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	Wednesdays, 6PM, 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 – such as SaMD (Software as a Medical Device), 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

This course aims to provide students with an overview of and the foundations of research in technology for healthcare. Through critical thinking and problem-solving, this course aims to cultivate an appreciation of the field's practical applications for researchers and practitioners.

Syllabus Portal

- CS 8803-029, Alexander Adams
- Spring 2026
- Course 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?

- Course Learning Outcomes

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

    - Build on the foundations of health technology to develop practical applications that enhance health outcomes.
    - 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

- Grading Policy
    - Assignments 35%
    - Participation 25%
    - Final Project 40%

- Standard 10-point scale is used for letter grades
    - A:[90-100], B:[80-89], C:[70-79], D:[60-69], F:[0-59]

- Attendance is required
  - Students are expected to maintain the highest standards of academic integrity. All work submitted must be original and properly cited. Plagiarism, cheating, or any form of academic dishonesty will result in immediate consequences as outlined in the university's academic integrity policy.

- Core IMPACTS Statement
  - This course aims to provide students with an overview of and the foundations of research in technology for healthcare. Through critical thinking and problem-solving, this course aims to cultivate an appreciation of the field's practical applications for researchers and practitioners.

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 when they have provided evidence for successful completion of relevant IRB (Institutional Review Board, which is concerned with ethical approvals for research conducted at Georgia Tech) training (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 of a project cannot be published as such. 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

Labs are in-class exercises designed to provide students with an in-depth understanding of physiological signals, the rationale behind how we analyze signals in specific ways, and an understanding of 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 will have no more than **two** members; **undergraduate student** groups can have up to **four** members.

The projects can be solely the student's idea. 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 the appropriate penalty for the violation.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to 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 articulate some basic expectations that 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.

Additional Course Policies

Campus Resources for Students

Academic Support

- Center for Academic Success http://success.gatech.edu
    - o 1-to-1 tutoring http://success.gatech.edu/1-1-tutoring
    - o Peer-Led Undergraduate Study (PLUS) http://success.gatech.edu/tutoring/plus
    - o Academic coaching http://success.gatech.edu/coaching
    - o Residence Life's Learning Assistance Program
- https://housing.gatech.edu/learning-assistance-program
    - o Drop-in tutoring for many 1000-level courses
    - o OMED: Educational Services (http://omed.gatech.edu/programs/academic-support)
    - o Group study sessions and tutoring programs
    - o Communication Center (http://www.communicationcenter.gatech.edu)
    - o Individualized help with writing and multimedia projects
- Academic advisors for your major
    - o http://advising.gatech.edu/

Personal Support

Counseling Center	counseling.gatech.edu	404-894-2575
Dean of Students (Student Life)	studentlife.gatech.edu	404-385-8772
GT Police	police.gatech.edu	404-894-2500
Stamps Health Services	health.gatech.edu	404-894-1420

Georgia Tech Resources

Academic Advisors (advising.gatech.edu/)
Help students navigate degree requirements and utilize campus resources to ensure their success. Instructors can ask advisors for input on situations involving specific students, and they should send struggling students to advisors for help and direction.

The Center for Academic Success (success.gatech.edu/)
Offers various academic support services to help students succeed academically at Georgia Tech (e.g., tutoring, peer-led study groups, study skills, etc.).

The Communication Center (communicationcenter.gatech.edu/)
Provides support for students concerning developing competency and excellence in written, oral, visual, electronic, and nonverbal communication.

The library (library.gatech.edu/)
Provides students with a range of services beyond borrowing privileges, including access to technology and technical assistance, online access to numerous journals and databases, as well as subject and personalized research assistance. You can place course materials on reserve behind the reference desk or request a librarian to teach an instructional session for your class.

The Office of Disability Services (disabilityservices.gatech.edu/)
Ensures that students with disabilities have equal access to all programs and activities offered at the Georgia Institute of Technology. They provide documentation and officially sanctioned requests for student accommodation and serve as a resource for instructors as they build learning environments to meet the needs of all students.

OMED: Educational Services (omed.gatech.edu/)
The unit at Georgia Tech charged with the retention, development, and performance of the complete student learner who is traditionally underrepresented, including African Americans, Hispanics, and Native Americans. OMED's programming and academic support services are designed to equip all students with the strategies necessary to navigate the Georgia Tech environment.

The Division of Student Life (studentlife.gatech.edu/)
Smithgall Student Services Building, 2nd floor, 404-894-6367

Often referred to as the Office of the Dean of Students, it offers resources and support to all students in our community. You can refer students to Student Life or contact them for help identifying appropriate campus resources and resolving problems with students.

Counseling Center
http://counseling.gatech.edu
Phone: 404-894-2575
Smithgall Student Services Building 2nd floor

- Services include short-term individual counseling, group counseling, couples counseling, testing and assessment, referral services, and crisis intervention. Their website also contains links to state and national resources.
- Students in crisis may walk in during business hours (8 am-5 pm, Monday through Friday) or contact the counselor after hours at 404-894-2204.
- Students' Temporary Assistance and Resources (STAR): http://studentlife.gatech.edu/content/need-help
- Can assist with interview clothing, food, and housing needs.
- Stamps Health Services: https://health.gatech.edu; 404-894-1420

- Primary care, pharmacy, women's health, psychiatry, immunization and allergy, health promotion, and nutrition
- OMED: Educational Services: http://www.omed.gatech.edu
- Women's Resource Center: http://www.womenscenter.gatech.edu; 404-385-0230
- LGBTQIA Resource Center: http://lgbtqia.gatech.edu/; 404-385-2679
- Veteran's Resource Center: http://veterans.gatech.edu/; 404-385-2067
- Georgia Tech Police: 404-894-2500

National Resources

The National Suicide Prevention Lifeline provides free and confidential support 24/7 to those in suicidal or emotional distress at 1-800-273-8255

The Trevor Project provides crisis intervention and suicide prevention support to members of the LGBTQ+ community and their friends. They are available 24/7 by telephone (1-866-488-7386), chat (http://www.thetrevorproject.org; 3-10 pm Eastern, 7 days a week), and text (Text "Trevor" to 1-202-304-1200; available 3-10 pm, Monday through Friday).

Course Schedule

The updated, detailed Course Schedule may be found here

Module	Module	Reading, Notes, due dates, and more
1	Introduction	
2	Sensing	
3	Signals	
4	Feedback	
5	Cardio System	
6	Pulmonary System	
7	Intake	
8	Processing	
9	Elimination	
10	Environment & Health	
11	Nervous System	
12	Sensory System	
13	Perception	
14	Muscular System	