INF632 Syllabus

Topics in Wearable Computing

College: Steve Sangi College of Engineering (SCE)

Department: School of Informatics, Computing, and Cyber Systems

Course-Section Number: INF632-000 (this semester as EE499-100 and EE599-100)

Time: Tuesdays and Thursdays, 11:10am to 12:25pm

Location: Class will meet SICCS (90) Room 223, and occasionally SICCS 122

Lecture / Hands On Lab: January 12 to May 1, 2026

Final Presentations: In finals week, Thursday May 7 10:00am to 12:00pm

Credit Hours: 3 (Co-convened this semester)

Prerequisite(s): Graduate Status (None for EE499 and EE599)

Modality: Face-to-face

Course Website: canvas.nau.edu, github.com/kylewinfree/inf632-spring2026

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SICCS (90) Room 204
Office Hours: Thursdays 12:45-2:00 and Mondays 1:00-2:00
Cell Phone: 928.853.0114, please use sparingly - I will not respond during class!

This syllabus is subject to change at the discretion of the instructor.

Academic Catalog Description:

Study of methods, techniques, and research areas in wearable computing, with varying emphases between offerings. Letter grade only. May be repeated for up to 6 unis of credit with different topic.

Course Description:

This project-based course is intended to provide a graduate-level study of wearable technologies, including the use of commercially available devices, such as the Fitbit. The course centers on the client-host interface and data exchanges involved in the design and application of wearable technologies, with a particular focus on applications in healthcare and wellness. Topics include applications of wearable technologies in health research, comparative studies, projects involving the creation of custom health monitoring devices, data analysis, real-time analysis techniques, and machine learning. Students will engage in iterative design projects that explore and apply a variety of wearable technology techniques and scholarly literature reviews that explore open research areas in the field. By the end of the course, students are able to engage in research in wearable computing and the design and creation of wearable devices in other research areas of interest.

Course Student Learning Outcomes:

Undergraduate:

Students who complete the undergraduate section of this course in good standing should be able to demonstrate the following advanced competencies:

1. Select, assess, and apply techniques appropriate to the application of wearable technologies for healthcare and wellness applications;

2. Synthesize, apply, and evaluate offline data analysis and machine learning techniques on large-scale data sets collected by wearable technologies;

3. Identify, interpret, and critically explain the significance of open research areas in wearable technologies and their applications in health-driven research;

4. Evaluate the applicability of wearable technologies in the commodity market.

Graduate:

Students who complete the graduate section of this course in good standing should be able to demonstrate the following advanced competencies:

1. Select, assess, and apply techniques appropriate to the design and implementation of wearable technologies for healthcare and wellness applications, including specialized communication protocols and data structures and storage techniques;

2. Synthesize, apply, and evaluate online and offline data analysis and machine learning techniques on large-scale data sets collected by wearable technologies;

3. Identify, interpret, and critically explain the significance of open research areas in wearable technologies and their applications in health-driven research;

4. Evaluate the applicability of wearable technologies in the commodity and research.

Assessment of Student Learning Outcomes:

Methods of assessment include: reading and homework assignments; participation in the in-class reading discussions; and a research project (purpose statement; literature review; implementation and comparison of several machine learning algorithms; final project report) in stages throughout the semester. Evaluations of the team project will be done at an individual level. Students will be required to complete their own literature review, hypothesis formation, and analysis/discussion of results. While the research methods plan and device design/implementation are dependent on other team members and will have a strong group influence, students will need to justify their own contributions and independently propose alternative designs and methods.

Table 1: Assessments and related fractional percentage of final grade.

Assessment	**Undergraduate**	**Graduate**
Attendance and in-class participation	10%	10%
Homework Assignments (3)	45%	30%
Research Project: Literature Review	5%	10%
Research Project: Questions and Hypotheses	10%	10%
Research Project: Device Design and Implementation	5%	10%
Research Project: Methods Plan	5%	5%
Research Project: Analysis	5%	10%
Research Project: Discussion of Findings	10%	10%
Research Project: In-Class Presentation	5%	5%
Total	100%	100%

Grading System:

This is a project heavy course. You will work through conception, development, implementation, and reflective analysis of a project in wearable computing. This project may include hardware development, will very likely include numerical analysis, and will absolutely include a formal written report and presentation. You may elect to work individually, or in a team of two. However, the scope of the project must be appropriate for either of these options - meaning, a team of two will have higher expectations than that of a person working individually. The relative impact of each assessment in your final grade can be found in Table 1. Final course letter grades will be determined as shown in the Table 2. There is no "curve;" your grade is completely up to you and is not affected by the grades of your classmates. Extra credit opportunities may present themselves throughout the semester and be announced during class meetings. If you feel a mistake has been made in grading your assignment, please address your concerns during office hours.

