

CS 8803-029, Health Sensing and Interventions Syllabus

Health Sensing and Interventions, Alexander Adams
Online, Asynchronous

Instructor Information

Instructor	Email	Drop-in Hours & Location
Alexander Adams	Alex.adams@gatech.edu	TBD, Zoom
Teaching Assistant(s)	Email	Drop-in Hours & Location
Kefan Song (lead)	Ksong75@gatech.edu	TBD
Rishabh Goel	RishGoel@gatech.edu	TBD

General Course Information

Description

Health Sensing and Interventions (HSI) aims to bridge the gap between the medical sciences and computing. At a high level, this course explores how to sense the human body and the various conditions/contexts that affect our health. More specifically, this course will investigate

- Different systems of human physiology (high-level)
- Existing devices that can measure our health.
- Devices that can provide feedback to users regarding their health
- How these medical devices and health technologies work
- Which technology to choose for a given problem
- How can we design new devices ourselves?

We will explore the different systems of the human body and discuss how to measure (or trigger, in the case of interventions) various aspects of them. We will brainstorm possible solutions, discuss how to test them, and discuss the implications of different approaches. Students will be able to, but not required to, build a physical device (A list of recommended health tech prototyping hardware will be provided to guide students interested in hardware solutions). Some solutions require hardware, while others can be based on software-as-a-medical-device (SaMD), including mobile applications, data analysis, and algorithmic solutions. Students should leave this course with the skills and confidence to tackle problems in healthcare that previously seemed insurmountable.

Course Goals and Learning Outcomes

Upon successful completion of the course, students will be able to:

- Build on the foundations of health technology to develop practical applications.
- Discern the capabilities of different components of health tech, which enables informed decisions on feasibility, usability, and potential technical challenges.
- Exploit the potential of technology to address real-world health and medical problems.
- Feel enabled to attack issues in healthcare that seemed unreachable or impossible before

Skills: Through active course participation, the students will gain the following:

- The ability to appreciate and analyze the foundations of Health Technology
- The ability to use Precision Health, Medical Devices, and Health Technology in innovative, real-world, practical applications.

Core IMPACTS

N/A

Course Requirements & Grading

Category	Sub-Category	Percent of grade	Max Grade Contribution
2 Assignments			35%
Participation	Quizzes	5%	25%
	Discussions	10%	
	Lab Reports	10%	
Projects	Proposal	5%	40%
	Mid-Term Presentation	5%	
	Final Presentation	15%	
	Final Report	15%	
*10% penalty for incomplete CITI training			
Total			100%

IRB: Students can only start working on their project after providing evidence of successful completion of relevant IRB (Institutional Review Board) training, which concerns ethical approvals for research conducted at Georgia Tech (CITI certificate(s) as outlined above).

All projects are—by definition—classroom (educational) projects and, as such—if adhering to good academic practice as attested through successful IRB training—are exempt from IRB approval.

However, without proper IRB approval (if required by the project), the results cannot be published. Publication (for example, in the form of a scientific article) typically requires IRB approval (depending on the project). Teams aiming to publish their project results should discuss this with their mentors/professors to seek advice.

Extra Credit Opportunities

There are extra-credit opportunities available for the final project, assignments, and select labs.

Description of Graded Components

Labs are in-class exercises designed to provide students with an in-depth understanding of physiological signals, the rationale for analyzing signals in specific ways, and how to apply their technical skills. Lab reports should include detailed descriptions and a justification for your analysis.

Assignments: There are two assignments in this course. They are designed to demonstrate how we can use software as a medical device, leveraging the mobile phones' built-in sensors to dive deeper into physiological signal analysis and human activity recognition. The second is designed to explore. Each is designed to give you confidence in skills you may need in your final project.

Projects: Students will work in groups on one practical project (per group) throughout the semester. Each project will be of the student's creation, with some help from the Tas and instructor. Students will have to organize themselves into groups and define the specifics of their project. For **graduate students**, groups may have no more than 2 members; **undergraduate student** groups may have up to 4 members.

The projects can be the student's idea alone. The instructor and Tas will also pitch several ideas for the students to use or build on. Teaching assistants will support students during the project definition phase to ensure all students can work on a project they want, find interesting, and lead to achievable results.

All projects must be discussed with and approved by Tas or the instructor. Part of these discussions involves adjusting the complexity (by the Tas in discussion with project teams) to aim for class-appropriate projects that are neither trivial nor unachievable. Examples of successful projects from previous semesters will be shared with the students.

Process: Students will form project teams at the start of the semester. Based on the initial readings, the example projects from previous years, and research areas and suggestions from mentors, teams will begin exploring the broader area of health technology to understand what interests them and what direction their project could take. Tas will play an active role in this process, helping students discover their passion.

Tas will also give feedback on the intended complexity of a project. Ideally, it should be challenging to push students out of their comfort zone, thus enabling learning without being unrealistically ambitious. This process will be iterative and require substantial work, but—if done well—it will pay off with a project the team will be passionate about, leading to mastery of Health Technology.

