



CHI Course: Introduction to HCI

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ABSTRACT

This course introduces the field of human-computer interaction (HCI). In the first unit, we present the characteristics of the field, discussing concepts and goals that distinguish it from other fields. In the second unit, we illustrate how to understand people, conduct user research, describe interaction, distinguish types of user interface, and design, engineer, and evaluate interactive systems. The course is based on an upcoming book (*Introduction to Human-Computer Interaction*) by the authors.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI)**.

KEYWORDS

Human-computer interaction

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1 BENEFITS

Although computing systems can be autonomous, many computer systems are intended to be used by humans and assist them in their activities. Four decades ago, a research field called *human-computer interaction* (HCI) emerged gradually through early efforts in various fields, including psychology, computer science, and sociology. The field of HCI was created based on the realization that computing must be constructed with a serious consideration of its users. Its birth coincided with the revolution of the personal computer, which saw the transition of computers from expensive mainframes kept at universities and corporations into computing technology blended into all areas of people's work, leisure, and daily lives.

Two questions become characteristic of HCI research: *How* should all this computing power be used and *for what*? Around the emergence of the personal computer in the late 1970s, it became clear that we need to design software for end-users and not just for specialists, such as programmers. These and other questions started a search for fundamental answers about the nature of human-computer interaction. Over the years, this expanded to the question that we

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now see driving HCI research: *how can people with vastly different goals and capabilities be able to use computing safely, productively, and enjoyably?* In other words, the goal of HCI is to help create computing for the betterment of humankind.

The course provides an accessible introduction to the field of HCI. HCI is primarily a research-driven field that focuses not only on the scientific principles of interaction, but also on the concrete goal of designing better interactive systems. For this reason, while the starting point in this course is theoretical research that helps us understand the interaction, we do not let design off the hook. The course acknowledges the many challenges that practitioners face, and it elucidates the solution principles that can be used to tackle them.

The first unit of the course reviews how the field has developed its capacity to solve problems. The second unit illuminates some core principles in HCI research through concrete examples. The course summarizes collective insights in the field in a new and accessible way. After the course, newcomers to the field will be better able to understand the different areas of research in HCI, engage with HCI researchers, and enjoy the CHI conference.

2 INTENDED AUDIENCE

The course is primarily aimed at researchers who are entering the field and those who intend to collaborate with HCI researchers and want to get an efficient overview of it. Second, for HCI educators, the course offers an approach to teaching as well as updated materials. Third, practitioners interested in moving into HCI may also find the course valuable.

3 PREREQUISITES

Bachelor's degree in a related area, such as computer science, electrical engineering, design, psychology, or social sciences.

4 CONTENT

The course is based on *Introduction to Human-Computer Interaction*, an upcoming textbook by the authors [1]. The book will come out in open access in the summer of 2023, but the course participants will be provided exclusive access to a preprint.

4.1 Unit 1: Overview of Human-Computer Interaction

This part will give an overview of the central ideas in modern human-computer interaction. Contents are organized around six sub-themes:

Why is HCI Hard? Here we cover reasons from design, psychology, and computer science. We discuss why socio-technical systems are complex.

Human-Computer Interaction as a Field Here we give a brief history of the field. We discuss how its core aims and approaches have developed.

Research in HCI We outline the types of research problems that HCI engages with. We discuss each type with more detailed examples in Unit 2.

The Practice of HCI We outline what HCI practitioners do and the types of knowledge that they draw on. We discuss the relationship between research and practice.

Fundamental Concepts We discuss fundamental commitments in HCI research, including being human-centered and the importance of evaluating the impact of our technologies.

Why HCI Matters Here we cover various arguments for societal and economic importance of HCI, including its return on investment and its impact on the technologies that shape our lives.

After completing this unit, attendees understand the unique characteristics of HCI as a research field. They understand the multidisciplinary nature of HCI research and how its constructive, empirical, and conceptual efforts support each other.

