

CPS 226: User Research Methods

Fall 2024

1 General Course Information

Course Title: User Research Methods (Quantitative and Qualitative Methods in User-Centered Research)

Class Location: Gross Hall 103

Class Time: Wednesdays & Fridays (1:25 p.m.-2:40 p.m.)

Course Schedule: <https://tinyurl.com/5e8973b2>

Course Website: <https://courses.cs.duke.edu/fall24/compsci226/>

Course Readings: <https://tinyurl.com/5bta4vj5>

Course Ed: <https://edstem.org/us/courses/63837/discussion/>

Class Recordings: <https://tinyurl.com/yhk44mnf>

Office Hours: Wednesdays & Fridays after the class in Gross Hall 103 or by appointment.

Course Instructor: Pardis Emami-Naeini (she/her)

Instructor's Email: pardis@cs.duke.edu

Instructor's Website: <https://users.cs.duke.edu/~pardis/>

Instructor's Office: LSRC D327

2 Course Description

Academic researchers, policymakers, and designers of technologies often need to conduct user-centered experiments to capture people's attitudes, concerns, expectations, and practices toward their designed tools and policies. Conducting effective, unbiased, and reliable user studies requires in-depth knowledge of empirical research methods and analysis tools. This course serves as an introduction to a wide range of user-centered research study design methods and quantitative and qualitative data analysis techniques that students can use to capture users' perceived and real attitudes and behaviors toward technologies and policies.

Below are some of the topics that are covered in the course:

- Developing user research hypotheses.
- Identifying suitable experimental designs (e.g., factorial design, mixed methods design).
- Designing effective quantitative experiments, including surveys.

- Designing effective qualitative studies, including interviews.
- Statistical tests to analyze quantitative data.
- Using R programming language to implement quantitative analysis methods (e.g., regression models, correlation tests).
- Coding methods to analyze qualitative data (e.g., first and second-cycle coding, grounded theory).
- Ethical considerations when working with human subjects.
- Emerging topics in human-centered security.
- Inclusivity considerations in human-centered security.

Due to the significance of data privacy and security, the reading materials, examples, topics, and exams throughout the course will be motivated by usable privacy and security themes, including phishing attacks and training, privacy notice and choice, and inclusivity in security and privacy.

The course involves a final research project, where students are expected to work in small groups to conduct a user study using the empirical methods they learn throughout the course. In addition, the course will include in-class activities, reading commentaries, and a midterm exam. The reading commentaries are designed to introduce students to human-centered experiments and analysis methods that are commonly used in human-computer interaction and usable security research communities.

This course is suitable for students who are interested in designing and exploring inclusive tools and policies for users. At the end of the course, students will learn several quantitative and qualitative user research and analysis methods, which they can use to effectively capture users' understanding, attitudes, and practices, thereby informing the design of emerging technologies and policies. The course is most suitable for students who have some programming, algorithms, and data analysis background (e.g., an undergraduate computer programming course, such as CompSci 201). In addition, having statistical knowledge and experience using statistical analysis tools, including R, Python, and STATA, is encouraged but not required.

3 Course Structure

At a high level, this course follows the structure below:

- **Class Lectures (see Section 9):** The instructor will be teaching topics on designing effective and ethical user research protocols and analyzing user data.
- **Reading Commentaries (see Section 6):** There are two required readings for most sessions. These readings are selected to show students various methods of conducting user research and qualitatively and quantitatively analyzing user data. The majority of the selected articles discuss a user study in security, privacy, or human-computer interaction (HCI). These reading articles are extensively peer-reviewed and are published at flagship security, privacy, and HCI venues. The hope is that students can critically assess the user research methodology of the work and be able to discuss the limitations and strengths of the research (e.g., conducted user experiments). In addition, we expect the students to use the lessons learned from these readings to further strengthen their course projects. For most sessions, students are expected to read and submit a thoughtful commentary on the two readings assigned to the sessions. In each session of the class where we have reading assignments, one (or two) of the classmates will lead a discussion (~20-30 minutes) on the two readings (~10-15 minutes each). The deadline for submitting the commentaries of each class is 7 p.m. the day before that session.
- **In-Class Discussion (see Section 7):** The discussion should be around 20 to 30 minutes, and it should be structured in a way that a portion of it covers one reading and the second portion covers the second

reading. The student(s) leading the discussion are not expected to submit the reading commentaries for that session, but they should submit their presentation slides by 10 p.m. the night before the session.

