

Tentative Syllabus

CS 4317: Human-Computer Interaction

Fall 2009

Monday & Wednesday, 3:00—4:20, Computer Science room 322

Instructor: Nigel Ward
Office: Comp 206
Phone: 747-6827
E-mail: nigel@utep.edu
Office Hours: Wednesday 10:30-11:30, Friday 1:30-2:30, whenever my door is open, or by appointment

Course Objective

Acquire the knowledge and skills needed to create highly usable software systems.

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

Types of Applications Covered

Information Presentation
Graphical User Interfaces
The Web
Mobile Devices
Groupware
Spoken Language Interfaces and Multi-Modal Interaction

Format Primarily lectures, but also in-class design exercises, lab time, project presentations and discussions.

Textbook *Designing the User Interface, 5th Edition*. Ben Shneiderman and Catherine Plaisant. Addison Wesley, 2010 (hereunder “sp”). 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. You will also need a book with coverage of Swing (Java’s GUI toolkit) to refer to. 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 due at the start of class will be collected after a one minute grace period; late assignments will receive at most two-thirds credit. Assignments are to be handed in as hardcopy unless

otherwise specified. Writing quality is important, and rework may be required if it is 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 and received from other students and sources should be noted in the assignment write-up.

Grading Approximate weighting:
 assignments 40%
 final 20%
 tests 25%
 quizzes 10%
 participation 5%

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 quiz or 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, as always, students will follow the UTEP Standards of Conduct, available at <http://studentaffairs.utep.edu/Default.aspx?tabid=4386>. And, as always, if you have or suspect a disability and need accommodations you should contact the Disabled Student Services Office (DSSO) at 747-5148 or at dss@utep.edu or visit Room 106 Union East Building.

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

Labor Day	September 7
Test 1	September 28
Test 2	October 28
Final Exam	December 7, 1:00-2:45

Tentative Schedule

Part I Introduction

1. Course Overview

1. Why Design for Usability? (sp1.1-1.3, 10.6s)
 2. Historical Perspective: machinery, the PC, the GUI, the Web
 3. Possible Futures
- Assignment A: Analyze a Usability Problem (1hr)*

Aug 24

Part II Foundations

2. Human Perception and Information Presentation

1. Perception, gestalt perception, typography (sp 11.7)
2. Color (in-class exercise)

Aug 26, 31, Sep 2

3. Graphic design (in-class exercise; hand-outs)
 4. Forms Design (sp 1.4)
 5. Displays, Paper, and other Output Devices (sp 8.5, 12.3)
 6. Virtual Reality (sp 5.5-5.6)
 7. Information Visualization (sp Ch 14)
- Exercise B: Static Information Presentation (1.5hr)*

3. The Human Body and Device Design Sep 9, 14

1. Input Devices and Ergonomics (sp 8.1-8.3)
Guest Lecture, Dr. Pennathur
 2. Hypothesis Testing and Statistical Significance (sp 4.7)
- Exercise D: A Time-and-Motion study of Mousing (2hr)*

4. Low-Level Human Cognition Sep 16

1. Time-scales and the Illusion of Multi-Tasking
 2. GOMS Modeling (keystroke level) (in-class exercise)
Case Study: correcting speech recognition errors
- (sp 1.4.2 cognitive abilities, sp 10.1-10.5 QoS; Raskin handout)

5. Higher Cognition and Interaction Styles Sep 21, 23

1. Metaphor (in-class exercise)
 2. Direct Manipulation (sp 5.1-5.4)
 3. Command Languages (sp 2.4.3, Ch. 7)
 4. Anthropomorphic Agents (sp 11.3, Appendix A3)
 5. Other Interaction Styles
 6. Choosing Among Interaction Styles (sp 2.3.1-2.3.3)
- Exercise Q: The Unix Shell*

Test 1 Sep 28

Part III Usability Engineering

6. Observing Users Sep 30, Oct 5

1. Mindset
 2. Subject-Running Techniques (sp 4.3-4.7)
- Exercise E: Observe Users with a GUI; Presentation (4hr)*

7. Usability Analysis Oct 7, 12

1. Error Handling, Error Prevention (sp 2.3.5, 11.2)
 2. Cognitive Walkthroughs (in-class exercise, sp 2.4.2)
 3. Heuristic Evaluation (sp 4.1-4.2)
 4. Usability Guidelines (sp 2.1-2.2)
 5. Choosing Among Usability Methods
- Exercise F: Evaluate the GUI again (2hr)*

8. Specifying and Prototyping Oct 14, 19, 21

1. Transition Diagrams
 2. Low-Fidelity Prototyping (sp 3.3.4)
 3. Visual Basic Prototyping
- Exercise H: Propose a Better GUI; Presentation (2hr)*
Exercise I: Prototyping in VisualBasic (3hr)

