Undergraduate Programs in Human-Computer Interaction (HCI)
2nd Major and Minor

Human Computer Interaction Institute
School of Computer Science
Carnegie Mellon University

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Introduction

• HCII has 307 undergraduate students enrolled in:
  – A primary major in HCI, within SCS, started in Fall 2020
  – An interdisciplinary 2nd Major in HCI
  – An interdisciplinary Minor in HCI
  – A concentration in HCI for students within SCS
Educational programs in HCI for undergraduates

HCI 2\textsuperscript{nd} major (interdisciplinary)

– Formal admissions (Spring) with \(~50\%\) admissions rate
– 12 courses, including a final capstone project
– Guaranteed admission to core courses

HCI Minor (interdisciplinary)

– Formal admissions (Spring) with a higher acceptance rate than the HCI 2\textsuperscript{nd} major
– 7 courses
– Guaranteed admission to core courses
The Philosophy of the HCI 2nd Major and Minor

Take excellent students with depth in one discipline relevant to HCI and give the educational opportunity to learn a set of core skills in HCI and to “walk in the shoes” of the other disciplines.

- Help the students become effective members of interdisciplinary teams in industry
- Prepare students for leadership in HCI-related industries
On the Philosophy...

• A second major or minor in HCI will provide students
  – Basic skills for designing and implementing user-centered software
  – Appreciation of the varied skills necessary to make useful, usable & satisfying interactive products
  – Ability to communication with specialists in other areas

• It will **not** make software developers into designers or psychologists into programmers.
• It is not a second degree.
What students like about the HCI 2nd major and HCI minor

• Interdisciplinary
• Project focused
• Flexible

• “Working with people from other disciplines “
• “The interdisciplinary nature. I learned a lot from having courses outside my major and from working with people that have different focii”
• “Courses were project oriented”
• “Applying the skills I learned in classes to research projects”
• “Without this major, I would have never discovered my enjoyment for creatively solving problems with constraints and business needs.”
• “The professors. I was lucky because all of the core classes ... were taught by professors who were well-respected in the field and clearly knew their stuff”
Why study HCI?

- Web services and mobile apps are the hottest start-ups in the world and HCI is in the middle of that
- HCI is the central topic in computing – the best way to build up some computer skills and credibility
- HCI is a good path towards being a project manager
- Agile development to understand user needs helps to create innovative products – in HCI and in business
Other reasons for getting an HCI 2nd Major / Minor

• CMU is the best in the world
• Interesting problems to work on
• Lots of interaction with stakeholders
• Creative expression
• Working on the parts of computers that everyone sees
• Career security, etc.
Hiring Companies in Recent Years

- Amazon
- Apple
- Applied Predictive
- Capital One
- Carnegie Mellon
- Deloitte
- eBay
- Etsy
- Facebook
- Firstborn
- Google
- Hudson River Trading

- Huge
- Idean
- McKinsey & Company
- Microsoft
- Pinterest
- Pricewaterhouse Coopers
- Procore Technologies
- SapientNitro
- Venmo
- WillowTree
- Yext
- Zazzle
Sample Job Titles

- Business Analyst
- Business Technology
- Core Developer
- Design Development
- Designer
- Development Program
- Digital Analyst
- Experience Designer
- Front End Developer
- Front End Engineer
- Full Stack Engineer
- Information Technology
- Interaction Designer
- Product
- Designer
- Software Engineer
- Technical Product Manager
- Technology Consultant
- Usable Privacy and Security Researcher
- User Experience Designer
- UX Designer
- UX Engineer
- UX Researcher
- UX Strategist
What our alumni say

• “My degree turned me into a world-class employee and significantly increased my ability to get a job that maximized my potential.”

• “It was amazing. The most intense period of my life. My colleagues are still close, ten years later.”