- **Class Project (see Section 8):** Throughout the course, students will work in groups of four to five to conduct a research project on human-computer interaction. Students have the option to choose from a list of usable security themes or propose a new project idea in HCI or human-centered security.
- **Midterm:** The class will have a written midterm exam, where students are asked about the topics covered by the exam date.

4 Course Expectations and Goals

We work together to achieve the following objectives in this course:

- Learning about different types of user research methods and how to design them.
- Learning about how to conduct qualitative coding.
- Learning about how to quantitatively analyze user data.
- Learning about the ethical considerations in human-centered research studies.
- Learning about emerging topics in human-centered security and privacy.
- Learning about inclusivity in human-centered security and privacy.

5 General Course Grading

Your final grade will be calculated based on the following rubric. Where needed, more detailed information about grading is provided in the rest of the syllabus.

- **Reading Commentaries:** 10% (see Section 6.3)
- **Discussion Lead:** 10% (see Section 7.2)
- **Active Class Participation:** 20%
- **Midterm:** 20%
- **Group Research Project:** 40% (see Section 8.1)

6 Reading Commentaries

Most lectures have two associated readings that are closely related to the topic of that session. For each session of the class (we have two sessions per week), students are expected to read and submit a thoughtful commentary on the two assigned readings. In each session of the class where we have reading assignments, one (or more) students will lead a discussion (~20-30 minutes) on the two readings (~10-15 minutes each). The discussion lead is not expected to submit the reading commentaries for the session they are leading the discussion for. For other students, the deadline for submitting the commentaries of each class is at 7 p.m. the day before that session. The discussion lead is responsible for selecting the readings for their

session. The readings could either be the default ones ¹ or the ones selected by the discussion lead. If the lead decides to select their own reading, this paper should be from flagship HCI/usable security venues, involving at least one user research experiment.

6.1 Expected Content of Commentaries

The submitted reading commentaries should include the following items:

- Short summary (2-4 sentences) of the reading.
- Two discussion prompts (see Section 6.2).

6.2 Discussion Prompts

An important part of the reading commentaries is the discussion prompts. Students are asked to write two discussion prompts per reading (four in total for each class) in their commentaries. These prompts can take a question or statement form. Regardless of how these prompts are formatted, they should demonstrate a deep understanding and critical thinking of the paper. The only requirement for the discussion prompts is that at least one of the prompts for each reading should be directly focused on the methodology of the reading. Below are a few questions that might be helpful to consider when designing the prompts:

- What are the limitations and strengths of the conducted research?
- Are the mentioned human-centered methods appropriate for the research objectives, and how can they be improved?
- Did the authors follow ethical human-centered research procedures when conducting this study?
- What future research directions could be informed and inspired by the current study?

6.3 Grading of Commentaries

For each class, students will receive two grades, one for each reading commentary. The assigned grade for the submitted reading commentary will be one of the following:

- **Complete (1 point):** The commentary is detailed, and the included prompts demonstrate a deep understanding of the intellectual content of the reading.
- **Incomplete (0.25 point):** The commentary either lacks the expected components (see Section 6.1) or provides incorrect details about the reading.

The two lowest reading grades will be dropped. There is no deadline extension policy for reading assignments, and they are expected to be submitted by 7 p.m. the day before the class. However, life is full of surprises, which requires flexibility. So if, for any reason, it becomes challenging to submit the assignments in time, students should reach out to the instructor to discuss possible accommodations. Students' health and happiness are the most important goals, so if there are any concerns about this class, the instructor is always available to chat.

¹<https://tinyurl.com/5bta4vj5>

7 In-Class Discussion

Depending on the number of students enrolled in the class, students are expected to sign up to lead a discussion for the readings. The class discussion should be around 20 to 30 minutes, and it should be structured in a way that a portion of it covers one reading and the second portion covers the second reading. The class discussion lead is not expected to submit the reading commentaries for that session, but they should submit their presentation slides by 10 p.m. the night before the session, which would allow the instructor to provide feedback on the slides before the class.

