

Tentative Syllabus

CS 4317: Human-Computer Interaction

Fall 2022

4:30 - 5:50, Tuesdays and Thursdays, Business 332

Instructor: Nigel Ward
Office: CCS 3.0408
Phone: 747-6827
E-mail: nigel@utep.edu
Office Hours: Wed 2:30 – 3:30, Fri 1:30 – 2:30, or by appointment,
and generally whenever the door is open

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/>

Assignments There will be a number of structured assignments, designed to give experience with various usability engineering activities. Most assignments will be done in teams. Assignments will be collected at the start of class with a one minute grace period. Late assignments will be accepted at the end of class or before or after any subsequent class session, and will be penalized at least 10% per day or partial day of lateness, for up to five days. Depending on the circumstances the penalty may be higher, for example, if an assignment is received after the solution has been discussed. Assignments are to be handed in as hardcopy unless otherwise specified. Writing quality is important, and rework may be required if not up to standard.

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.

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

Grading Approximate weighting:
assignments 45%
tests 25%
final exam 20%
quizzes and participation 10%

To achieve these weights, a point on an assignment will typically be worth 1.1 to 1.3 times as much as a point on a test. Assignments and tests will be challenging; as a result no one will ever feel completely satisfied with their achievements, but this is the nature of HCI. Grading will be on a points-earned basis (points above zero), rather than a points-off basis (points below expectation). Letter grades will be assigned accordingly; in the past, the A/B break has been around 80% and the B/C break around 70%. Grading of design projects unavoidably involves subjective judgments, but these will not be a major influence on the overall grade.

Conduct, etc. Students are expected to be punctual, and to 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> .
If you have or suspect a disability and need accommodation you should contact CASS at 747-5148 or at cass@utep.edu or visit Room 106 Union East Building.

Tests will be closed-book, except that one page of hand-written notes may be brought in for the first test, two for the second test, and three for the final. If you leave the classroom 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. Students are free to attend class or not, bearing in mind that absence may annoy other students, interfere with learning, and result in a lower grade.

Important Dates

August 23: Class begins
September 22: Test 1 (tentative)
October 27: Test 2 (tentative)
November 24: Thanksgiving
December 2: Dead Day
?: Final Exam,

Schedule

- A. Course Overview** (Chapter 1) (1 day)
1. Why Design for Usability?
 2. Historical Perspective: machinery, computers, GUIs, the Web, mobile
 3. Possible Futures

Assignment A: Analyze a Usability Problem (1hr)

B. 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 B: Graphic Design

Exercise B3: Information Visualization (2 hr)

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

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

Exercise O2: Module Design (1 hr)

D. Time and Motion

1. Time and Motion Studies
2. GOMS Keystroke-Level Modeling

Assignment D: Time-and-Motion study of GUI Use (2hr)

E. Higher Cognition, Design Patterns (Chapters 3, 7, 9) (2 days)

1. Metaphor and Mental Models
2. Direct Manipulation
3. Product Postures
3. Widget Survey
4. Other Interaction Styles
5. Choosing Among Interaction Styles

Exercise Q: The Unix Command Line (1.5 hr)

Test 1

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

1. Working with Users: Mindset and Methods
2. Usability Studies

Assignment E: Observe Users with a GUI; Presentation (4hr)

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

1. Error Handling, Error Prevention (3.3.5)
2. Cognitive Walkthroughs (3.4.2)
3. Heuristic Evaluation (3.3.4, 5.2)
4. Usability Guidelines
5. Choosing Among Usability Methods

Exercise F: Reevaluate the GUI (2hr)

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

1. Systems Analysis, Task Decomposition, CARD
2. 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)

Exercise X: Allocation of Functions (1 hr)

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

1. Low-Fidelity Prototyping
2. Transition Diagrams
3. High-Fidelity Prototyping

Exercise H: Propose a Better GUI; Presentation (2hr)

Exercise G: Usability in the Business Context

Exercise ZZ: Widget Behavior Specification

Exercise M1: Conceptual Design

Test 2

J. 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 T2: Events and Handlers (4 hrs)

K. Topics (Chapters 11, 14, 15; Afterword) (3 days)

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

L. Review (Section 2.4.1) (1 day)

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

(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