September 2, 2016

Revised Syllabus

CS 4317: Human-Computer Interaction

Fall 2016

Tuesday & Thursday, 9:00 - 10:20, CCSB 1.0202

Instructor: Nigel Ward
Office: CCS 3.0408
Phone: 747-6827
E-mail nigel@utep.edu

Office Hours: Wednesdays 2:30-3:30, or by appointment, and generally whenever the door is open

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 Lectures, discussion, in-class design exercises, lab time, project presentations, etc.

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 to 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 to follow the spirit and letter of the UTEP Standards of Student Conduct http://admin.utep.edu/Default.aspx?tabid=73922.
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
October 27: Test 2
November 24: Thanksgiving holiday
December 6: Final Exam, 10:00-12:45

Schedule

Part I Introduction

1. Course Overview (1 day)

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)

Part II Foundations

2. Human Perception and Information Presentation (3 days)

1. Perception, gestalt perception, typography
2. Color (sp 11.7, in-class exercise)
3. Graphic design (sp 11.4, in-class exercise; hand-outs)
4. Displays, Paper, and other Output Devices (sp 8.5, 12.3)
5. Information Visualization (sp Ch 14)

Exercise B: Static Information Presentation (1.5hr)

3. The Human Body and Device Design (3 days)

1. Input Devices and Ergonomics (sp 8.1-8.3)
2. Virtual Reality (sp 5.5-5.6)

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

4. Low-Level Human Cognition (1 day)

1. Time-scales and the Illusion of Multi-Tasking (sp 1.4.2, sp 10.1-10.5)
2. GOMS Keystroke-Level Modeling (in-class exercise)
3. Hypothesis Testing and Statistical Significance (sp 4.7)

5. Higher Cognition and Interaction Styles (2 days)

1. Metaphor (in-class exercise)
2. Direct Manipulation (sp 5.1-5.4)
3. Widget Survey (sp 6.1-6.6)
4. Command Languages (sp 2.4.3, 7.1-7.3)
5. Other Interaction Styles
6. Choosing Among Interaction Styles (sp 2.3.1-2.3.3)

Exercise Q: The Unix Command Line (1.5 hr)

Test 1

Part III Usability Engineering

6. Observing Users (2 days)

1. Mindset
2. Subject-Running Techniques (sp 4.3-4.7)
3. Usability Studies

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

7. Usability Analysis (2 days)

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 3.3.4, 4.1-4.2)
4. Usability Guidelines (sp 3.3.2, 2.1-2.2)
5. Choosing Among Usability Methods

Exercise F: Evaluate the GUI Again (2hr)

8. Specifying and Prototyping (2 days)

1. Low-Fidelity Prototyping (sp 4.3.4)
2. Transition Diagrams
3. Visual Basic Prototyping

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

9. Task Analysis and User-centered Design (2 days) (3 days)

1. Systems Analysis (sp 1.5.3, 2.4.4, Ch 3 (esp 3.4, 3.5, 3.7))

2. Techniques: Task Decomposition, CARD, Ethnographic Observation
3. Allocation of Functions (sp2.3.6)
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)
Exercise G: Examine a Usability Consultancy (1.5 hr)

Test 2

Part IV: User Interface Programming

10. Interface Design and Programming (3 days)

1. Forms Design (sp 6.7)
2. Interface Design Patterns (sp11.4, 11.6)
3. Development Tools (sp 3.3.3)
4. Events and Handlers, MVC (Sierra and Bates Chapter 12, Olsen)
5. Responsiveness Issues

Exercise M: GUI Design (2 hrs)
Exercise L1: GUI Architecture (2 hrs)
Exercise L2: GUI Implementation (5 hours)

11. Web Usability (3 days)

1. Content Analysis
2. Information Architecture (in-class exercises)
3. Supporting Navigation
4. Implementation: html, CSS, Javascript
5. Browser and Device (In)Dependence
6. Assigning Functions to Client and Server
(sp 11.5; McCracken & Wolfe Appendix)

Exercises R and S: Website Analysis and Design (3 hr)
Exercise T: Javascript (2 hrs)

Part V: Special Application Areas (1 day)

12. Small-Screen/Mobile Devices
13. Groupware (sp Chapter 9
14. Spoken Dialog Systems
15. Games (sp 5.2.5)
Exercise V: Case Studies at the Frontiers

Part VI: Review

16. Review
(sp 2.4.1) (1 day)
Exercise Y: A Question for the Final Exam (1 hr)
Exercise Z: Evaluate the Course

(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 (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