supplemental instruction, graduate academic support and more.

Academic Integrity

A Student Resource from ASU on Academic Integrity

Mental Health

Students may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These emotional health concerns or stressful events may diminish academic performance and/or reduce the ability to participate in daily activities. ASU Counseling Services provides counseling and crisis services for students who are experiencing a mental health concern. Any student may call or walk-in to any ASU counseling center for a same day or future appointment to discuss any personal concern. ASU's dedicated crisis line is available 24/7 for crisis consultation by calling 480-921-1006.

ASU POLICIES

ASU Academic Policies – January 6, 2020

ASU Excused Absences

Accommodation for Religious practices in accordance with ACD 304-04

Summary: Administrators and faculty members are expected to reasonably accommodate individual religious practices (e.g., by an adjustment to the academic or workplace environment, such as rescheduling, flexibility in scheduling, voluntary substitutions, job reassignments, modification of grooming requirements). A refusal to accommodate is justified only when undue hardship to the university's legitimate business purposes would result from each available alternative of reasonable accommodation (e.g., requires more than ordinary administrative costs, diminishes the efficiency in other jobs, infringes on other employees' job rights or benefits, or impairs campus/workplace safety). Contact the Office of the Provost of the University or the Office of Equity and Inclusion for assistance in determining undue hardship or reasonable accommodation.

Missed class due to University-sanctioned activities in accordance with ACD 304-02

Summary: Students who participate in university-sanctioned activities that require classes to be missed, shall be given opportunities to make up examinations and other graded in-class work. However, absence from class or examinations due to university-sanctioned activities does not relieve students from responsibility for any part of the course work required during the period of the absence.

The provost of the university or designee shall determine, for the purposes of this policy, whether a particular event qualifies as a university-sanctioned activity.

In each college, a specific individual (e.g., dean's designee) shall be responsible for facilitating adherence to this policy. In particular, students who participate in university-sanctioned activities shall,

1. *In accordance with any academic unit or college requirements, be provided make up assignments, examinations, or other graded coursework that was missed because of the university-sanctioned activity without penalty; if this is not possible,*
2. *Receive an incomplete, with arrangements made for completing the final coursework and earning a final grade.*

Disability Accommodations:

Qualified students with disabilities who will require disability accommodations in this class are encouraged to make their requests to me at the beginning of the semester either during office hours or by appointment. Note: Prior to receiving disability accommodations, verification of eligibility from the Disability Resource Center (DRC) is required. Disability information is confidential.

Establishing Eligibility for Disability Accommodations: Students who feel they will need disability accommodations in this class but have not registered with the Disability Resource Center (DRC) should contact DRC immediately. Students should contact the Disability Resource Center, campus-specific location and contact information https://eoss.asu.edu/drc/contactus) can be found on the DRC website. DRC offices are open 8 a.m. to 5 p.m. Monday – Friday. Check the DRC website (http://eoss.asu.edu/drc) for eligibility and documentation policies.

- Email: DRC@asu.edu
- DRC Phone: (480) 965-1234
- DRC FAX: (480) 965-0441

Academic Integrity and Student Code of Conduct:

Academic Integrity

While interaction among students is encouraged, all work performed on the class assignments and quizzes must be that of the student taking the quiz. Any indication that the work on a quiz or exam is not that of the student can lead to a range of consequences from failing the quiz to failing the course and reporting the lack of academic integrity to the College. No use of work by other students can be used, and no work taken verbatim and directly from other sources (e.g., the internet) can be used. Academic honesty will be taken very seriously in this course. Please consult http://students.asu.edu/srr/code for the ASU Student Code of Conduct.