• “I learned a lot about UI... enough to start a startup.”
HCI 2nd Major Requirements

4 pre-requisites

3 required courses, 4 electives

1 capstone project course

Cognitive Psychology
85-211 or 85-213
or
Social Psychology
85-241

Interaction Design Studio 1
05-561
(Fall only)

Statistics
36-200 or 36-201 or 36-207
or 36-247 or 36-220 or 36-225 & 226 or 70-207

Introduction to Programming
15-100 or 15-104
or 15-110 or 15-112 or 15-121 or 15-123

Electives
four 9 or 12 unit HCI related courses

Interaction Design Studio 2
05-650
(Spring only)

User-Centered Research and Evaluation
05-410

Interface Programming
05-430 (PUI)

Capstone Project Course
05-571
(Spring of senior year)

This pre-requisite is not needed for Design students.
HCI Second Major
Senior Capstone Project Course Goals

• Apply HCI skills on a semester-long project
• Work in interdisciplinary teams (3-5 people)
• Work with clients

• Integrate skills gathered over the curriculum
• Learn to write reports & give presentations
Mattress Factory: Interactive Archive of Past Installations
Controls for a Semi-Autonomous Orchard Tractor
Playbook Training for Pittsburgh Steelers
The Human-Centered Design Approach

**Phase:**
- UNDERSTAND
- D E S I G N

**Goal:**
- Explore
- Discover
- Generate
- Refine

[Diagram showing phases of design process with divergent and convergent thinking]
The Human-Centered Design Approach

Phase: 
Action: 
Goal: 

UNDERSTAND

COLLECT DATA 
SYNTHESIZE 

IDEATE 
ITERATE 

Explore 
Discover 

Generate 
Refine 

Human-Computer Interaction Institute
Quote by a student about the capstone project

“I had the chance to use HCI methods and understand the basis for them. We had to constantly test and change things based on the very specific needs of our users. Things that seemed so simple to us were like a foreign language to them. It really helped drive the entire point of HCI home to me.”
HCI Minor Requirements

1 pre-requisite

Electives
four 9 or 12 unit
HCI related
courses

Introduction to Programming
15-100 or 15-104
or 15-110 or 15-112 or 15-121 or
15-123

Interaction Design
Overview (IDO)
05-392
(Design majors
may substitute a
05 course.)

Designing Human-
Centered Systems
(DHCS)
05-391
(Design majors
may substitute a
05 course.)

Design students may
substitute an extra elective for
05-391 and one for 05-392.

2 required courses,
4 electives
## Comparison of HCI 2\textsuperscript{nd} Major & Minor

<table>
<thead>
<tr>
<th></th>
<th>BHCI Major</th>
<th>BHCI Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Admission</strong></td>
<td>Application and admissions required</td>
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</tr>
<tr>
<td><strong>Prerequisite</strong></td>
<td>• Freshman-level programming (15-110 or 15-112 or 15-121 or 15-104)</td>
<td>• Freshman-level programming (15-110 or 15-112 or 15-121 or 15-104)</td>
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<tr>
<td></td>
<td>• Statistics (introductory)</td>
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<td></td>
<td>• Cognitive psychology (85-211)</td>
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<tr>
<td></td>
<td>• Interaction Design Studio I (or Communication Design Fundamentals) (05-651)</td>
<td></td>
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<tr>
<td><strong>Core courses</strong></td>
<td>• Interaction Design Studio II (IxDS) (05-650)</td>
<td>• Interaction Design Overview (IxD) 05-392</td>
</tr>
<tr>
<td></td>
<td>• User Centered Research &amp; Evaluation (UCRE) (05-410)</td>
<td>• Designing Human Centered Software (DHCS) 05-391</td>
</tr>
<tr>
<td></td>
<td>• HCI Programming (PUI/SSUI) (05-430 or 05-431)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• BHCI Project (05-571)</td>
<td></td>
</tr>
<tr>
<td><strong>Electives</strong></td>
<td>4 electives</td>
<td>4 electives</td>
</tr>
<tr>
<td><strong>Double counting</strong></td>
<td>2 courses with primary major</td>
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</tbody>
</table>
How can you explore whether HCI is for you?

