

USC VITERBI SCHOOL OF ENGINEERING INFORMATICS PROGRAM

INF 555: User Interface Design, Implementation and Testing

Pedro Szekely

Fall Semester 2014

Course Meets Tuesday/Thursday 1:30 p.m. – 2:50 p.m.

Course Meets in RTH 100

pszekely@isi.edu

Teaching Assistant: TBD

Office: TBD

Office Hours: TBD

Contact Info: TBD

IT Help:

Hours of Service:

Contact Info:

Professor's Office Hours

Wednesday 1:30 p.m. to 4:30 p.m. in RTH 205. Other hours by appointment only. Students are advised to make appointments with the professor ahead of time and be specific with the subject matter to be discussed. Students should also be prepared for their appointment by bringing all applicable materials and information.

Catalogue Description

Understand and apply user interface theory and techniques to design, build and test responsive applications that run on mobile devices and/or desktops.

Expanded Course Description

One of the cornerstones of analytics is presenting the data to customers in a usable fashion. When considering the design of systems that will perform data analytic functions, the interface for the user is of utmost importance, as it allows for more efficient and effective processing, leading to faster and more accurate results. A quality interface will combine functionality and graphical elements in a fashion that will support current and evolving user needs. Because many fields will employ analysts who are not engineers or technologists, they will heavily rely on the user interface to back-end functions to perform their work. Therefore, it is important for engineers to understand the principles of user interfaces, and for analysts to be able to articulate needs and environmental opportunities/challenges, so as to foster the best tools possible.

In this course, students will apply the theory and techniques in a semester-long group project where they design, build and test a responsive application that runs on mobile devices and desktops.

Learning Objectives

Students will learn:

- the theory and practice of creating effective user interfaces for modern devices ranging from mobile phones to large screen displays.
- to design guidelines for effective human computer interaction and the cognitive science theory that support the guidelines.
- usability testing techniques to inform the design process and implementation techniques for building responsive user interfaces that adapt to different devices.
- to work in groups.

Textbooks

All books, papers or reports will be available to students in one of three ways: 1) in the USC bookstore; 2) via a CD that the instructor will provide at the beginning of class; and/or 3) via the web.

The course will use four textbooks, each focusing on a specific part of the course: theory (Johnson), design guidelines (Cooper), usability testing (Krug) and implementation of responsive designs (Kadlec).

Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules, by Jeff Johnson. ISBN: 978-0123750303.

About Face 3: The Essentials of Interaction Design, by Alan Cooper , Robert Reimann and David Cronin. ISBN: 978-0470084113.

Rocket Surgery Made Easy: The Do-It-Yourself Guide to Finding and Fixing Usability Problems, by Steve Krug. ISBN: 978-0321657299.

Implementing Responsive Design: Building Sites For An Anywhere, Everywhere Web (Voices That Matter), by Tim Kadlec. ASIN: B008QZI012.

Optional Readings

Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition), by Ben Shneiderman, Catherine Plaisant , Maxine and Steven Jacobs. ISBN: 978-0321537355.

The Design of Everyday Things, by Donald A. Norman. ISBN: 978-0465067107.

Usability Testing Essentials: Ready, Set...Test by Carol M. Barnum. ISBN: 978-0123750921.

Don't Make Me Think: A Common Sense Approach to Web Usability, 2nd Edition by Steve Krug. ISBN: 978-0321344755.

Evaluation

Quizzes:	20%
Homeworks:	15%
Final exam:	20%
Class project:	45%
Total	100%

Note: An incompletes grade will be granted only under the conditions called out in the student handbook, *SCAMPUS*, which is available online, <http://scampus.usc.edu>.

Quizzes

There will be a quiz every week at the beginning of the first lecture of the week. The quiz will be 10 minutes and consist of two parts:

1. Questions testing understanding of the material from the previous week.
2. Fundamental questions about the readings for the class of the quiz. Students who perform the required reading should not struggle with the questions.

Quizzes will start on week 2 and run through week 13. The worst quiz will not count towards the grade. There will be no make-ups or rescheduling for any reason (this is why one quiz does not count).

Homeworks

Homework will be assigned in weeks 2 through 7. Homeworks are entirely individual and students have one week to complete it. The instructor will not accept late work. Starting on week 8 there will be no homeworks as students are expected to work on the class projects.

Final Exam

The final exam is cumulative, and will be a on the day indicated in the USC Schedule of Classes. Students should look at the schedule of final exams before planning their vacation travel as there is no option for rescheduling a final exam.

Class Project

The class project gives students the opportunity to put into practice the theory and techniques covered in class. Each project is completed in a group project of two

students. Since an important objective of the class is to teach students to work in groups, students cannot work on projects individually. A single group of 3 students will be created if necessary).

In addition, groups will be organized into clusters of 3 or 4 groups. The purpose of clusters is to provide a way for groups to have test subjects for the requirements analysis and usability testing of their projects.

The projects are about designing, implementing and testing a responsive Web applications that adapts to mobile devices and desktops. Students will choose the domain of their application.

