

## CSC 484: Human-Computer Interaction

### Instructor

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### General Information

The general subject matter of this course is how human beings interact with designed artifacts. The artifacts can range from candy machines to web-based multi-player games. There are certain general principles of interaction that apply to these, and any other form of interactive device.

Given the background of most class members, the type of engineered artifacts we deal with are predominantly computer-based. While we will study general principles of human interaction, we will focus more specifically on principles of human-computer interaction (HCI). HCI is equivalently referred as computer-human interaction (CHI). A related sub-discipline is called "human factors in computing". The human factors side of things focuses more on the social and psychological aspects of HCI. The "other" side is more technological, focusing on tools and techniques for HCI.

For our purposes in 484, the over-arching term "HCI" will work fine, despite what subtle differences the alternate names may connote. In terms of catalog descriptions, this year's version of CSC 484 will include some material from the related course CSC 483. The official titles are:

- *CSC 483 -- Current Topics in Human-Computer Interaction*
- *CSC 484 -- User-Centered Interface Design and Development*

Since CSC 483 is infrequently offered, we will cover subject matter that falls under both course titles in 484.

### Course Objectives

The course objectives are the following:

- learn to appreciate the importance of user-centered design and development techniques, particularly within the process of software development
- learn established techniques to assess the usability of engineered artifacts, in particular interactive software
- apply the techniques to construct and analyze a new software prototype, or to rigorously analyze the usability of an existing software product
- learn how to present well-reasoned analyses of software usability, both orally and in writing
- learn how to read, understand, analyze, cite, adapt, and apply the research literature in HCI

### Prerequisites

CSC 307 or 308, and junior or senior standing.

### Activities

You will pursue the following activities, in teams of approximately five people:

- Semi-formally evaluate the usability of one of your favorite and one of your least favorite pieces of software. This is a "structured rant" exercise.
- Design, conduct, and analyze the results of a small-scale usability study. This will provide some evidence for your structured rantings, and act as a warm-up for the larger usability study you will do for your class project.

- Design, storyboard, and (possibly) prototype a software project. If possible, the project should employ some form of "non-standard" software user interface. Possibilities include voice, natural language, domain-specific language, alternative haptic, example-driven, computer-learning based.
- Design, conduct, and analyze the results of a formal usability study. This can be a study for the prototype you develop, or for an outside tool or website. If your team works on a very substantial usability study, the study itself can serve as the class project, with your team doing little or no software development (more below).
- Participate in the usability studies developed by your class colleagues.
- Read and apply the research literature in HCI, and related disciplines.
- Give oral presentations of assignments and project results to your peers, during lab sessions.
- Participate in team debates, arguing one side of a pointed issue related to HCI.

### Textbook and Online Materials

The text book is

- Interaction Design: Beyond Human-Computer Interaction 2nd Edition, by Jenny Preece, Yvonne Rogers, and Helen Sharp. John Wiley & Sons: New York, 2007. ISBN-10: 0470018666; ISBN-13: 978-0470018668.

The book contains many references to additional reading, and has an accompanying website with further material and links. The site is <http://id-book.com/>

There is a CSC 484 course website at [~gfisher/classes/484](http://fisher/classes/484). There is a variety of material on the site, organized into the following directories:

- o lectures -- lecture notes, as presented in class*
- o assignments -- assignment writeups and supporting material, including lab activities*
- o projects -- project milestone writeups, and supporting material*
- o handouts -- general informational handouts, such as this syllabus*
- o solutions -- example solutions to the assignments and quizzes*
- o examples -- additional examples relevant to the assignments and projects*
- o documentation -- supplemental documentation and reference material, including links to weekly readers*
- o bin -- executable programs, or links to same*
- o grades -- posted grades, with password-protected access to individuals' scores*

Like almost all course texts, ours is not perfect, nor does it provide complete in-depth coverage of all course material. It does contain many useful references, as do the websites for the book and course. The positive aspects of the textbook are these:

- o It provides a good overall structure for the course topics; as noted in the preface, the book need not be followed in direct chapter order, and we in fact will skip around among the chapters, per the recommended threads described in the preface.*
- o It is a good book to expand our software-centric horizons; software developers sometimes come across as software know-it-alls on software development teams; this book helps us broaden our perspectives.*
- o I don't agree with everything the book says, which is also a good thing. The book will stimulate our thinking in ways that more purely technical software treatments do not.*
- o We'll focus on the software side of things, but it's good to consider other types of interacting artifacts, to help us think "outside of the software box".*

### Assignments

There will be a total of three assignments, covering project-related topics. Some of the work you do in the assignments may be reusable in your class project, but the assignments will have separate and specific deliverable dates from the project.

The assignment topics are as follows:

- a. Perform a small-scale, analytic usability study of existing software.
- b. Conduct a usability field study, collect and analyze the data.
- c. Prepare and present storyboards for some aspect of your class project, or for a separate design artifact.

Each will be described in full detail in a writeup, with appropriate supporting materials.

## Projects

Insofar as possible, class projects will be based on the interests and expertise of class members. During the first lab, you will fill out a brief questionnaire that will provide some data to be used in project selection and team formation.

As noted in **Activities** above, all projects will involve some form of usability study. Depending on the size and scope of the study, it may form the basis for the entire project. My preference is for all teams do at least some prototype development for the project. Given this, here are the three acceptable structures for project work:

- a. design and development a user prototype; perform a usability study on that prototype
- b. perform a rigorous usability study on an existing product; develop a prototype that demonstrates potential product enhancement, based on the results of the study
- c. perform a very rigorous usability study on an existing product; analyze the results very thoroughly, and make overall recommendations for product use and improvements

In all cases, the focus of the project is on user interface design and evaluation, not on production implementation of software. There are indeed overlaps between the typical software engineering process and the development process we'll use in 484. However, our focus in 484 is on the quality of the end user experience.

## Teams

The different assignments and project focus on different types of work, and so may lend themselves to different team compositions. You may choose whether to stay with the same set of classmates on one team throughout the quarter. This one team will work on all of the assignments, the project, and the debates. Alternatively, you can change team membership, based on the tasks at hand, and the interests of other class members.

In other words, you will be a member of following *logical* teams, whose *physical* membership may be the same, or may vary from team to team:

- software project team -- as described above, you will develop a prototype (typically), and assess usability
- end-user team -- you will participate as experimental subjects in usability studies of other teams
- debate team -- you will participate in a debate, arguing one side of a pointed issue related to HCI
- ad hoc assignment teams -- you will work on the lab-related assignments

Teams will give a number of presentations of their work, both on the assignments and for the projects. Presentation scheduling details will be determined by the end of the second week of class.

## Research Papers

I will post weekly research papers that all class members are required to read. Owing to the short first week, the first paper will be for both weeks 1 and 2. The papers will be on topics related to the assignments and projects. This week's paper is called "*Investigating attractiveness in web user interfaces*", by Hartmann, Sutcliffe, and De Angeli, from the University of Manchester.

More so than with many computing disciplines, HCI research papers are quite accessible to a general readership. There is little use of sophisticated mathematics or algorithmic reasoning, that would require a particular technical background. There *is* use of terminology with which you may not be familiar, in particular from the fields of psychology and sociology. (Pseudo-scientists often like to use gratuitously specialized vocabulary, to afford there

research a sense of depth.) When you come across such terminology, you should look it up. I can even live with Wikipedia for such look ups.

In many cases, the papers will be available at the ACM digital library. The digital library is a subscription-based service. As a Cal Poly student, you can use the campus-wide subscription to gain full access to all the digital library holdings. The most important part of full access is that you can download PDF versions of full articles. Without a subscription, you can only access the abstracts and bibliographies.