4.2 Unit 2: Insight from Research

After the general introduction of HCI as a field, we review selected cases from published research that illustrate HCI research. The cases are selected to span both classic and more recent research. The cases exemplify the different parts of human-centered design process: Understanding users, User research, Theories of Interaction, User interfaces, Design, Engineering, and Evaluation.

Concrete examples that we aim to cover are as follows.

Working in VR Can people work in virtual reality for an entire workweek? (*Understanding people*)

Social media profiles and dying What are the mechanisms involved, and how do people manage online profiles when users pass away? (*User research*)

AI for accessibility Can we automatically adapt interfaces to suit users with varying needs? (*Interaction*)

Marking menus How can we design interaction techniques that enable a seamless transition from novice to expert behavior? (*User interfaces*)

Menstruation How can we design for the menstruating body and reduce the societal stigma associated with bodily fluids? (*Design*)

Predictive text Is word prediction useful? If so, why is it useful and when? (*Engineering*)

Understanding fitness trackers How can the experience sampling method be used to gain insight into people's use of mobile technology in their everyday lives? (*Evaluation*)

After this unit, attendees understand how HCI's methods can be applied in realistic cases and what their pros and cons are.

4.3 Open Discussion

We conclude with an open discussion about HCI. We discuss the CHI conference and how to make the most of the conference experience.

4.4 Practical work

The course consists of lectures and in-class discussions. Course participants will be asked to read an introductory chapter before taking the course.

5 INSTRUCTOR BACKGROUND

Kasper Hornbæk received his M.Sc. and Ph.D. in Computer Science from the University of Copenhagen, in 1998 and 2002, respectively. Since 2014, he has been a professor of computer science at the University of Copenhagen. His core research interests are human-computer interaction, including usability research, shape-changing interfaces, large displays, body-based user interfaces, and information visualization. He serves on the editorial board of ACM Transactions on Human-Computer Interaction, has served for more than 10 years as an associate chair for CHI, and has reviewed for more than 20 years for the conference. In 2020, he was inducted to the CHI Academy.

Per Ola Kristensson is a Professor of Interactive Systems Engineering in the Department of Engineering at the University of Cambridge and a Fellow of Trinity College, Cambridge. He is a co-founder and co-director of the Centre for Human-Inspired Artificial Intelligence at the University of Cambridge. He is interested in designing intelligent interactive systems that enable people to be more creative, expressive, and satisfied in their daily lives. His PhD thesis was on gesture keyboard technology, which he co-invented together with Dr Shumin Zhai in 2001-2002, and in 2007 he co-founded ShapeWriter, Inc. to commercialize this technology. He is an Associate Editor of ACM Transactions on Computer-Human Interaction and ACM Transactions on Interactive Intelligent Systems and serves as a Technical Program Co-Chair for ACM CHI 2023.

Antti Oulasvirta is Professor of user interfaces at Aalto University where he leads the Interactive AI research programme at the Finnish Center for AI. He was previously a Senior Researcher at the Max Planck Institute for Informatics. He received his doctorate in Cognitive Science from the University of Helsinki in 2006, after which he was a Fulbright Scholar at the School of Information, University of California-Berkeley. He was awarded an ERC Starting Grant (2015-2020) for research on the computational design of user interfaces. Antti has published 51 papers at CHI in the past 20 years.

6 RESOURCES

Course participants will have access to a preprint of the book. The book will be published in open access during Summer 2023 by Oxford University Press. Course slides will be released on the homepage of the book.

7 ACCESSIBILITY

The course materials consist of lecture slides presented on a projector. These slides will use accessibility features (Alt text). Depending on the need, we will ask the conference organization to offer sign language interpretation.

REFERENCES

- [1] Kasper Hornbæk, Per-Ola Kristensson, and Antti Oulasvirta. 2023. *Introduction to Human-computer Interaction*. Oxford University Press.