ASU expects and requires its students to act with honesty, integrity, and respect. Required behavior standards are listed in the Student Code of Conduct and Student Disciplinary Procedures (http://www.asu.edu/aad/manuals/ssm/ssm104-01.html), Computer, Internet, and Electronic Communications policy (http://www.asu.edu/aad/manuals/acd/acd125.html), ASU Student Academic Integrity

Policy (http://provost.asu.edu/academicintegrity), and outlined by the Office of Student Rights & Responsibilities (https://eoss.asu.edu/dos/srr). Anyone in violation of these policies is subject to sanctions.

The ASU student academic integrity policy lists violations in detail. These violations fall into five broad areas that include but are not limited to:

1. *Cheating on an academic evaluation or assignment.*
2. *Plagiarizing.*
3. *Academic deceit, such as fabricating data or information.*
4. *Aiding academic integrity policy violations and inappropriately collaborating.*
5. *Falsifying academic records.*

Student Code of Conduct

Violations of the ASU Student Code of Conduct, other than the provision concerning academic dishonesty, are more generally considered inappropriate behavior. The Office of Student Rights and Responsibilities reviews and sanctions these matters. If a student violates both the academic integrity provision and additional provisions of the Student Code of Conduct, both the college and the Office of Student Rights and Responsibilities will review the matter. Each independently makes determinations concerning violations and appropriate sanctions.

Disruptive or Violent Behavior

Students are entitled to receive instruction free from interference by other members of the class (http://www.asu.edu/aad/manuals/ssm/ssm104-02.html). An instructor may withdraw student from the course when the student's behavior disrupts the educational process per Instructor Withdrawal of a Student for Disruptive Classroom Behavior (http://www.asu.edu/aad/manuals/usi/usi201-10.html).

Appropriate online behavior (also known as netiquette) is defined by the instructor and includes keeping course discussion posts focused on the assigned topics. Students must maintain a cordial atmosphere and use tact in expressing differences of opinion. Inappropriate discussion board posts may be deleted by the instructor.

Title IX

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish discuss any concerns confidentially and privately.

No Generative AI Use Permitted

In this course, all assignments must be completed by the student. Artificial Intelligence (AI), including ChatGPT and other related tools used for creating of text, images, computer code, audio, or other media, are not permitted for use in any work in this class. Use of these generative AI tools will be considered a violation of the ASU Academic Integrity Policy, and students may be sanctioned for confirmed, non-allowable use in this course.

Copyright

This syllabus and all other course materials (powerpoint slides, handouts, assignments, quizzes, exams, digital recordings, etc.) are intellectual property of Arizona State University and are not to be publicly distributed or otherwise commercialized since these materials are copyright protected. Publishing, uploading, linking, redistributing, and/or downloading course material may subject students to penalties for academic misconduct. Such materials are for sole use in that designated semester. It cannot be used in any other form unless via a written statement of approval from the instructor of record. Commercial note taking services are prohibited without written permission from the instructor of record in accordance with ACD 304-06 available at http://www.asu.edu/aad/manuals/acd/acd304-06.html. This includes powerpoint slides and powerpoint slides with audio.

Third-Party Software and FERPA

*During this course you might have the opportunity to use public online services and/or software applications sometimes called third-party software such as a blog or wiki. While some of these are required assignments, you need **not** make any personally identifying information on a public site. Do not post or provide any private information about yourself or your classmates. Where appropriate you may use a pseudonym or nickname. Some written assignments posted publicly may require personal reflection/comments, but the assignments will not require you to disclose any personally identifiable/sensitive information. If you have any concerns about this, please contact your instructor.*

This syllabus is subject to change with reasonable advance notice. Please consult the syllabus on Canvas regularly.

The course syllabus and all other class materials (slide presentations, handouts, assignments, digital recordings, exams, quizzes, etc.) are intellectual property of Arizona State University and are not to be publicly distributed or otherwise commercialized since these materials are copyright protected. Such materials are for sole use in that designated semester. It cannot be used in any other form unless via a written statement of approval from the instructor. Commercial note taking services are prohibited in accordance with ACD 304-06 available at http://www.asu.edu/aad/manuals/acd/acd304-06.html