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

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Human-Computer Interaction Institute

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 2nd 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 2nd 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
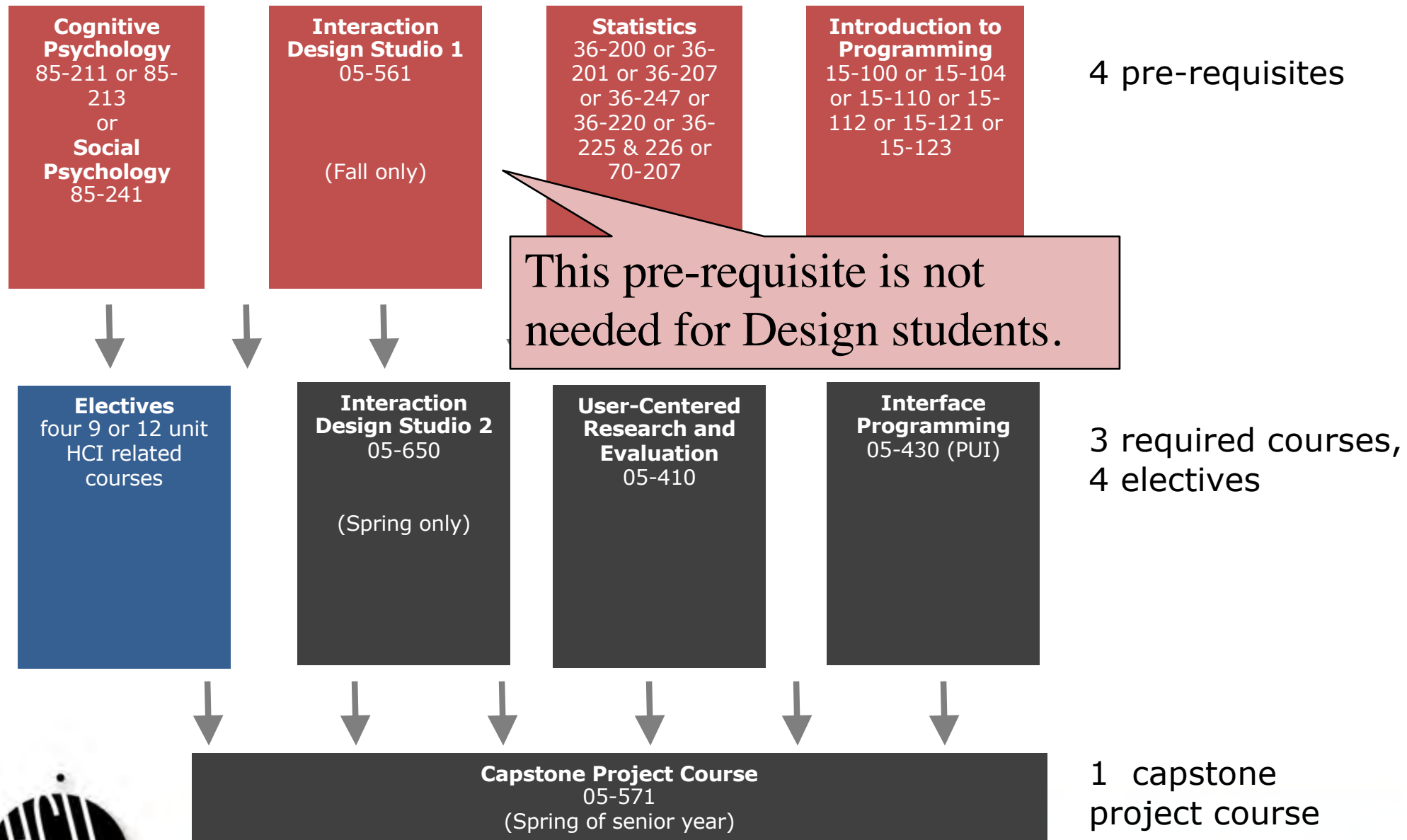- Venmo
- WillowTree
- Yext
- Zazzle

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 | 4 pre-requisites |

This pre-requisite is not needed for Design students.

| 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) | 3 required courses, 4 electives |

| Capstone Project Course 05-571 (Spring of senior year) | 1 capstone project course |