7.1 Discussion Strategies

Below are some potentially helpful practices students can consider when structuring their discussion strategies:

- **Short Reading Summarization (~3-5 minutes):** Start the discussion by briefly summarizing the readings. Each student in the class is expected to read the articles and submit their commentaries prior to the class. Therefore, the discussion lead(s) do not need to spend a lot of time summarizing the details of the readings. However, to remind the class about the readings and keep the class on the same page, it would be helpful to start by providing a summary of the critical aspects of the readings. The summary could include the goals of the reading, their methodology, and their main contributions. In the summary section, the discussion lead(s) should include any detail that they would refer to in the rest of the discussion.
- **Class Participation (~7-10 minutes):** The discussion lead(s) are essentially the instructors of that discussion/reading. Therefore, they are expected to get students to talk and participate in the discussion. They will have access to students' commentaries and are strongly encouraged to read through them to get inspired by some discussion prompts. If the discussion lead(s) are using some of the ideas from the students' prompts, it is a nice and good practice to credit the student who came up with that prompt. We all want to be acknowledged! :) To keep the conversation flow going, students can and are encouraged to design some in-class activities. They might decide to break students into small groups so students can discuss among themselves for a few minutes and then inform the class about their conversations. This is just one idea, but it is entirely up to the discussion lead(s) about how the discussion should look like and what in-class activities they would like to use. Above all, the discussion lead(s) are the teachers of the discussion. They are expected to view this teaching time not as a monologue but rather as an active engagement with their class. It is super important to have fun with this role and help students feel comfortable and included in the discussions and activities.

7.2 Discussion Lead Grading

Discussion leads do not have to submit reading commentaries for the session that they are leading, and their reading grade for that session will be thoroughly based on their role as the discussion lead. Below is the criteria that will be used for discussion leads' reading grades:

- **Professional (1 point):** The slides are well-designed and presented (0.25 point). The discussion has an energetic flow, where most (if not all) students are actively engaged in it (0.25 point). The students' submitted commentaries were integrated into the presentation (0.25 point). The raised questions and comments in the discussion reflect a deep understanding of the readings and inspire new insights and perspectives on the readings (0.25 point).
- **Insufficient (0.25 point):** The slides are not thoroughly readable/understandable (-0.25 point). Either no meaningful discussion questions/prompts are raised in the class, or they are not helpful to

help the conversation flow (−0.25 point). The students' submitted commentaries are not integrated into the discussion (−0.25 point).

8 Course Research Projects

Throughout the course, students will work in small groups to conduct a research project on human-computer interaction. Students have the option to choose from a list of project topics, mainly on human-centered security (see Section 8.2). Students are allowed to select any other HCI topic to work on. However, they should discuss their proposals with the instructor at their earliest convenience and by September 12 at the latest. Although not necessary, the project could entail designing a system prototype (e.g., interface, app, plugin), which should then be evaluated through user studies as part of the project. Groups may decide not to design a system and instead conduct empirical research by collecting user data and then conducting appropriate analysis. If the proposed project includes a system design, the user study component of the project will be smaller compared to the projects with no system design. Regardless, all projects should have a user study component, either as its main contribution or a side contribution.

Groups are expected to write a research paper on the project and present it to the class. Prior to the final presentations, groups will give interim presentations, where they will have the opportunity to present their work and get feedback. Students are expected to incorporate the feedback in their final presentation and report. All group members should present in both the interim and final presentations. Students are encouraged to submit their research as a full paper or a poster to human-computer interaction (e.g., ACM CHI, CSCW), security, and privacy (e.g., IEEE S&P, USENIX), or a usable security (e.g., SOUPS) venue. Submitting a full paper to these venues requires additional work beyond the semester. The instructor will mentor students who are interested in continuing with their research projects and submitting them to the appropriate venues.

