

COMP 3020 – Human-Computer Interaction 1

Course Description

Calendar entry

Human-computer interaction: human factors and usability, user-centered design, prototyping, usability evaluation. Prerequisite: COMP 2150 or ECE 3740. A course in cognitive psychology, such as PSYC 2480 or PSYC 2481, is recommended.

General Course Description

This course introduces human-centered considerations, approaches, methods and techniques for the design and evaluation of interactive technologies. Students who complete this course will be able to describe the importance and phases of user-centered design. They will also be familiar with a suite of methods and techniques that they can apply to the design, prototyping and evaluation of interactive technologies.

Detailed Prerequisites

Before entering this course, a student should be able to:

- Write moderately complex programs; this requires “programming maturity” corresponding to a 3rd-year level.
- Write interactive programs (i.e., programs that elicit input from users and respond accordingly).
- Craft written reports in English.

Course Goals

By the end of this course, students will:

- Apply principles of the User-Centered Design process.
- Identify important usability and user experience goals for interactive systems.
- Identify categories of users and requirements for an interactive system.
- Apply important principles for design, on-screen layout, and navigation.
- Apply basics of human vision, attention, memory, and cognition in relation to the use and design of interactive technologies.
- Contrast a range of user-centered data collection techniques for informing the design and refinement of interactive technologies.
- Generate structured representations of users and their tasks (e.g., via user profiles, scenarios, and task decompositions).

- Compare and apply a variety of prototyping techniques.
- Be aware of important implementation concerns for interactive systems (e.g., choice of architecture, event handling and computational layout techniques).
- Contrast a range of evaluation approaches and specific methods.
- Conduct evaluations on interactive systems.
- Describe common principles of universal usability.
- Apply course concepts in the context of a multi-stage group project.

Learning Outcomes

Principles of User-Centered Design

Students should be able to:

1. Describe the importance of user-centered design.
2. Provide examples of the impacts of poor design.
3. Describe factors that make design challenging (e.g., Designer's fallacy).
4. Identify the different phases of the UCD cycle.
5. Explain the iterative nature of design and evaluation.

Usability and User Experience Goals

Students should be able to:

1. Describe and contrast important usability and user experience goals.
2. Critique a system in terms of supporting key usability and user experience goals.

Users and Requirements

Students should be able to:

1. Describe categories of users that should be considered in design.
2. Provide examples of different categories of users within the context of a particular interactive system.
3. Describe different categories of design-centric requirements for an interactive system.
4. Formulate design-centric requirements for a particular interactive system.

Informing Design via Data Collection and Structured Representations

Students should be able to:

1. Describe, compare, and contrast a variety of methods for collecting data to inform design, e.g., using the IDEO terminology of Look, Ask and Try.

2. Create structured representations of users and their tasks through techniques such as user profiles, scenarios, and task decompositions.
3. Apply data collection and representation methods in the context of a particular design task.

Prototyping

Students should be able to:

1. Describe the role of prototyping in the context of developing interactive technologies.
2. Compare and contrast low- and high-fidelity prototyping.
3. Compare and contrast vertical and horizontal prototyping.
4. Apply a range of prototyping techniques in the context of a particular design task.

Human Abilities

Students should be able to:

1. Describe characteristics of the human visual system and attention as they relate to working with interactive technologies.
2. Describe characteristics of how humans visually group items and recognize patterns, e.g., according to the Gestalt principles.
3. Describe characteristics of human memory as they relate to working with interactive technologies.
4. Describe characteristics of human cognition as they relate to working with interactive technologies.
5. Apply their knowledge of human vision, attention, memory, and cognition to interface design challenges.

Design Principles, Layout and Navigation

Students should be able to:

1. Describe and apply a set of standard research based HCI design principles and heuristics that contribute towards effective interactive technologies.
2. Describe potential trade-offs amongst different design principles.
3. Describe and apply principles of supporting user navigation in interactive systems.
4. Describe and apply common techniques for effective visual layout.

Software Engineering for Interactive Technologies

Students should be able to:

1. Describe the objective and components of the Model-View-Controller architecture.
2. Describe the mechanisms of event handling in interactive technologies.
3. Describe and contrast different high-level algorithms and approaches for computational layout.
4. Implement simple interfaces in a modern API.

Evaluation

Students should be able to:

1. Describe common evaluation goals and the role of evaluation in the UCD process.
2. Describe important high-level evaluation considerations.
3. Describe and apply one or more analytical evaluation techniques.
4. Describe the components of a usability test and formulate a usability test for a given interactive technology.
5. Describe the components of an experiment.
6. Compare and contrast the different evaluation methods covered.

Universal Usability

Students should be able to:

1. Describe several different ways that technologies can exclude different user groups.
2. Provide examples of universal design, including instances where a design or technology for a minority group ultimately benefitted a majority group.
3. Describe the difference between equity and equality.
4. Be aware of resources that can be used to help create more accessible technologies.