Graduate students will be graded with a different rubric than undergraduate students and in general will be expected to do more. As your instructor, I expect to have access to all materials related to your assignments. This includes data, design files, analyses, and write ups.

Undergraduate:

Undergraduate students may use either GitHub or Google Drive to share all work with the instructor. Both support Colab, which undergraduate students are encouraged to use for analysis and report generation. These students may complete assignment write ups in Google Docs (recommended) or LaTeX. Write ups must then be exported to pdf[1].

Graduate:

Graduate students must use GitHub to share all work with the instructor. All analysis code (Octave, Python / Jupyter Notebooks, or R) must be available in this repository. All written assignments must be submitted typeset in IEEE BHI LaTeXformat[2] (not MS Word, Pages, Google Docs, or chicken scratch).

[1] `https://dev.to/revisepdf/the-history-of-pdf-from-adobes-creation-to-universal-standard-33d`
[2] `https://template-selector.ieee.org/secure/templateSelector/publicationType`

Table 2: Percentage grade and corresponding letter grade.

Percentage Grade (G)	**Letter Grade**
$G \geq 90\%$	A
$90\% > G \geq 80\%$	B
$80\% > G \geq 70\%$	C
$70\% > G \geq 60\%$	D
$60\% > G$	F

Readings and Materials:

No text book will be required. You will need to purchase the materials to create a wearable device. This material list will be provided; expect costs to be approximately that of a textbook. Students in the undergraduate section have the option of completing the research project with off-the-shelf devices and may not need to purchase materials. Additional readings will be provided from various sources; this list below includes materials that will not be provided to you in class and are recommended as helpful readings.

1. *Open Software, Second Edition*, by Tony Olsson, David Gaetano, Samson Wiklund, & Jonas Odhner (ISBN: 978-91-97-95540-9)
2. *Practical Arduino*, by Jonathan Oxer and Hugh Blemings (ISBN: 978-1430224778)
3. *GNU Octave - A high-level interactive language for numerical computations*, by John W. Eaton [3]
4. *Python Data Science Handbook*, by Jake VanderPlas (ISBN:978-1-491-91205-8)
5. *R: A Language and Environment for Statistical Computing - The R Manuals*, by the R Core Team [4], [5]
6. *LaTeX* [6], [7]

Course Policies

- **Your Work should be Your Work**
  - Cheating and plagiarism are strictly prohibited. All academic integrity violations are treated seriously. All work you submit for grading must be your own. You are encouraged to discuss the intellectual aspects of assignments with other class participants. However, each student is responsible for formulating responses and solutions on their own and in their own words. Academic integrity violations will result in penalties including, but not limited to, a zero on the assignment, a failing grade in the class, or expulsion from NAU or your degree program.

[3] `https://www.octave.org/`
[4] `https://www.r-project.org/`
[5] `https://cran.r-project.org/manuals.html`
[6] `https://en.wikibooks.org/wiki/LaTeX`
[7] `https://upload.wikimedia.org/wikipedia/commons/2/2d/LaTeX.pdf`

