

Human-Computer Interaction, SCS Concentration

Haiyi Zhu, Undergraduate Director
Email: haiyiz@andrew.cmu.edu

Amelia Baisley, Concentration Manager
Location: Newell-Simon Hall 3526B

Human-Computer Interaction Concentration

This concentration is available to SCS students only.

In this concentration, students learn techniques, processes, principles, and theory of Human-Computer Interaction (HCI). This interdisciplinary field aims at understanding how interactions with digital technologies and services can augment what humans do. It also aims at understanding what design, prototyping, and evaluation processes lead to innovative digital technologies and services that fulfill human needs. The concentration enhances what is learned in the SCS majors by addressing how digital products and services can be designed and evaluated so they benefit individuals, small groups, organizations, larger networks, and societies. It is synergistic with SCS majors in that envisioning, designing, and implementing innovative digital interactions benefit from superior technical skill. The concentration consists of 5 courses (2 required courses and 3 electives).

The concentration helps prepare students for jobs as technically-skilled specialists in design and development of interactive systems. The concentration will give students a broader perspective on how technologies impact humans, which may help them move faster into product management positions. It also lays a foundation for graduate study in the field of Human-Computer Interaction.

Learning Objectives

Students will learn skills and methods for:

- Eliciting and understanding human objectives, preferences, and needs through qualitative and quantitative methods for data collection and analysis
- Generating and imagining possible solutions and design concepts that involve human/technology partnerships
- Basic visual design, including typography, grids, color and the use of images
- Design of interactive systems, experiences, and technologies
- Developing and evaluating interactive prototypes as a way of iteratively refining designs
- Evaluating interactive technologies to assess and improve their functioning through data-driven redesign, including discount and empirical evaluation methods

Students will also learn about:

- Digital technologies, including, possibly, web and mobile platforms, conversational technologies, wearable computing, gadgets, digital fabrication, virtual reality and mixed reality
- Human psychology, regarding individuals, groups, organizations, societies, and cultures, as it relates to interactions with digital products and services

Curriculum

Prerequisites

For this concentration, students should have completed the following courses prior to starting the concentration:

		Units
15-122	Principles of Imperative Computation	12
15-150	Principles of Functional Programming	12

Course Requirements

The following requirements are for students entering Fall 2026.

Students in an SCS major wanting to complete a concentration in HCI must complete 5 courses, namely, 2 required courses and 3 electives.

Required courses (2 courses)

1. Select one from:

		Units
05-391	Designing Human Centered Software	12
05-380	Prototyping Algorithmic Experiences	12
05-431	Software Structures for User Interfaces	12

***Students who completed 05-180 (Introduction to HCI) in spring 2025 or later should register for 05-380 or 05-431.**

2. Select one from:

05-360	Interaction Design Fundamentals	12
05-312	The AI Augmented Designer	12
05-315	Persuasive Design	12
05-317	Design of Artificial Intelligence Products	12
05-362	Transformational Game Design Studio	12
05-418	Design Educational Games	12
05-452	Service Design	12
05-470	Digital Service Innovation	12

Electives (3 courses): at least one technical, at least two 05-xxx classes

1. At least one of the electives must have strong technical content and must be selected from the following list:

05-318	Human AI Interaction	12
05-333	Gadgets, Sensors and Activity Recognition in HCI	12
05-434	Machine Learning in Practice	12
05-499	HCI Special Topics	12
05-839	Interactive Data Science	12
15-464	Technical Animation	12
15-466	Computer Game Programming	12
15-494	Cognitive Robotics: The Future of Robot Toys	12
16-467	Introduction to Human Robot Interaction	12
17-422	Human-AI Interaction using Sensing Systems	12
17-428	Machine Learning and Sensing	12
17-437	Web Application Development	12
17-537	Artificial Intelligence Methods for Social Good	9

Other courses as approved by the concentration director

2. The remaining two electives must be courses in HCI offered by the Human-Computer Interaction Institute, meaning they have an 05 prefix number, or be included in the pre-approved list of electives maintained on the HCI website: <https://hcii.cmu.edu/academics/hci-undergrad/electives>

3. Of the three HCI elective classes, at least two must be 05-xxx courses.

Other courses may be approved as HCI electives on a case-by-case basis by the HCI Undergraduate Director.

Students can apply one semester of a senior thesis or research-based independent study (05-589) in a topic related to this concentration, as approved by the concentration director/advisor, as an elective course for this concentration. This research must have a significant communication component, including a paper or technical report, and a poster presentation. Any research course can count for at most 12 units towards the concentration and can count for at most one elective.

Double Counting

At most 2 courses can be double counted with any major, minor or other concentration being pursued by the student.

Advising and Management

Management will fall on the HCI Undergraduate Director and the HCI Academic Program Manager. The requirements for the courses will be reviewed annually by the HCI Curriculum Committee, in consultation with the URC.

Students in the HCI concentration will be advised by the HCII Undergraduate Director and/or the HCII Academic Program Manager, who also oversee and direct the HCI additional major and the HCI minor.

SCS students interested in this concentration should contact the HCII Academic Program Manager for an initial advising consultation.