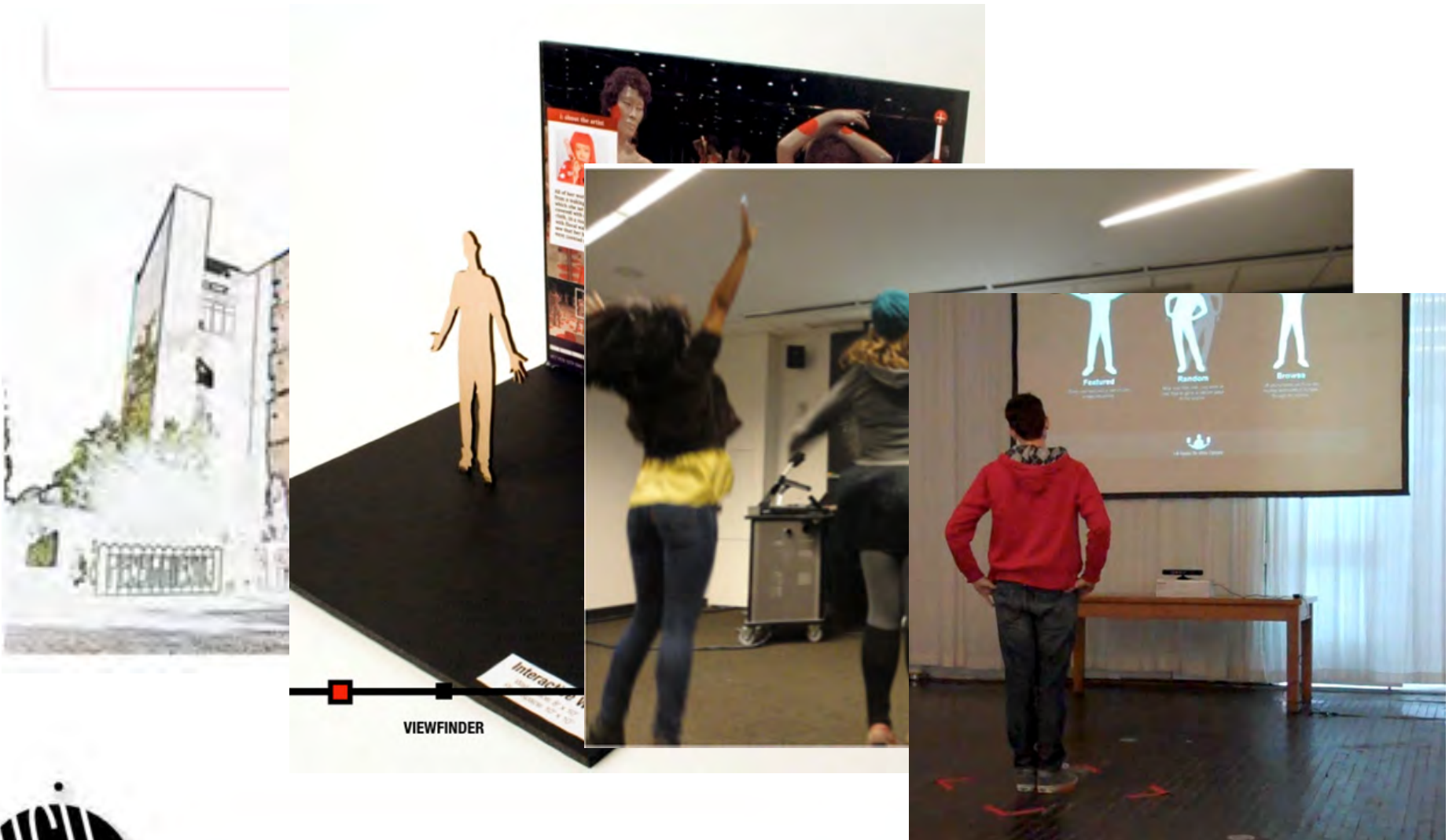Human-Computer Interaction Institute