Project Teams: Students are responsible for forming teams. Graduate Teams should consist of no more than two members, and Undergraduate teams may consist of up to four members. Students are encouraged to enter basic information about their background, experience, and motivation/interests into a class-public spreadsheet, making the project-forming process easier. The link to the document is given on Canvas.

All project team members will complete a team contract, outlining their goals and objectives, their anticipated roles within the project, and their overall ambitions. This contract is a required deliverable (pass/fail grade). It will be used throughout the project to track progress, particularly the individual contributions of all team members. See grading guidelines below.

Project Deliverables: Projects have the following deliverables that will be graded (totaling up to 40% of the overall grade):

- Team contract – must be signed by all team members and is binding
- Project proposal [5% of overall grade]
- Halftime project update (report, presentation, and discussion – details to be specified) [5% of overall grade]
- Project demo (end of project) [15% of overall grade]
- Project report [15% of overall grade]

Guidelines for writing proposals, reports, demos, slides, and video presentations are available on Canvas (Files section).

Grading Scale

Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

According to policy, grades at Georgia Tech are interpreted as follows:

A	Excellent (4 quality points per credit hour)
B	Good (3 quality points per credit hour)
C	Satisfactory (2 quality points per credit hour)
D	Passing (1 quality point per credit hour)
F	Failure (0 quality points per credit hour)

[See the Registrar's breakdown of the grading system](#) for more information.

Course Materials

Course Text: N/A

Additional Materials/Resources: N/A

Course Website and Other Classroom Management Tools

Canvas, ED

Course Policies, Expectations, & Guidelines

Submission Policy

All work needs to be submitted through Canvas using the Assignments feature. For group assignments, only one submission per team is required. We will use the group feature in Canvas as soon as the project teams are finalized. Tas will assist students with submissions.

The acceptable format for written reports is PDF (only).

The acceptable format for slide submission (not presentation) is PDF (only). Use your preferred presentation software for the in-class presentation, but please export the slides to PDF for submission to Canvas. Alternatively, students may submit links to online resources (such as Google Slides) that can be used for in-class presentations.

When submitting videos, please use standard codecs that can be played on both Mac and Windows (test before submission). However, it is strongly encouraged that links to online resources (such as YouTube) where the videos have been uploaded should be provided.

Extensions, Late Assignments, & Re-Scheduled / Missed Exams

Late assignments are not accepted without a suitable excuse (doctor's note, police report, etc.). Note that extenuating circumstances must be brought to the instructor's attention **before the fact**, through the regular channels; that is, *do not send doctor's notes to the instructor or Tas*, but instead send them to student services, who will contact the instructor. Late submission without evidence of extenuating circumstances will result in zero marks for the component. In the event of a planned absence (e.g., for interviews), students must notify the team and instructor well in advance so that they can discuss alternative arrangements. In the event of unplanned yet excused absences (e.g., illness), the instructor and team will discuss options for a student to make up any missed work. Missing a quiz – without evidence of extenuating circumstances as defined before – will result in failing the quiz and thus zero marks for this component.

However, in the event of extenuating circumstances as defined previously, quizzes/exams may be rescheduled, or other accommodations may be discussed, in accordance with the official Georgia Tech policy and procedure. In any case, it is strongly advised to consult with the instructor well in advance (at least one week's notice) should extenuating circumstances result in extraordinary difficulties with the schedule. We will always aim to find a satisfying solution within the constraints of fair treatment and within reason.

Academic Integrity

Georgia Tech strives to foster a community founded on trust, academic integrity, and honor. Students are expected to conduct themselves in accordance with the highest ethical standards. [Review Georgia Tech's Honor Code](#) and the [student Code of Conduct](#).

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, which will investigate the incident and determine an appropriate penalty.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodations, [contact the Office of Disability Services](#) (404-894-2563) as soon as possible to schedule an appointment to discuss your needs and obtain an accommodations letter. Please also email me as soon as possible to arrange a time to discuss your learning needs.

Attendance and/or Participation

Attendance is required and assessed through in-class exercises and labs.

Collaboration, Group Work, and Use of Generative AI

Group Work

Group work is explicitly encouraged for the project that students will work on throughout the course. Project reports will be written in groups (all team members submit the same report and receive the same grade). Group discussions will be fostered in the classroom at appropriate times throughout the course.

Generative-AI

AI can be used as a tool to aid in programming and assist with grammar in writing. You must cite code that was generated with AI tools and add a statement about how AI was used in your writing.

Student-Faculty Expectations Agreement

At Georgia Tech, it is essential to foster an atmosphere of mutual respect, acknowledgment, and responsibility between faculty members and the student body. [The Student-Faculty Expectations](#) outline basic expectations you can have of me and that I have of you. Ultimately, simple respect for knowledge, hard work, and cordial interactions will help create the environment we desire. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Campus Resources for Students

Graduate Student Academic and Professional Success Resources:

A list of resources for graduate students is given on the [Office of Graduate and Postdoctoral Education](#) website. Specific information for [current graduate students](#) includes

- [Academic Resources](#) such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- [Student Resources](#) such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and
- [Professional Development](#) such as the programming from the Career Center and other professional development resources and events”

Student Well-Being:

At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A [comprehensive list](#) of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being ([student-resource-guide \(gatech.edu\)](#))