9. Task Analysis and User-centered Design (2 days) Oct 26, Nov 2

1. Systems Analysis (sp 1.5.3, 2.4.4, Ch 3 (esp 3.4, 3.5, 3.7), 3.2.6)
Case Studies: taking notes in class, other

- 2. Usability Engineering in the Business Context
- Exercise J: Sketch People-Icons (.5 hr)*
- Exercise K: Task Analysis (1.5 hr)*
- Exercise X: Allocation of Functions (1 hr)*
- Exercise G: Examine a Usability Consultancy (1.5 hr)*

Test 2 **Oct 28**

Part IV: User Interface Programming

10. Interface Design and Programming **Nov 4, 9, 11**

- 1. Widget Survey (sp 6.1-6.6)
- 2. Forms (sp 6.7)
- 3. Interface Design Patterns (sp 11.4, 11.6)
- 4. Development Tools (sp 3.3.3)
- 5. Events and Handlers, MVC (Sierra and Bates Chapter 12, Olsen)
- 6. Responsiveness Issues
- Exercise L: Event Handling (2 hrs)*
- Exercise M: Brief Requirements Analysis and GUI Design (2 hrs)*
- Exercise N: Implementation (4 hrs)*

11. Web Usability **Nov 16, 18, 23**

- 1. Content Analysis
- 2. Organizing Information Across Pages
Information Architecture (in-class exercise)
- 3. Supporting Navigation
- 5. Browser and Device (In)Dependence
- 6. Assigning Functions to Client and Server
- 7. Search (sp Ch. 13)
- (sp 11.5; McCracken & Wolfe 105-120, Appendix)
- Exercise P: HTML and CSS / Build a Personal Home Page (1.5 hrs)*
- Exercise R: Site Analysis (1 hr)*
- Exercise S: Navigation and Layout (2 hrs)*
- Exercise T: Javascript (2 hrs)*

Part V: Special Application Areas

12. Small-Screen Devices **Nov 25**

- Telephones, iPods, Handheld Games
- Pen Computing, Wearables, Digital Jewelry, Ubiquitous Computing
- (sp 8.5.4)
- Exercise U: Examine the Interface of a Mobile Device (2hr)*

13. Spoken Dialog Systems **ditto**

- Strengths and Weakness of Speech
- Interpersonal Interaction, Social Cognition and the Media Equation
- (sp 6.8, 8.4)
- Exercise V: Examine a Spoken Language Interface (1 hr)*

14. Groupware **Nov 30**

- (sp Chapter 9)

15. Games **ditto**

- (sp 5.2.5)

16. Training, Learning, and Help
User Interface Documentation etc.
(sp 12.1-3, 12.4-12.8)

ditto

17. Accessibility)
(sp1.4)

ditto

Part VI: Review

18. Review (2 days)
(sp 2.4.1)
Exercise Y: A Question for the Final Exam (1 hr)

Dec 2

(Note that the above time estimates for the exercises are for an efficient person working with a well organized team)
(A suffix of “s” on a reading means that that chapter or section need only be skimmed)

Target Learning Outcomes

Level 3: Synthesis and Evaluation

(Level 3 outcomes are those 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

- a. Explain and apply various approaches to designing user interfaces, such as guidelines, user observation, task analysis, user-participatory design, scenario development, and prototyping
- b. Design and evaluate graphical user interfaces in Web and stand-alone applications, including appropriate choice of interaction styles and widgets, information presentation, error prevention, error message design, display design, and use of color

Level 2: Application and Analysis

(Level 2 outcomes are those 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

- a. Explain and apply various approaches to evaluating a user interface, such as heuristic evaluation, cognitive walkthrough, GOMS analysis, usability testing, survey, and controlled experimentation
- b. Use software tools such as specification methods, interface-building tools, and evaluation tools
- c. Apply basic principles of human perception and ergonomics to the design of user interfaces, such as response-time models and Fitts' Law
- d. Select an appropriate hardware interface device (from among various keyboards, keypads, pointing and drawing devices, screen types and sizes, etc.) for a given interface task and user population
- e. Select appropriate interaction styles and interfaces (distant and co-located, synchronous and asynchronous) to support a given human collaboration need

Level 1: Knowledge and Comprehension

(Level 1 outcomes are those 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

- a. Explain the role of well-designed, usable interfaces in market success, reliability, and accessibility
- b. Explain the use of guidelines, design principles, and theoretical models in designing user interfaces
- c. Explain the roles of HCI professionals and practitioners of related disciplines in the workplace
- d. Explain the role of systems software in achieving acceptable system response times
- e. Explain how interface design is ultimately dependent on human perception and cognition
- f. Explain the advantages and disadvantages of graphical user interfaces, command language interfaces, and spoken dialog interfaces