

CS 889 Experimental Design in HCI

This course explores the design of experiments to answer research questions in human-computer interaction. The focus is not on any one experimental method, but instead to explore the design of experiments based on the specific research question being proposed.

Broadly, the goals of the course are as follows:

1. Students will develop an understanding of human-computer interaction research questions.
2. Students will become comfortable reading and interpreting Human-Computer Interaction papers, ideally any human-computer interaction paper.
3. Students will develop experience with designing and executing quantitative and/or qualitative experiments in Human-Computer Interaction.

To accomplish these goals, the course includes a mix of classroom-based lecture, seminar-style paper discussion, smaller data collection exercises, and a course project.

Course Structure

For pedagogical reasons, the course is organized following an accelerated schedule. This accelerated schedule is necessary as, to do human-computer interaction research, some experience with designing and executing data collection is essential. However, to have time to specify a study, perform data collection, and analyze results, taught background must be presented in an accelerated manner.

The first three weeks of the course present includes 18 hours/six weeks equivalent of lecture material. This material provides students with the necessary background to read papers independently, and to design and execute a human-computer interaction study independently.

Weeks 4 – 6 include student paper presentations (3 X 1.5 hour classes with approximately 30 minutes discussion per paper) and weeks 5 and 6 also include small experiments done as a class (one quantitative and one qualitative).

May - June (alternating weeks of instruction are highlighted, 28.5 hours of instruction):

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| 3 Hours | Course Into, Requirements |
| 3 Hours | Ethics of human subjects research |
| 6 Hours | Quantitative Methods (Slides plus readings) |
| 6 Hours | Qualitative Methods (Slides plus readings) |
| 3 Hours | Approaches to zero contact research. |
| 1.5 Hours | Student paper presentations |
| 1.5 Hours | Student paper presentations |
| 1.5 Hours | Data Analysis (Quantitative) |
| 1.5 Hours | Student paper presentations |
| 1.5 Hours | Data Analysis (Qualitative) |

Alongside instructional components, students will complete projects either individually or in groups of two students. The project will also include in-class presentation time to support peer instruction as follows:

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| Late June, 3 hours | Project Presentations: Research questions and design. |
| Late July, 4.5 hours | Paper Presentations: Results and analysis. |

Resources, slides, videos and readings will be posted on the course website:

<https://cs.uwaterloo.ca/~lank/CS889/s21/index.html>

Typically, the course is conducted in-person as a seminar-style course with Piazza providing support for submission, discussion, and peer learning.

Covid Modifications, Spring 2021

There are multiple modifications as a result of Covid-19 restrictions. First, additional material (+3 hours) is included in the first three weeks of the course, focused on zero-contact HCI research.

Second, due to in-person restrictions, this course is offered on-line. This course is structured in a hybrid manner, including asynchronous instruction (3 weeks), synchronous paper presentations (3 weeks), asynchronous exercise analysis, and synchronous project presentations.

1. Course discussion for assigned readings in weeks 1 - 3 will take place asynchronously on Piazza and is structured to foster asynchronous interaction. At the deadline for readings, students are expected to provide a “*précis*” of approximately five sentences the paper which includes:
 - The research question.
 - A summary of results.
 - Strengths and weaknesses of the paper.

After students post, I will post a video summary of the papers, highlighting issues of experimental design, results, interpretation, etc. Students will then have a 48 hour discussion period where each student is expected to interact on Piazza around papers and others’ observations.

2. Course discussion for student papers will occur synchronously with Piazza as support. The evening before paper discussion, the student responsible for the paper will post a five to seven minute video presentation on the paper. This video can be viewed by other students. Other students will post a synopsis of the paper (as above), which I will leverage to seed discussion. The papers will then be discussed during a synchronous meeting. Discussion groups will be restricted to a maximum of 9 students, and I will conduct multiple discussion groups during weeks 4 – 6 of the term. *Note that enrollment in this course is typically high – it averages over 20 students per term it is offered – so I will conduct three discussion group sessions for weeks 4 – 6, with each student participating in one discussion group.*
3. As with paper presentations, project presentations will combine video presentation and in-person discussion. To foster effective discussion, students will again be divided into multiple groups (estimate two groups) and will only interact within their project presentation group.

Third, all data collection in the course will be completed remotely, and participants in studies will be other students in the class (this is known as piloting, or a pilot study, in HCI). All experimental data collection must be designed such that it can either occur on others’ systems (e.g. via a Javascript web page, via an installable app) or, if a piece of technology is necessary, via zero-contact exchange of disinfected hardware.

Grading

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| Readings and Discussion Participation | 15% |
| Exercise participation | 5% |
| TCP2 Tutorial | 5% |
| Paper presentation and review (individual readings) | 20% |
| Project: Experimental Design | 15% |
| Project: Data Collection and Analysis | 15% |
| Project: Final Write-Up | 25% |

