Advanced Human-Computer Interaction

EECS 255, 4 Units, SPRING 2019
https://www.asarif.com/courses/eecs255/spring2019.html

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Catalog Description

This course explores the theory, design procedure, programming practices, and evaluation methods in Human-Computer Interaction (HCI), with a particular focus on input and interaction techniques. It introduces students to recent developments in the area and provides them with the methods to design, develop, and evaluate existing or novel interactive systems.

Textbooks and Other Required Materials

This course does not use textbooks. Students are expected to study publications and relevant books form a suggested reading list https://www.asarif.com/notes/SuggestedReading.html, particularly:

- S. K. Card, A. Newell, T. P. Moran. 1983. *The Psychology of Human-Computer Interaction*. Lawrence Erlbaum.
- D. Norman. 2013. *The Design of Everyday Things: Revised and Expanded Edition*. Basic Books.
- B. Buxton. 2007. *Sketching User Experiences: Getting the Design Right and the Right Design*. Morgan Kaufmann.
- I. S. MacKenzie. 2013. *Human-Computer Interaction: An Empirical Research Perspective*. Morgan Kaufmann.
- I. S. MacKenzie, K. Tanaka-Ishii. 2007. *Text Entry Systems: Mobility, Accessibility, Universality*. Morgan Kaufmann.

Course Objectives

Primarily, the course covers the following topics.

CO 1. A brief overview of the historical development of major advances in the area.
CO 2. Recent developments and challenges in the area, focusing on input and interaction techniques, tangible and embodied user interactions, mobile interactions, augmented and virtual reality, game user interfaces, and/or interaction techniques for special user groups.
CO 3. Quantitative research methods, including experimental design, quantifying and modeling human and system factors, digital and physical prototyping, and statistical analysis.
CO 4. Research ethics and working with human subjects.
CO 5. Reporting research findings in scientific articles.

Program Learning Outcomes

Graduate Studies in Electrical Engineering and Computer Science (EECS) has established the following program learning outcomes. Graduates of the PhD in EECS:

PLO 1. Are able to identify novel and significant open research questions in electrical engineering and computer science and are able to situate such questions in the contexts of current research literature.
PLO 2. Are able to apply their knowledge of computing, mathematics, science, and engineering to the analysis of technological problems, as well as to the design and implementation of viable solutions to those problems.
PLO 3. Are able to design and conduct experiments and computational simulations for the purpose of evaluating and comparing proposed solutions on the basis of empirical evidence
PLO 4. Possess the characteristics of lifelong learners; they are able to acquire and use new techniques, skills, and engineering and scientific tools for research and development in electrical engineering and computer science, as well as to develop new methods and make new discoveries.
PLO 5. Practice a high standard of professional ethics, including integrity in the conducting and writing of research.
PLO 6. Communicate effectively through oral, visual, and written means, effectively addressing a broad range of technical audiences.

Course Learning Outcomes

Students participating in this course are expected to achieve the following learning outcomes through lectures, guest lectures, readings, and research projects. The ability to:

CLO 1. Apply theory to design and develop useful, efficient, and enjoyable interactive systems (PLO 1, PLO 2).
CLO 2. Evaluate interactive systems using empirical research methods (PLO 3).
CLO 3. Practice a high standard of professional ethics (PLO 5).
CLO 4. Report research findings in scientific articles (PLO 5, PLO 6).

CLO 1, CLO 2 require students to adapt techniques, skills, and research tools to make discoveries that are characteristics of lifelong learners (PLO 4).

Prerequisites by Topic

Strong skills in computer and web programming preferred.

Course Policies

Class participation is required. Late submission is not permitted.

1. **Weekly Inspiration.** Students briefly discuss a recent, relevant project or publication that has inspired them.
2. **Lecture.** The instructor delivers a lecture on a relevant topic.
3. **Paper Discussion.** The class collectively discusses a research paper.
4. **Research Project.** Students works individually on small research projects. Each project must involve the design and development of an input and interaction technique, user study, data evaluation, and a 2-page report.
5. **Lab.** During supervised labs, students receive feedback on their projects and learns how to use research tools. During unsupervised labs, students work independently on their research project.

Academic Dishonesty Statement

1. Each student in this course is expected to abide by the University of California, Merced's Academic Honesty Policy. Any work submitted by a student in this course for academic credit will be the student's own work.
2. Students are encouraged to study together and to discuss information and concepts covered in lecture and the sections with other students. They may give "consulting" help to or receive "consulting" help from such students. However, this permissible cooperation should never involve one student having possession of a copy of all or part of work done by someone else, in the form of an email, an email attachment file, a diskette, or a hard copy. Should copying occur, both the student who copied work from another student and the student who gave material to be copied will both automatically receive a zero for the assignment. Penalty for violation of this Policy can also be extended to include failure of the course and University disciplinary action.
3. During examinations, students must do their own work. Talking or discussion is not permitted in the examinations, nor comparing papers, coping from others, or collaboration in any way. Any collaborative behavior during the examinations will result in failure of the exam and may lead to failure of the course and University disciplinary action.

Student Accessibility Services

University of California, Merced is committed to creating learning environments that are accessible to all. If you anticipate or experience physical or academic barriers based on a disability, please feel welcome to contact me privately so we can discuss options. In addition, please contact Student Accessibility Services (SAS) at (209) 228-6996 or disabilityservices@ucmerced.edu as soon as possible to explore reasonable accommodations. All accommodations must have prior approval from Student Accessibility Services on the basis of appropriate documentation.

If you anticipate or experience barriers due to pregnancy, temporary medical condition, or injury, please feel welcome to contact me so we can discuss options. You are encouraged to contact the Dean of Students for support and resources at (209) 228-3633 or https://studentaffairs.ucmerced.edu/dean-students.

Topics

The course covers some or all of the following topics.

Recent Developments

- Theories
- Input and interaction techniques
- Tangible and embodied user interactions
- Mobile interactions
- Augmented and virtual reality
- User interface for games
- Special user groups, e.g., children, elderly, disabled
- Accessibility research
- Social aspects

Research Methods

- Empirical research methods
- Quantifying human and system factors
- Modeling interaction: descriptive and predictive
- Digital and physical prototyping, fabrication
- Hypothesis testing
- Research ethics
- Working with human subjects, IRB
- Demonstration
- Reporting research findings

Hours

Lecture	Monday & Wednesday	4:30—5:45 PM	**COB2 263**
Lab	Friday	7:30—10:20 PM	**CLSSRM 281**
Office Hours	Friday	3:00—5:00 PM	**SE2 212**

Assessment and Grading Policy

- Class participation 10%
- Weekly inspiration 10%
- Reading 20%
- Project 30% (development 10%, study 10%, data 10%)
- Presentations 20%
- Report (2-page) 10%