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
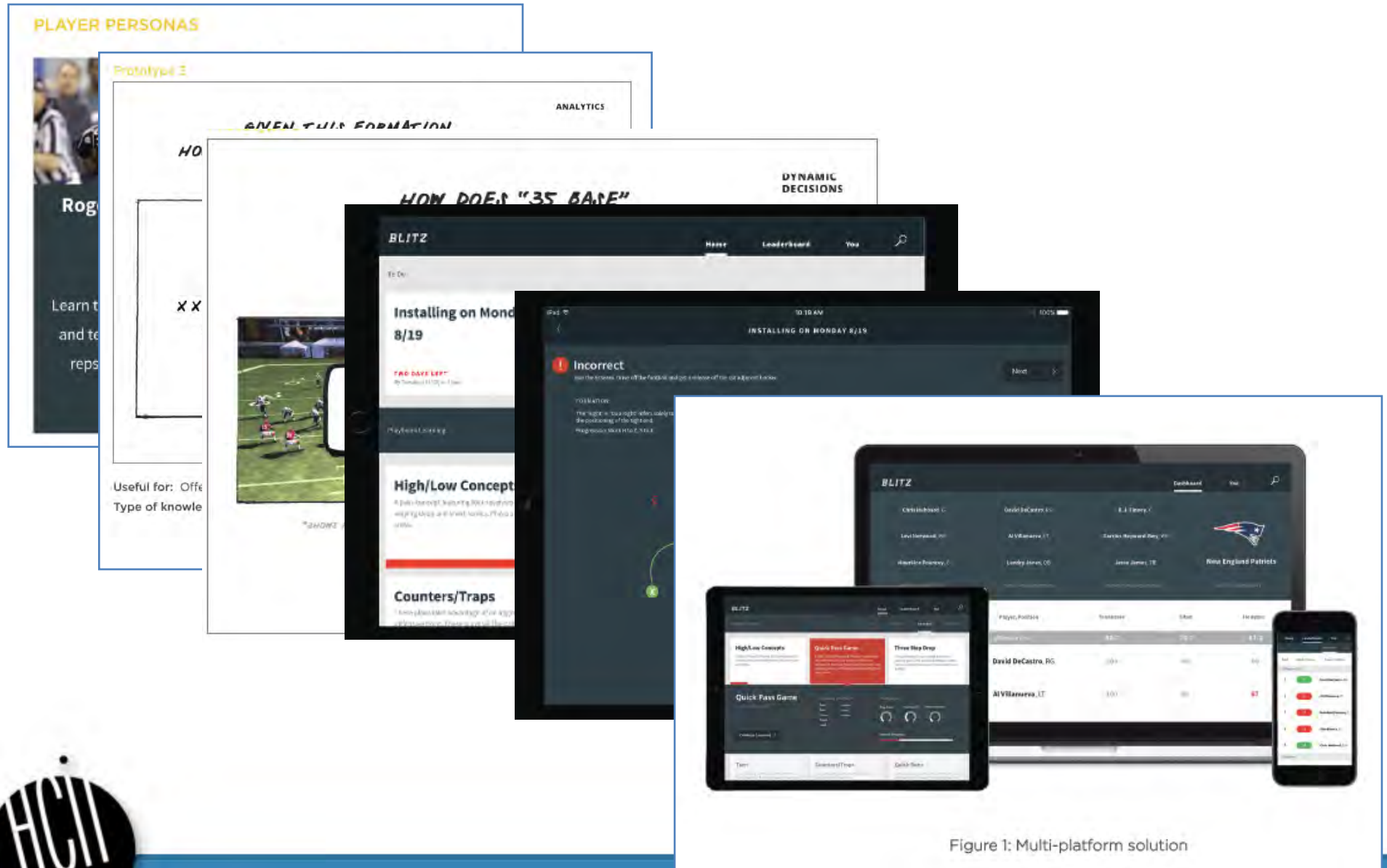