- **Generative Artificial Intelligence**
  - I'd like you to know that I am not strictly opposed to the use of generative AI. However, I want to see you use it appropriately.
  - Written reports or explanations of your work that are indicative of generative AI may be considered cheating. This doesn't mean that you can't use something like Grammarly to help you improve your writing, but this does mean that you shouldn't ask a generative AI to summarize your code for you.
  - We all run into challenges when coding at times. You may certainly ask your friend, your favorite search engine, or a generative AI to help you through a bug or to figure out what functions/methods you should be using. You should not however be copy-pasting code from generative AI into your code. Instead, consider this: copy-paste the prompt or search term and the key response from either into a comment block. Then, use that to help you write your own code!
  - The bigger problem with using generative AI, in my opinion, isn't that you could be learning to copy-paste, but is instead that YOU AREN'T LEARNING[8]. You're hear to learn. Sure, maybe also to earn a degree and then get a job, but you won't likely be able to maintain that job if you haven't actually learned what your degree says you did. Don't cheat yourself out of your education.
- **Be Present**
  - Electronic device usage must support learning in the class. This includes notebook computers, tablets, and phones.
  - I devote 100% of my attention to providing a high-quality lecture; please respect this by devoting 100% of your attention to listening and participating.
- **Grades**[9]
  - For those in the undergraduate section, a **C** grade reflects **average** performance, a **B** grade reflects **above average**, and an **A** grade reflects work that is **excellent**.
  - For those in the graduate section, a **C** grade is the **lowest grade acceptable for graduate credit** and may trigger academic probation, a **B** grade reflects performance that is **satisfactory**, and an **A** grade reflects work that is **superior**.
  - Grades will be maintained in the Canvas LMS course shell. Students are responsible for tracking their progress by referring to the online grade book and cross referencing to the course materials.
  - There is no course grading curve, but the grading rubric may be adjusted in cases where all students are observed to have struggled.
- **Attendance and Absences**
  - Attendance is expected. Regular absences and non-participation may result in the reduction of your final grade by up to one letter grade. If you expect to be absent, please notify me, your instructor. The same goes for absences resultant of sickness or other emergencies.

[8] `https://www.youtube.com/watch?v=G-cdVurdoeA`
[9] `https://www9.nau.edu/policies/Client/Details/1996`

- Students are responsible for all missed work, regardless of the reason for absence. It is also the absentee's responsibility to get all missing notes or materials.

- **Communication**
  - Emails and Canvas messages to the instructor and teaching assistants must be respectful and professional. Specifically, such messages should adhere to the following:
    * Contain a salutation, (for example, "Dear Dr. Winfree," or "Kyle,")
    * Contain a closing, (for example, "Best, Jane Doe")
    * The body should contain complete sentences and correct grammar including correct usage of lowercase and uppercase letters. Composing emails on a mobile device is not an excuse for poor writing. Poorly composed emails may be returned without a response to the questions asked.
    * The body of your message should also be respectful and explain the full context of the query. If you are asking for input on any of your assignment materials, be sure to include a link to your repository.
    * The subject should be prefixed with "INF632" so that the message can be easily identified or placed in an auto-folder. The subject should also use lower case and upper case correctly.
  - Please allow up to three business days for a response to email. To accelerate this timeline, please send your message via Canvas - this will pop up on my phone right away. My cell number is provided above. I ask that this be used sparingly and for reasonable emergencies.
  - If you have a question that would require a long response or you have a lot of questions, please come to office hours or schedule an appointment with the instructor or teaching assistant.
  - Visiting during office hours is encouraged! I am happy to talk about the class, careers, research, and topics related (even loosely) to this course.

University Policies

The University Policy Library contains the Syllabus Policy Statements[10] in addition to many other relevant and important policies.

[10] `https://nau.edu/university-policy-library/syllabus-requirements/`

Tentative Schedule:

Shown in Table 3 outlines a tentative schedule. This may be adjusted for a variety of reasons, such as supporting your learning and instructor conflicts.

Table 3: Tentative Course Schedule.

Week of	Content
January 12	Course expectations, setup (GitHub or Google Drive), and peer introductions (come prepared to introduce yourself with something you learned this past semester or summer). Start your assigned reading — this should become habit!
January 19	Dimensions of functionality Haptic interfaces *NAU is closed on Monday in observance of MLK Day*
January 26	Health research and trends in wearable health monitoring Analysis, comparative testing
February 2	Introduction of the **Research Project** Research methods for studies
February 9	Literature review, finding the gap in knowledge, forming a hypothesis No class on Thursday!
February 16	Statistical learning methods (applied) — regression, logistic regression, over fitting, neural nets
February 23	Statistical learning methods (applied) — support vector machines, decision trees, k-means, k-nearest neighbors
March 2	Device design Sensing
March 9	Spring Break! No class.
March 16	Soldering lab Arduino Part 1 Device design review (everyone shares)
March 23	Arduino Part 2 Raspberry Pi
March 30	Project time
April 6	Project time
April 13	Interpreting your results Communicating your analyses and findings
April 20	Writing lab — come prepared to work on writing up the **Discussion and Findings** with your group
April 27	Project time
May 4	Finals week, no class on Tuesday Project presentations on Thursday from 10:00am to 12:00pm