August 20, 2021

Syllabus

CS 5317: Graduate Human-Computer Interaction

Fall 2021

Mondays and Wednesday 1:30 - 2:50 in Liberal Arts, Room 319

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Office Hours: Tuesdays 2:30 - 3:30, Wednesdays 3:50 – 4:50, and by appointment

Course Objectives

Acquire the knowledge and skills needed to create highly usable software systems.
Prepare to contribute to the advancement of Human-Computer Interaction theory and practice.

Main Topics Human Perception, Ergonomics, Cognition, and Psychology
Task Analysis
User Interface Design
Interface Programming
System Evaluation

Format Lectures, student presentations, discussions, in-class design exercises, lab time, project activities, project presentations, etc.

Textbook *Designing the User Interface, 6th Edition.* Ben Shneiderman, Catherine Plaisant, *et al*., Addison Wesley, 2017. We will be skipping back and forth in the book as we follow the topics listed above.

This will be supplemented by readings handed out in class. Some other good books to own are listed at the course website.

Course Website: http://www.cs.utep.edu/nigel/hci/

Format Lectures, student presentations, discussions, in-class design exercises, lab time, project activities, project presentations, possible guest speakers

Materials Bring the textbook to class, also unlined paper and pens or pencils of different thickness, darknesses or colors for sketches and designs.

Assignments There will be a number of structured assignments, designed to reinforce knowledge and hone skills. Most assignments will be done in teams. Writing quality is important, and rework may be required if not up to standard. Graduate students will have two additional assignments.

Assignments will be generally due at 1:31, in hardcopy. For group assignments, only one submission is needed, making sure that all team member names are listed. Late assignments

will receive at most 90% credit, less when the solution has been discussed in class, decreasing by 10% per day late. Feedback on group assignments will generally be visible only to the submitter, so he/she will need to communicate them to the rest of the group.

Cooperation among students and among teams is encouraged, but not to the extent that it interferes with each individual's understanding or with learning-by-doing. Help given to and received from other students and sources should be noted in the assignment write-up.

Grading

assignments (~75 points)
project (~75)
midterms and final exam (~150)
participation and quizzes (~50)
total (~350)

Grading will be on a points-earned basis (points above zero), rather than a points-off basis (points below expectation), and everything will be challenging. Letter grades will be assigned appropriately; in the past, the A/B break has been around 80% and the B/C break around 70%.

Tests Tests will be be closed-book, except that one page of hand-written notes may be used for the first test, two for the second test, and three for the final. If you leave the room for any reason, your test will be graded on only what you did up until that time. No make-up exams or assignments will be given except under the conditions set forth in the Catalog.

Participation Participation credit will be based on participation in discussions, groupwork, etc.

Communication If you have general questions, questions about assignments, etc., please ask in class or during office hours. Email is also an option, but please note that I process these in batch and respond only two or three times a day. Do not expect responses on weekends; please plan ahead.

UTEP-General Information

Academic Integrity Students will follow the spirit and letter of the UTEP Standards of Student Conduct and Academic Integrity policy https://www.utep.edu/student-affairs/osccr/student-conduct/academic-integrity.html . Suspected violations will be reported.

Disabilities If you have or suspect a disability and need accommodation please contact CASS at 747-5148 or at cass@utep.edu or visit Room 106 Union East Building.

Important Dates

August 23: Class begins
September 6: Labor Day
September 27: Test 1 (tentative)
November 1: Test 2 (tentative)
December 8: Final Exam, 4:00 - 6:45

Schedule

A. Course Overview (Chapter 1) (1 day)

1. Why Design for Usability?
2. Historical Perspective: machinery, computers, PCs and GUIs, the Web
3. Possible Futures

Assignment A: Analyze a Usability Problem (1hr)

B. Observing Users (Sections 5.3 ~ 5.7) (2 days)

1. Time and Motion Studies
2. GOMS Keystroke-Level Modeling
3. Working with Users: Mindset and Methods
4. Subject-Running Techniques
5. Usability Studies

Assignment D: A Time-and-Motion study of GUI Use (2hr)
Assignment E: Observe Users with a GUI; Presentation (4hr)

C. Usability Analysis (Chapter 3, Section 5.2) (2 days)

1. Error Handling, Error Prevention (3.4.2)
2. Cognitive Walkthroughs (3.3.4, 5.2)
3. Heuristic Evaluation
4. Usability Guidelines
5. Choosing Among Usability Methods

Exercise F: Evaluate the GUI Again (2hr)

D. Task Analysis, User-Centered Design (Sections 4.4 - 4.8, 5.1, 5.6, Chapter 6) (3 days)

1. Systems Analysis
2. Techniques: Task Decomposition, CARD, Ethnographic Observation
3. Allocation of Functions; (3.3.6)
4. Usability Engineering in the Business Context

Exercise J: Sketch People-Icons (.5 hr)
Exercise K: Task Decomposition (1.5 hr)
Exercise I: Ethnographic Observation (1 hr)
Inclass Exercise: Allocation of Functions (1 hr)