Playbook Training for Pittsburgh Steelers
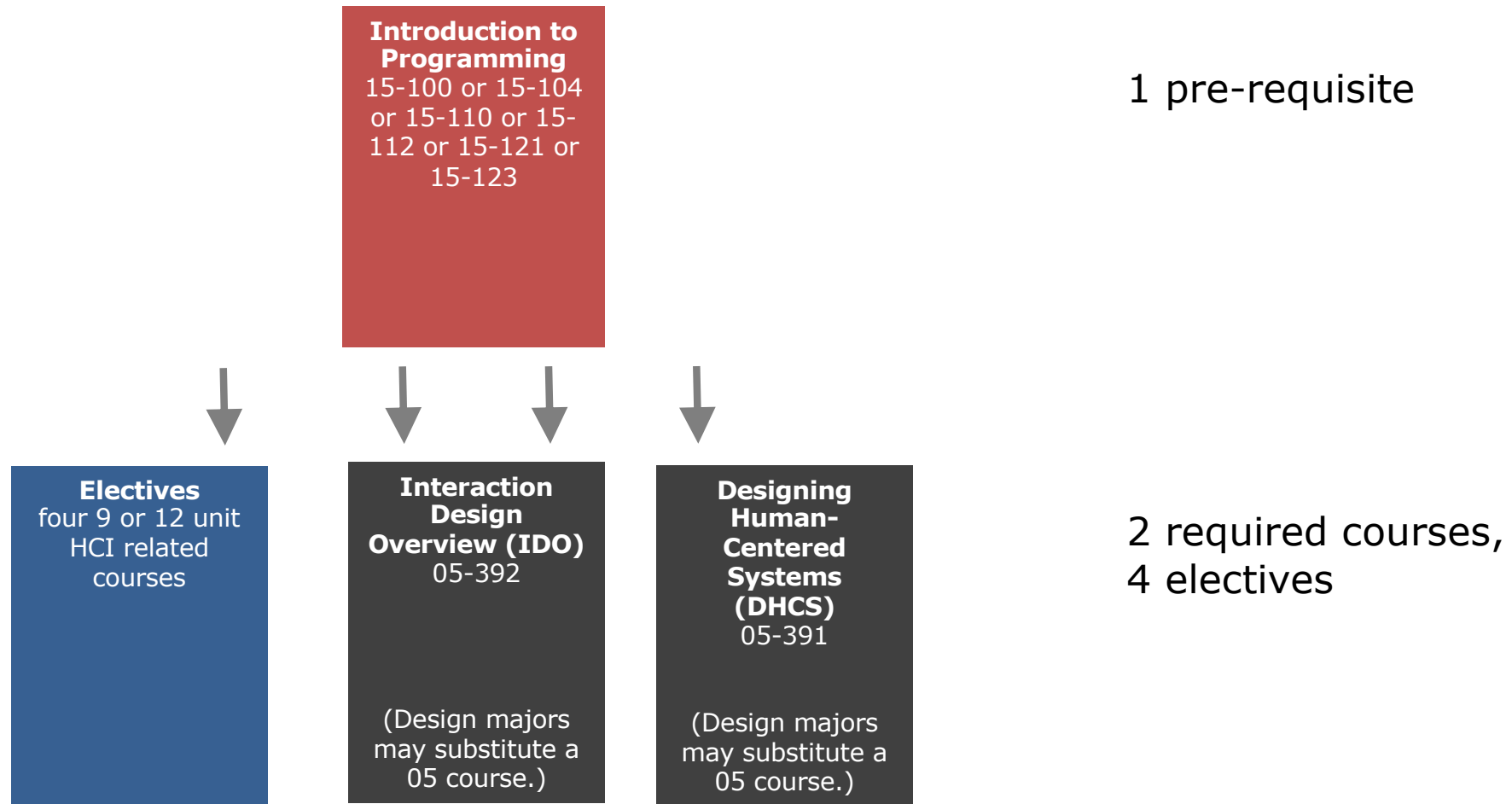