Project Deliverables

Working demo: students should produce a working demo of the system and deploy it on a Web site where the instructor and TA can access it.

Video: students should produce a 5-minute (or less) video of their application and upload it to YouTube.

Paper: students should write a final paper about the project formatted as if they were submitting it to a conference for publication. The papers should be written in the LNCS format (<http://www.springer.com/computer/lncs?SGWID=0-164-6-793341-0>) and should be at most 5 pages long. The paper should be organized as a publication, stating the problem being addressed, the approach and description of the system, evaluation, related work and references.

Project Schedule

Week 4: students will hand in a project proposal that defines the application they intend to build. The project proposal defines the domain of the application, the goals that it enables users to accomplish and a sketch of the navigation and information presentation. Project proposals will be up to 4 pages long in LNCS format (<http://www.springer.com/computer/lncs?SGWID=0-164-6-793341-0>). The project proposals will not be graded. The instruction will provide an estimate of the maximum grades students will obtain if they proceed with their proposed project. Students are encouraged to refine their proposals accordingly and to discuss them with the instructor.

Week 9: interim progress review. Students will prepare a Powerpoint presentation to report progress on their projects. The presentation should state the objective of the application and contain requirements and design information as discussed in class. Groups will schedule appointments during office hours to present their interim reviews in 10 minutes, with 5 minutes for discussion.

Week 13: the project papers are due on the last class of week 13. Students are encouraged to submit their papers for publication in workshops, posters or demo

sessions at conferences. The instructor will guide the students depending on the venues with appropriate deadlines and topics.

Week 14: project presentations and posters. The instructor will select the best papers for presentation to the full class. Other groups should prepare posters. In lecture 1, half the groups will present posters, and the other half of the students will visit the posters to see what students did. In lecture 2 the roles will be reversed.

Course Topics and Schedule

User Interface Design Principles (Textbook: Cooper)

Week 1

Lecture 1: introduction and course overview.

Lecture 2: understanding goal-oriented design; focusing on users not the software; user goals and mental models; implementation models; design process.

Readings: Cooper chapters 1 and 2.

Week 2

Lecture 1: user categories and their needs, beginners, intermediates, experts; understanding users, qualitative research; stakeholder, subject matter expert, customer and user interviews; conducting interviews, what to ask.

Readings: Cooper chapters 3 and 4.

Lecture 2: personas, definition, steps to construct them; user goals, experience, end and life goals.

Readings: Cooper chapter 5.

Homework 1: conduct interviews for an example application (e.g., purchasing music), define personas and goals.

Week 3

Lecture 1: foundations of design, scenarios and personas; steps to define requirements using personas; from requirements to design, defining sketches; validating designs with scenarios.

Readings: Cooper chapters 6 and 7.

Lecture 2: overview of responsive design and Kadlec textbook

Readings: Kadlec chapter 1.

Week 4

Lecture 1: principles of interaction design, design values; interaction design patterns; platforms and postures; designing for the desktop; designing for the Web, informational vs transactional Web sites, Web applications;

Readings: Cooper chapters 8 and 9. Kadlec chapter 2.

Lecture 2: orchestration and flow, transparent interaction, modeless interaction; examples of good and bad designs; identifying GUI features that slow down use (excise), in navigation, error messages and alerts,

Readings: Cooper chapters 10 and 11.

Homework 2: identify 5 examples of excise in applications you use and propose better alternatives.

Week 5

Lecture 1: designing good behavior; addressing excise: putting idle cycles to work, remembering user actions; metaphors, idioms and affordances; problems with metaphors.

Readings: Cooper chapters 12 and 13. Kadlec chapter 3.

Lecture 2: visual interface design; relationships, hierarchy, alignment, grid, consistency, visual noise and clutter, simplicity, text, color, standards

Readings: Cooper chapters 14

Homework3: identify 3 examples of excise and 3 examples of inappropriate visual design in applications you use and propose solutions.

Week 6

Lecture 1: undo, single and multiple; saving the user's work; data entry, data errors, missing data, system responses.

Readings: (optional Cooper chapter 15), Cooper chapters 16, 17 and 18. Kadlec chapter 4.

Lecture 2: direct manipulation; pointing and clicking; affordances; selection, command ordering and selection, multiple selection; drag and drop, insertion targets; modal tools; cursors, object manipulation

Readings: Cooper chapter 19 (optional Cooper chapter 20).

Homework 4: identify 3 examples of inappropriate direct manipulation behavior in applications and propose solutions; identify 3 examples in applications where direct manipulation should have been used but wasn't and propose solutions.

Week 7

Lecture 1: controls, widgets and dialogue boxes; buttons, selection, checkboxes, radio buttons, list controls, combo boxes; data entry controls, dials, sliders, text boxes, validation; scrolling; menus.

Readings: Cooper chapters 21 and 22 (optional Cooper chapter 23). Kadlec chapter 5.

Lecture 2: dialogs, modal and modeless; uses of dialog boxes; complex dialogs; errors, alerts and confirmations; preventing errors; feedback.