Test 1

E. Interaction Styles, Higher Cognition (Chapters 3, 7, 9) (2 days)

1. Metaphor (in-class exercise)
2. Direct Manipulation
3. Widget Survey
4. Other Interaction Styles
5. Choosing Among Interaction Styles

Exercise Q: The Unix Command Line (1.5 hr)

F. Specifying and Prototyping (Sections 4.1-4.3) (2 days)

1. Low-Fidelity Prototyping
2. Transition Diagrams
3. Visual Basic Prototyping

Exercise H: Propose a Better GUI; Presentation (2hr)
Inclass Exercise ZZ: Widget Behavior Specification

G. Human Perception, Information Presentation, Layout (Chapters 8, 12, 16) (3 days)

1. Perception, gestalt perception, typography
2. Color
3. Graphic design
4. Displays, Paper, and other Output Devices (10.4, 8.3)
5. Forms Design
6. Information Visualization

Exercise B3: Information Visualization (2 hr)

Test 2

H. Interface Implementation (c.f. Chapters 2, 13) (3 days)

1. Events and Handlers
2. The Model-View-Controller Design Pattern
3. Responsiveness Issues, Time-scales and the Illusion of Multi-Tasking

Exercise L2: GUI Implementation: Visual Basic (2 hrs)
Exercise Theta: Events and Handlers (4 hrs)

I. **The Human Body and Device Design** (Chapter 10) (3 days)

1. Input Devices and Ergonomics (2.2)
2. Virtual Reality (7.5-7.6)

J. Topics (Chapters 11, 14; Afterword) (3 days)

Web, Mobile, Speech and Multimodal, Groupware, Games, etc.

Research Paper Presentations

K. Review (2.4.1) (1 day)

Exercise Y: A Question for the Final Exam (1 hr)

Project Presentations

(The above time estimates for the exercises are for an efficient person, working with a well-organized team)

Target Learning Outcomes

Level 3 (Outcomes in which the student can apply the material in new situations. This is the highest level of mastery.) Upon successful completion of this course, students will be able to …

Evaluation

3a1. Evaluate user interfaces and detect usability problems by doing usability studies (observations) with human subjects

3a2. Visualize/simulate how a user would understand and attempt to use an interface using an analytical method such as the cognitive walkthrough

3a3. Find likely usability issues quickly using heuristic evaluation

3a4. Communicate usability findings and concerns both in writing and orally

Analysis

3b1. Break down a complex activity sequence into its component actions using hierarchical task decomposition

3b2. Assign functions appropriately to the human and to the machine

3b3. Break down a graphical user interface (GUI) activity sequence into the component actions, identify these actions, and use the GOMS keystroke-level model to estimate the time required

Interface Design

3c1. Choose an appropriate interaction style for a given need (GUI, command-line, natural language, etc.)

3c2. Choose appropriate widgets for a GUI

3c3. Come up with a suitable layout of widgets and display elements for a GUI window

3c4. Convey a proposed design with a low-fidelity prototype

3c5. Develop high-fidelity prototypes using at least one development tool

Implementation

3d1. Be able to implement simple widget-based GUIs both for desktop applications and for the Web

3d2. Be able to write handlers for user input events in at least one language

3d3. Be able to use simple 2D graphics in at least one language

Level 2 (Outcomes in which the student can apply the material in familiar situations, e.g., can work a problem of familiar structure with minor changes in the details.) Upon successful completion of this course, students will be able to …

2a. Decompose a complex interactive system into simpler components, using appropriate design patterns including client-server and model-view-controller

2b. Convey a software design with diagrams and words

2c. Select and combine appropriate colors, fonts, and layouts for a specific information-presentation need

2d. Develop a suitable organization and navigation scheme for a moderate-sized Website

2e. Select an appropriate hardware input device, for a given task and user population, from among various text entry, pointing and drawing devices

2f. Select an appropriate hardware output device for a given task and user population

2g. Perform a comprehensive task analysis, including ethnographic observation and use case development, for a single-user task of moderate complexity

Level 1 (Outcomes in which the student has been exposed to the terms and concepts at a basic level and can supply basic definitions. The material has been presented only at a superficial level.) Upon successful completion of this course, students will be able to …

1a. Explain how interface design is ultimately dependent on human perception and cognition

1b. Explain the role of well-designed, usable interfaces in market success, reliability, and accessibility

1c. Explain the roles of HCI professionals and practitioners of related disciplines in the workplace

1d. Explain the role of systems software, distributed systems design, and GUI program efficiency in achieving acceptable system response times

1e. Explain how much trust can be placed in the various types of knowledge that HCI practitioners commonly deal with, for example facts established by controlled experiments, theoretical models such as Fitts' Law, guidelines, analysis methods, heuristics, and hunches

1f. Specify the desired behavior of an interface or interface component with a state-transition diagram