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

Human Computer Interaction Institute
School of Computer Science
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Introduction

• HCII offers a 2nd Major and a Minor in HCI (~ 250 enrolled students)

New!

• A primary major in HCI, within SCS, will start in Fall 2020

• 2nd Major and Minor in HCI remain relevant, important, and vibrant
• Let’s focus on the interdisciplinary HCI 2nd Major and HCI Minor first
• We’ll come back to the new HCI Major within SCS
Educational programs in HCI for undergraduates

**HCI 2\textsuperscript{nd} major (interdisciplinary)**
- Formal admissions (Spring) with \(\sim\)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...

- Undergrad education 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 BHCI programs

- 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
**HCI 2nd Major Requirements**

**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

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**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)

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4 pre-requisites

3 required courses, 4 electives

1 capstone project course

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
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

<table>
<thead>
<tr>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction to Programming</strong></td>
</tr>
<tr>
<td>15-100 or 15-104 or 15-110 or 15-112 or 15-121 or 15-123</td>
</tr>
</tbody>
</table>

2 required courses, 4 electives

<table>
<thead>
<tr>
<th>Electives</th>
</tr>
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<tbody>
<tr>
<td>four 9 or 12 unit HCI related courses</td>
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</table>

<table>
<thead>
<tr>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interaction Design Overview (IDO)</strong></td>
</tr>
<tr>
<td>05-392</td>
</tr>
</tbody>
</table>

(Design majors may substitute a 05 course.)

<table>
<thead>
<tr>
<th>Required Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Designing Human-Centered Systems (DHCS)</strong></td>
</tr>
<tr>
<td>05-391</td>
</tr>
</tbody>
</table>

(Design majors may substitute a 05 course.)
## Comparison of HCI Major & Minor

<table>
<thead>
<tr>
<th></th>
<th>BHCI Major</th>
<th>BHCI Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission</td>
<td>Application and admissions required</td>
<td>Application and admissions required</td>
</tr>
<tr>
<td>Prerequisite</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>
</tr>
<tr>
<td></td>
<td>- Statistics (introductory)</td>
<td></td>
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<tr>
<td></td>
<td>- Cognitive psychology (85-211)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Interaction Design Studio I (or Communication Design Fundamentals) (05-651)</td>
<td></td>
</tr>
<tr>
<td>Core courses</td>
<td>- Interaction Design Studio II (IxDS) (05-650)</td>
<td>- Interaction Design Overview (IxDO) 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>Electives</td>
<td>4 electives</td>
<td>4 electives</td>
</tr>
<tr>
<td>Double counting</td>
<td>2 courses with primary major</td>
<td>2 courses with primary major</td>
</tr>
</tbody>
</table>
How can you explore whether HCI is for you?

- Enroll in one of the core courses
  - Designing Human-Centered Systems is a great intro course
- Enroll in an elective
- Pick a course you can double count
- Become involved in HCI research (internship or independent study with HCII professor)
Popular electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<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>
</tr>
<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

– Submit statement
  • Show writing ability & knowledge of the area

– Submit transcript
  • GPA is probably the most important factor
  • GPA ranges from 3.0 to 4.0, with 3.5 typical

– Submit schedule for taking courses

– Optional: recommendation letter, portfolio

– Very small numbers of freshmen accepted

– Timeline
  • March 10: Applications open
  • March 22, Midnight: Applications due
  • April 8: Notifications of acceptance
  • April 20: Fall registration begins
Application Process: HCI Minor

- Submit transcript
- Submit schedule for taking courses
- Optional: Portfolio
- Admissions is limited by enrollment caps on the two required courses
- Timeline
  - March 10: Applications open
  - March 22, Midnight: Applications due
  - April 8: Notifications of acceptance
  - April 20: Fall registration begins
Who can apply?

• Any major can apply
• You do not need to have the pre-requisites completed before you apply
• Typically sophomores apply
  – Small numbers of freshmen with very high GPA
  – Upperclassman if they can complete the major in time remaining
• And now, back to the HCI Primary Major
Educational programs in HCI for undergraduates (2)

HCI Major (School of Computer Science)

• Starting this fall
• One of the first majors in the country in Human-Computer Interaction
• Students admitted to SCS declare their major in their first year
• Students already at the university would need to satisfy transfer requirements
Philosophy

• 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

- HCI is now its own field
- There is a need for technically accomplished HCI specialists
  - E.g., Human-AI interaction
- Builds on CMU strengths
Proposed SCS Major in Human-Computer Interaction (HCI)

- **Computer Science Core**
  - 5 Courses

- **Math & Statistics**
  - 4 Courses

- **HCI Capstone Project**
  - 1 Course
  - Industry partnerships drive challenges for interdisciplinary teams.

- **HCI Core**
  - 6 Courses
  - Research & Evaluation,
    - Ideation & Design,
    - Prototyping & Implementation,
    - Psychology

- **HCI Electives**
  - 4 Courses
  - Technical, Design, other

- **Free Electives**
  - 4 Courses

- **Science & Engineering**
  - 4 Courses
  - Optional Additional Minor

- **Humanities & Arts**
  - 7 Courses
  - Optional Research Track
    - Includes Senior Thesis

Human-Computer Interaction Institute
Comparison with the Secondary Major in HCI

**Second Major in HCI**

**Prerequisites (4 courses)**
- Introductory programming
- Interaction Design Studio 1
- Statistics (introductory)
- Cognitive psychology

**Core (3 courses)**
- User Centered Research
- Interaction Design Studio 2
- HCI Programming

**Electives (4 courses)**

**Capstone Project (1 course)**

**Primary Major in HCI**

All these requirements, plus
- Additional required course in Service Design (so 3 required design courses instead of 2)
- Stronger stats requirement: 1 or 2 intermediate stats courses instead of 1 basic course
- More technically-demanding HCI programming course (technology-rich prototyping)
- Additional requirements in CS, Mathematics and Statistics
- Free Electives
- And so forth
## Comparison with CS Major

<table>
<thead>
<tr>
<th>HCI Major</th>
<th>CS Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS Core (5 courses + immigration course)</td>
<td>Computer Science (7 courses + immigration course)</td>
</tr>
<tr>
<td>Mathematics and Statistics (4 courses)</td>
<td>Mathematics/Probability (4 courses)</td>
</tr>
<tr>
<td>HCI Core (6 courses)</td>
<td></td>
</tr>
<tr>
<td>HCI Electives (4 courses)</td>
<td>CS Electives (6 courses)</td>
</tr>
<tr>
<td>HCI Capstone Project (1 course)</td>
<td></td>
</tr>
<tr>
<td>Science and Engineering (4 courses)</td>
<td>Engineering and Natural Sciences (4 courses)</td>
</tr>
<tr>
<td>Humanities and Arts (7 courses)</td>
<td>Humanities and Arts (7 courses)</td>
</tr>
<tr>
<td>Free Electives (4 courses; could be used for optional Research Track or optional minor)</td>
<td>Free Electives (? courses)</td>
</tr>
<tr>
<td>Computing @ Carnegie Mellon (3 units)</td>
<td>Computing @ Carnegie Mellon (3 units)</td>
</tr>
<tr>
<td>Communication Skills in HCI Capstone Project course</td>
<td>Technical Communications Course</td>
</tr>
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More Information

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