Readings: Cooper chapters 24 and 25.

Homework 5: research and identify 5 examples of inappropriate dialogs and alerts in applications and propose solutions.

Cognitive and Perceptual Science in the Design Principles (Textbook Johnson)

Week 8

Lecture 1: perception, vision, Gestalt principle; visual structure.

Readings: Johnson chapters 1, 2 and 3. Kadlec chapter 6.

Lecture 2: reading; design to support reading; color vision; ability to distinguish colors, guidelines for using color; peripheral vision; making messages visible;

Readings: Johnson chapters 4, 5 and 6.

Week 9

Lecture 1: memory, short-term and long-term; implications for interface design; attention, external aids; goal directed behavior; recognition vs recall, implications for interface design

Readings: Johnson chapters 7, 8 and 9. Kadlec chapter 7.

Week 10

Lecture 1: learning from experience; actions vs problem solving; implications for interface design; facilitating interface learning, consistency; avoiding user fear;

Readings: Johnson chapters 10 and 11. Kadlec chapter 8.

Lecture 2: interface responsiveness; limitations of the human brain; implications for interface design.

Readings: Johnson chapter 12.

Usability Testing (Textbook Krug)

Week 11

Lecture 1: do-it-yourself testing; observing users; organizing your tests; what to test.

Readings: Krug chapters 1, 2, 3 and 4. Kadlec chapter 9.

Lecture 2: recruiting users, how many; what to test; organizing your tests, checklists; test setup; conducting the tests

Readings: Krug chapters 5, 6, 7 and 8.

Week 12

Lecture 1: observing tests; what to record; debriefing users, what to ask; what to take away from tests; making decisions.

Readings: Krug chapters 9, 10, 11 and 11.

Lecture 2: finding the main problems; making sure usability is improving; remote testing.

Readings: Krug chapters 12, 13 and 14.

Responsive Design (Textbook Kadlec)

Week 13

Lecture 1: review of responsive design. Students should be reading this textbook in the background even though we are not covering it in class explicitly. The material is simple, but the techniques are useful for the projects.

Lecture 2: course review.

Week 14

Project presentations.

Week 15

Final examination review. Overflow to accommodate holidays.

Week 16

Final examination: See the USC Schedule of Classes.

Class Communication:

Blackboard at USC will be used for class communication.

Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me as early in the semester as possible. Your letter must be specific as to the nature of any accommodations granted. DSP is located in STU 301 and is open 8:30 am to 5:30 pm, Monday through Friday. The telephone number for DSP is (213) 740-0776.

Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, (www.usc.edu/scampus or <http://scampus.usc.edu>) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

The University, as an instrument of learning, is predicated on the existence of an environment of integrity. As members of the academic community, faculty, students, and administrative officials share the responsibility for maintaining this environment. Faculties have the primary responsibility for establishing and maintaining an atmosphere and attitude of academic integrity such that the enterprise may flourish in an open and honest way. Students share this responsibility for maintaining standards of academic performance and classroom behavior conducive to the learning process. Administrative officials are responsible for the establishment and maintenance of procedures to support and enforce those academic standards. Thus, the entire University community bears the responsibility for maintaining an environment of integrity and for taking appropriate action to sanction individuals involved in any violation. When there is a clear indication that such individuals are unwilling or unable to support these standards, they should not be allowed to remain in the University."

(http://policies.usc.edu/p4acad_stud/facultyhandbook.pdf)

Academic dishonesty includes:

(http://policies.usc.edu/p4acad_stud/facultyhandbook.pdf)

- Examination behavior – any use of external assistance during an examination shall be considered academically dishonest unless expressly permitted by the teacher.
- Fabrication – any intentional falsification or invention of data or citation in an academic exercise will be considered a violation of academic integrity.
- Plagiarism – the appropriation and subsequent passing off of another’s ideas or words as one’s own. If the words or ideas of another are used, acknowledgment of the original source must be made through recognized referencing practices.
- Other Types of Academic Dishonesty – submitting a paper written by or obtained from another, using a paper or essay in more than one class without the teacher’s express permission, obtaining a copy of an examination in advance without the knowledge and consent of the teacher, changing academic records outside of normal procedures and/or petitions, using another person to complete homework assignments or take-home exams without the knowledge or consent of the teacher.

The use of unauthorized material, communication with fellow students for course assignments, or during a mid-term examination, attempting to benefit from work of another student, past or present and similar behavior that defeats the intent of an assignment or mid-term examination, is unacceptable to the University. It is often difficult to distinguish between a culpable act and inadvertent behavior resulting from the nervous tensions accompanying examinations. Where a clear violation has occurred, however, the instructor may disqualify the student’s work as unacceptable and assign a failing mark on the paper.

Return of Course Assignments

Returned paperwork, unclaimed by a student, will be discarded after a year and hence, will not be available should a grade appeal be pursued following receipt of his/her grade.

Emergency Preparedness/Course Continuity in a Crisis

In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies.