



Course Number: CAP 4104
Course Name: Human-Computer Interaction
Credits: 3

Course Prerequisites

COP 3337 – Programming II

Official Catalog Course Description

HCI foundations, user-centered interaction design, prototyping and programming interactive systems, qualitative and quantitative evaluation techniques, designing multimodal interfaces.

Course Outcomes

Upon successful completion of this course, students will be able to:

1. Apply the principles of human-computer interaction including usability and user experience goals, design guidelines and heuristics, to the design of digital interfaces. [Apply]
2. **Apply** principles of human cognition to create effective interaction designs for digital user interfaces. [Apply]
3. **Describe** the human-centered design lifecycle process in the context of human-computer interaction. [Understand]

4. **Discuss** user interface paradigms (e.g. socially intelligent interactive agents, social robots, and virtual reality systems). [Understand]
5. **Analyze** user requirements, based on collected data, to discover user needs. [Analyze]
6. **Develop** system requirements and user interface designs utilizing a data driven approach based on user needs. [Create]
7. **Design** a prototype for user interfaces. [Create]
8. **Evaluate** user interfaces using feedback collected from end-users. [Evaluate]
9. **Conduct** a small-scale heuristic usability study to collect user data for the purpose of critiquing the usability of a software product. [Apply]

Textbook and Course Materials

Required Textbook

Sharp, H., Rogers, Y., & Preece, J.

Interaction Design: Beyond Human–Computer Interaction (6th Edition).

Wiley, 2023.

ISBN: 978-1119901099

Faculty can override the default

Curriculum: Topics and Required Readings

Topic	CLO(s)	Cred. Hrs	Lec. Hrs
Foundations of HCI & Usability Principles	1, 3	0.24	3.0
Human Cognition, Perception, Memory & Mental Models	2	0.32	4.0
Human-Centered Design Lifecycle	3	0.32	4.0
UX Goals, Design Guidelines & Heuristics	1, 9	0.36	4.5
User Research Methods & Data Collection	5	0.40	5.0
Requirements Analysis & Data-Driven Design	5, 6	0.36	4.5
Prototyping (Low- and High-Fidelity)	6, 7	0.40	5.0
Usability Testing & End-User Evaluation	8	0.24	3.0
Heuristic Evaluation & Small-Scale Usability Studies	9	0.20	2.5
Emerging Interface Paradigms (AI agents, VR, Social Robotics)	4	0.16	2.0
Total		3.00	37.5

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Goals, Objectives, and Student Expectations

Students are expected to attend the class regularly and submit the assignments by their given due dates and take the exams in a timely manner.

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Weekly schedule

- Week 1:** Introduction to HCI and usability
- Week 2:** Human-centered design lifecycle
- Week 3:** Human cognition and perception
- Week 4:** Mental models and interaction design
- Week 5:** Usability and UX goals
- Week 6:** Design heuristics and accessibility
- Week 7:** User research methods
- Week 8:** User requirements analysis
- Week 9:** Data-driven design techniques
- Week 10:** Low-fidelity prototyping
- Week 11:** High-fidelity prototyping tools
- Week 12:** Usability testing methods
- Week 13:** Heuristic evaluation and critique
- Week 14:** Emerging interface paradigms
- Week 15:** Project presentations
- Week 16:** Final evaluation and reflection

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Student Evaluation Practices

Required by the University

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Grading Weights

Assessment Component	Weight (%)
Assignments / Homework	25
Design & Prototyping Project	30
Usability Evaluation Study	20
Quizzes	10
Final Presentation / Report	15

Assessment Component	Weight (%)
Total	100

Grading Scale

Letter Grade	Numeric Range
A	93 – 100
A-	90 – 92.99
B+	87 – 89.99
B	83 – 86.99
B-	80 – 82.99
C+	77 – 79.99
C	70 – 76.99
D	60 – 69.99
F	Below 60

Policy for Make-Up Work

Required by the University

Faculty can override the default

Attendance Standards

Required by the University if the faculty enforces attendance

Faculty can override the default and choose to omit this section from their syllabus if they do not require attendance

Academic Integrity and GenAI

Recommended, but not required, by the University

Faculty can override the default and choose to omit this section from their syllabus

Supplementary Material

This section can include any material the developer sees as useful to an instructor teaching the course for the first time.

Sample Assignments and Rubrics

Assessment Methods by Topic

Other Helpful Materials

This section will be kept private and faculty can choose which (if any) resources they wish to use in their section(s)

Assessment Assignments and Rubrics

Assignment Title: AI-Assisted Interface Evaluation and Redesign

Assignment Description

Students will conduct a usability evaluation of an existing digital interface (web or mobile) using **human-computer interaction principles** and **heuristic evaluation techniques**. Students are expected to **intentionally leverage Generative AI (GenAI) tools** to support parts of their workflow (e.g., heuristic identification, usability issue brainstorming, redesign ideation), while maintaining full responsibility for **analysis, judgment, and final design decisions**.

Students must document **how, when, and why** GenAI tools were used and critically reflect on their usefulness and limitations.

Learning Outcomes Assessed

- CLO 1: Apply usability and UX principles
- CLO 5: Analyze user requirements based on data
- CLO 7: Design and evaluate a user interface
- CLO 8: Conduct a heuristic usability study

Student Tasks

1. **Interface Selection**
Select an existing interface with sufficient interaction complexity.
2. **Heuristic Evaluation (with GenAI Support)**
 - Apply established usability heuristics to identify usability issues.
 - GenAI may be used to *suggest* potential heuristic violations.
 - Students must validate, revise, or reject AI-generated suggestions.
3. **Data Analysis and Prioritization**
Analyze identified issues and prioritize them based on severity and user impact.
4. **Redesign Proposal**
Create a revised interface design (wireframes or prototype) addressing the most critical issues. GenAI may assist with ideation, but final designs must reflect student reasoning.
5. **Reflection on GenAI Usage**
Submit a short reflection describing:
 - Which GenAI tools were used
 - How they influenced the workflow
 - Their strengths, limitations, and potential biases

Rubric: AI-Assisted Interface Evaluation and Redesign

Criterion	Excellent (A)	Satisfactory (B–C)	Needs Improvement (D–F)
Heuristic Evaluation Quality	Correctly identifies and justifies usability issues using appropriate heuristics; clear evidence of critical judgment beyond AI output	Identifies usability issues with partial justification; limited critical filtering of AI suggestions	Heuristics misapplied or largely copied from AI without validation
Use of GenAI Tools	GenAI use is intentional, transparent, and clearly supports (not replaces) analysis; prompts and outputs are critically assessed	GenAI use is documented but reflection lacks depth or critical evaluation	GenAI use is undocumented, uncritical, or substitutes for original thinking

Criterion	Excellent (A)	Satisfactory (B–C)	Needs Improvement (D–F)
Data Analysis & Prioritization	Issues are well-prioritized based on user impact and usability principles	Some prioritization present, but rationale is incomplete or superficial	Little or no prioritization; decisions appear arbitrary or AI-driven
Redesign Quality	Redesign directly addresses identified issues and demonstrates strong HCI reasoning	Redesign addresses some issues but lacks coherence or depth	Redesign weakly connected to evaluation or usability principles
Reflection on AI Limitations	Insightful discussion of GenAI strengths, limitations, and bias	Basic reflection with limited critical insight	Reflection missing or purely descriptive
Communication & Presentation	Clear, professional, and well-structured report and visuals	Understandable but inconsistently organized	Unclear, incomplete, or poorly presented