Figure 1: Multi-platform solution

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

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

1 pre-requisite

Electives
four 9 or 12 unit HCI related courses

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.)

2 required courses, 4 electives

Comparison of HCI Major & Minor

	BHCI Major	BHCI Minor
Admission	Application and admissions required	Application and admissions required
Prerequisite	• Freshman-level programming (15-110 or 15-112 or 15-121 or 15-104) • Statistics (introductory) • Cognitive psychology (85-211) • Interaction Design Studio I (or Communication Design Fundamentals) (05-651)	• Freshman-level programming (15-110 or 15-112 or 15-121 or 15-104)
Core courses	• Interaction Design Studio II (IxDS) (05-650) • User Centered Research & Evaluation (UCRE) (05-410) • HCI Programming (PUI/SSUI) (05-430 or 05-431) • BHCI Project (05-571)	• Interaction Design Overview (IxDO) 05-392 • Designing Human Centered Software (DHCS) 05-391
Electives	4 electives	4 electives
Double counting	2 courses with primary major	2 courses with primary major

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

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

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

New!

- And now, back to the HCI Primary Major

Educational programs in HCI for undergraduates (2)

New!

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
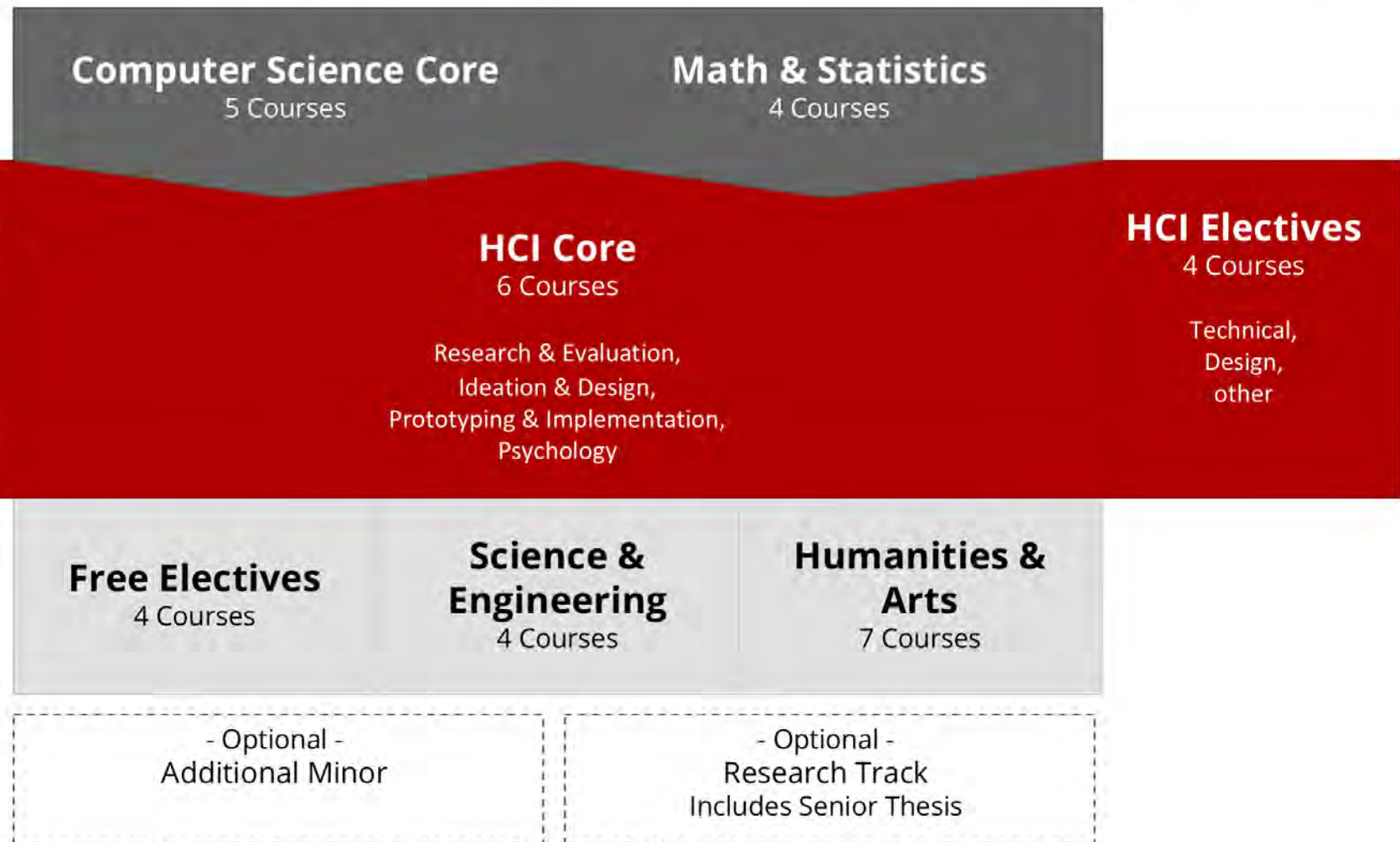- Will enable them to explore new design spaces

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

Humanities & Arts
7 Courses

- Optional -
Additional Minor

- Optional -
Research Track
Includes Senior Thesis

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

HCI Major	CS Major
CS Core (5 courses + immigration course)	Computer Science (7 courses + immigration course)
Mathematics and Statistics (4 courses)	Mathematics/Probability (4 courses)
HCI Core (6 courses)	
HCI Electives (4 courses)	CS Electives (6 courses)
HCI Capstone Project (1 course)	
Science and Engineering (4 courses)	Engineering and Natural Sciences (4 courses)
Humanities and Arts (7 courses)	Humanities and Arts (7 courses)
Free Electives (4 courses; could be used for optional Research Track or optional minor)	Free Electives (? courses)
	Required Minor / Concentration (4-6 courses)
Computing @ Carnegie Mellon (3 units)	Computing @ Carnegie Mellon (3 units)
Communication Skills in HCI Capstone Project course	Technical Communications Course

More Information

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