8.1 Project Timeline and Grading

Below is the tentative timeline for various stages of the project. The percentage of project grade for each item is provided in parentheses, if applicable:

- Setting up a meeting with the instructor to discuss any project proposal that is not included in the recommended list (see Section 8.2) no later than September 12.
- Returning the project preferences form by September 16. Students will then be assigned to a project team by September 17. (5%)
- Submitting a brief project proposal by September 27. (5%)
- Submitting Institutional Review Board (IRB) application by October 8. (Optional: Extra 5 points)
- Submitting a short interim progress report by October 11. (10%)
- Slides (and presentation) for an 8 to 10-minute in-class presentation on the project interim progress by October 15 or October 17, depending on the assigned date of presentation. (20%)
- Slides (and presentation) for a 10 to 15-minute final project presentation by December 3 or December 5, depending on the assigned date of presentation. (20%)
- Submitting the final project paper by December 12. (40%)

8.2 Project Recommendations

Below are a few recommendations on the topic or theme of the research projects. If a theme looks exciting, students should work on defining a concrete research goal/question that they would like to explore in this course:

- Privacy and security concerns/practices in smart homes.
- Privacy and security attitudes/practices of household members toward smart home devices.
- Usability of phishing warnings and users' nudging.
- Privacy and security concerns and practices in the gaming context.
- Dark/manipulative patterns in voice and video interfaces.
- Informing consumers' security and privacy purchase decision-making (e.g., apps, smart devices).
- People's understanding of smart device security and data practices.
- Security and privacy concerns of diverse populations (e.g., immigrants, blind or low-vision individuals) toward health and wellness technologies (e.g., AI-enabled mental health chatbots, remote health monitoring systems).
- Concerns toward smart home devices in remote work settings.
- Concerns toward smart devices in academic settings.
- Harms and privacy risks of social robots for at-risk populations (e.g., senior adults, minors).
- Security and privacy concerns, attitudes, and expectations toward extended reality.
- Shared security and privacy practices and misconceptions on social media during the time of crisis (e.g., the war in Ukraine, demonstrations in Iran).
- Security and privacy concerns and attitudes toward popular categories of apps, including online dating apps, health apps, and educational apps.

9 Course Schedule

The course schedule can be found using this link: <https://tinyurl.com/5e8973b2>. The link to the lecture slides will be posted prior to each session. Any changes to the schedule will be announced to all enrolled students in a timely manner.

10 Class and Collaboration Policies

Students are expected to follow the specified deadlines. However, the instructor will try to be as flexible as possible. Students are expected to let the instructor know if any special accommodations are needed.

Students are allowed to discuss the readings among themselves. However, each student is responsible for writing the reading commentaries by themselves. Any collaboration on the midterm exam is strictly prohibited unless otherwise indicated by the instructor. Students are allowed to collaborate on the research project among their group members only.

11 Academic Integrity

We expect everyone to uphold the Duke Community Standard, which you can find here: <https://integrity.duke.edu/new.html>. The standard is composed of the three following components:

- I will not lie, cheat, or steal in my academic endeavors;
- I will conduct myself honorably in all my endeavors; and
- I will act if the Standard is compromised.

Students should discuss with the instructor if there is any situation where they are not sure how to best comply with the specified components.

12 Inclusivity and Diversity

We are a diverse community, and we should work together to create an inclusive and welcoming environment for all students. We expect each member of this course (e.g., students, instructor, TAs) to make proactive efforts to make sure everyone feels comfortable in all aspects of the course, including class discussions and project participation. If any student ever feels any discomfort for themselves or anybody else in this course, we strongly encourage them to raise their concern with the instructor if they feel comfortable sharing.

Duke University is committed to providing equal access to students with documented disabilities. Students with disabilities may contact the Student Disability Access Office (SDAO) to ensure their access to this course and to the program. There you can engage in a confidential conversation about the process for requesting reasonable accommodations both in the classroom and in clinical settings. Students are encouraged to register with the SDAO as soon as they begin the program. Please note that accommodations are not provided retroactively. More information can be found using the following link: <https://access.duke.edu/>.

13 Course Evaluation

The instructor deeply cares about the students' assessments to improve the class both for the current students, and the future ones. To this end, the instructor will ask students to complete a short survey several times during the semester. The survey will be anonymous, and no identifying information will be collected.

14 Students' Health and Happiness

This course is important, but the students' continued health and happiness are far more valuable. More than anything, the instructor expects students to take care of themselves by learning what works for them. For some of us, that means taking some time from our days for meditation, exercise, or talking to a therapist. The form of self-care is not important as long as we commit to it. The instructor will try their best to be flexible, and will always be available to hear from students.