- Enroll in an elective
- Pick a course you can double count
- Become involved in HCI research (internship or independent study with HCII professor)
- Enroll in one of the core courses (though hard to get in)
  - Designing Human-Centered Systems is a great intro course
- Take 05-300 HCI Undergraduate Pro Seminar (2 units) – many HCII faculty present their work
- For SCS students interested in the HCI Primary Major: 05-120 Introduction to Human-Computer Interaction
# Popular electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>05-589</td>
<td>Independent Study</td>
</tr>
<tr>
<td>05-413</td>
<td>Human Factors</td>
</tr>
<tr>
<td>51-327</td>
<td>Intro to Web Design</td>
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<tr>
<td>05-320</td>
<td>Social Web</td>
</tr>
<tr>
<td>05-833</td>
<td>Gadget, Sensors and Activity Recognition in HCI</td>
</tr>
<tr>
<td>51-385</td>
<td>Designing for Service</td>
</tr>
<tr>
<td>05-899</td>
<td>Design of Educational Games</td>
</tr>
<tr>
<td>70-643</td>
<td>Publishing to the World Wide Web</td>
</tr>
<tr>
<td>15-437</td>
<td>Web Application Development</td>
</tr>
<tr>
<td>15-462</td>
<td>Computer Graphics</td>
</tr>
<tr>
<td>51-328</td>
<td>Advanced Web Design</td>
</tr>
<tr>
<td>70-311</td>
<td>Organizational Behavior</td>
</tr>
<tr>
<td>05-434</td>
<td>Applied Machine Learning</td>
</tr>
<tr>
<td>05-418</td>
<td>Design Educational Games</td>
</tr>
<tr>
<td>05-395</td>
<td>Applications of Cognitive Science</td>
</tr>
<tr>
<td>51-359</td>
<td>Tools for UX Design</td>
</tr>
<tr>
<td>36-309</td>
<td>Experimental Design for Behavioral and Social Sciences</td>
</tr>
<tr>
<td>05-438</td>
<td>Technology and Learning in the 21st Century</td>
</tr>
<tr>
<td>15-390</td>
<td>Entrepreneurship for CS</td>
</tr>
<tr>
<td>05-341</td>
<td>Organizational Communication</td>
</tr>
<tr>
<td>51-831</td>
<td>Methodology of Visualization</td>
</tr>
<tr>
<td>36-202</td>
<td>Introduction to Statistic</td>
</tr>
<tr>
<td>70-415</td>
<td>Introduction to Entrepreneurship</td>
</tr>
<tr>
<td>85-310</td>
<td>Research Methods in Cognitive Psychology</td>
</tr>
</tbody>
</table>
Application Process: HCI 2nd major

– Personal statement
  • Show writing ability & knowledge of the area
  • Highlight HCI experience
  • Relate HCI to personal interest and/or career goals

– Transcript
  • QPA ranges from 3.0 to 4.0, with 3.5 typical

– Schedule for taking courses

– Optional (but helpful): recommendation letter(s), link to online portfolio (include with other materials)

– Admission is limited by enrollment caps on the required courses (acceptance rate ~50%)
Application Process: HCI Minor

– Submit transcript
– Submit schedule for taking courses
– Optional: Link to online Portfolio (include with schedule, e.g., on separate page)
– Admission is limited by enrollment caps on two required courses (acceptance rate has been close to 100% in recent years)
Timeline for Applying to the HCI 2nd Major and Minor (Spring 2022)

- March 4: Applications open
- March 21, 11:59pm: Applications due
- April 11: Notifications of acceptance
- April 18: Fall registration begins
Who can apply?

• Any major can apply
• You do not need to have completed any pre-requisites before you apply
• Typically sophomores apply
• Freshmen may apply, but the bar is higher (due to limited info)
• Juniors may apply if they can complete the program in the time remaining
• Repeat applications are welcome
Applying to both programs

- If you want to be considered for both the 2\textsuperscript{nd} major and the minor (in case you do not get into the 2\textsuperscript{nd} major) you need to apply to both.

- If you apply to the HCI 2\textsuperscript{nd} major only, you will not automatically be considered for the HCI minor if you do not get in. You have to apply to the HCI minor in order to be considered.
Important!!!

• If you want to be considered for both the 2\textsuperscript{nd} major and the minor, apply to both.
HCI Major (School of Computer Science)

- Started fall 2020
- Has 11 enrolled students, and 2 graduates
- One of the first majors in the country in Human-Computer Interaction
- Students admitted to SCS declare their major in their first year
- Students in SCS and in other colleges may transfer to the HCI Major
Graduates - After three semesters!

Mansi Agarwal (S2021)

Tianyou (Sidney) Zhang (F2021)
Philosophy of the HCI Major

- Grow HCI specialists who understand and create innovative interactive services, systems, and applications that serve humans
- Strong grounding in CS and superior technical skill
- Holistic understanding of how digital interactive products and services impact people, groups, societies
- Will enable them to explore new design spaces
Rationale of the HCI Major

• HCI is now its own field
• There is a need for technically accomplished HCI specialists
  – E.g., Human-AI interaction
• Builds on CMU strengths
More Information

Director’s Office
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Questions?