If you follow paper the link from a browser running on a campus machine, you will automatically gain full access to the digital library. For example, the screen for this week's paper looks like this:

The screenshot shows the ACM Digital Library interface. At the top left is the 'PORTAL' logo for California State University. To the right are links for 'Subscribe (Full Service)', 'Register (Limited Service, Free)', and 'Login'. Below these is a search bar with radio buttons for 'The ACM Digital Library' (selected) and 'The Guide', and a 'SEARCH' button. A breadcrumb trail reads: 'DL Home → Proceedings → CHI → CHI '07 → Citation'. The main title is 'Investigating attractiveness in web user interfaces'. Under 'Full text', there is a 'Pdf (1.39 MB)' link. The 'Source' section includes a thumbnail of the conference proceedings cover and text: 'Conference on Human Factors in Computing Systems archive', 'Proceedings of the SIGCHI conference on Human factors in computing systems table of contents', 'San Jose, California, USA', 'SESSION: Empirical studies of web interaction table of contents', 'Pages: 387 - 396', 'Year of Publication: 2007', and 'ISBN:978-1-59593-593-9'. The 'Authors' section lists: 'Jan Hartmann University of Manchester, Manchester, United Kingdom', 'Alistair Sutcliffe University of Manchester, Manchester, United Kingdom', and 'Antonella De Angeli University of Manchester, Manchester, United Kingdom'.

Note the "California State University" label below the "PORTAL" icon. This indicates that you're accessing through the university's campus-wide ACM subscription. About mid-way in the screen is the link labeled "Full text". Follow the "Pdf" link to access the full text of the article.

From off campus, you can gain full access to the ACM digital library through the Poly portal. Click on the "Library Services" link and select "All Article Databases." You will see the ACM and IEEE digital libraries.

If you access the digital library without a subscription, you can still search for articles, read the abstracts, and see the full bibliographies. However you cannot access the full text of the articles.

A great way to have guaranteed full library access, as well as other benefits, is to become a student member of the ACM. See <http://www.acm.org/membership/student/student-toc>.

## Quizzes

There will be a total of five quizzes. They will be held in lab, on Fridays of the even weeks of class. The quiz duration will be 20 to 30 minutes each. The majority of quiz questions will be based on material from the required research paper readings. I will provide an overview of quiz topics on the Wednesday before each quiz. The quizzes may be open-note or closed-note, depending on the subject matter.

## Debates

During the last week or two of class, labs will be devoted to formal debates on pointed topics. "Pointed" means thought provoking and controversial. Each team will argue one side of the debate, following established debating

rules and procedures.

Here are some possible topics:

- web-based user interfaces are useless for doing real work
- the qwerty keyboard will be obsolete in ten years
- natural language will be the dominant form of HCI within twenty years

We will discuss the debates more fully in coming weeks. You are strongly encouraged to suggest debate topics.

## **Labs**

The labs will be used for the various activities described above:

- assignment work
- project work
- conduct of and participation in usability studies
- team presentations
- quizzes
- debates

The assignment and project writeups will indicate specific lab activities, to be conducted at particular times. There will also be time for you to use the lab for general work on the assignments and projects, in particular for team meetings.

## **Individual Work**

For the most part, all members of a team will receive the same grade on team-based deliverables. There will be some aspects of the assignments and projects that are individual responsibilities, for which you will receive individual grades. The assignment and project writeups will provide precise grading breakdowns.

## **Grading**

A high level grading breakdown is as follows

- Assignments (3): 40%
- Project (4 milestones): 45%
- Quizzes (5): 15%

Further grading details will be given with the assignment and project writeups.

The standard grading breakdown is 90% = A, 80% = B, 70% = C, 60% = D, below 60% = F. I may lower the curve, but not raise it. E.g., if you receive  $\geq 90\%$  of the possible points on all graded work, you are guaranteed an A or A- in the class.

## **Schedule**

A detailed activity schedule will be made available by the second week of class, once the the number and size of teams is established. Scheduling details will be subject to refinement as necessary throughout the quarter.

**Change History:**

<b>Date</b>	<b>Page</b>	<b>Description</b>
2 April		First distribution, paper copies handed out in class.
23 May	5	<ul style="list-style-type: none"><li>• Adjusted high-level grading breakdown:<ul style="list-style-type: none"><li>◦ Debate is replaced with an Assignment 4.</li><li>◦ There are 4 quizzes instead of 5; Quizzes 1-3 worth 35 each; Quiz 4 worth 6%.</li><li>◦ Final exam is replaced with final project presentations.</li></ul></li></ul>