INDE/TC 455: User Interface Design
Class: 11:30A-12:20P, Monday, Wednesday & Friday, THO 134
Lab: 2:30P-4:20P, Friday, MGH 030

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Purpose
This course addresses the fundamentals of designing interfaces between humans and complex machines, notably computer systems. Topics include models of human-computer interaction; the interface design process; hardware, software, and human factors elements associated with the design and use of interfaces; encompassing the sensory, perceptual, cognitive and psychomotor aspects of human-computer interaction in real and virtual environments. In addition to theoretical concepts, group work will be emphasized since it is important for students to develop skills that will allow them to work effectively on interdisciplinary design teams in industry. The course includes invited lecturers that give students further insight to the practical aspects of designing and assessing interfaces in various settings. Other advanced topics will be presented as time permits.

Required Materials
1. Course notes and presentation materials available for downloading from course website (http://courses.washington.edu/ie455) or from CD distributed the second day of class.
2. Selected papers and other resources to be available for downloading from course website or from course CD.
3. American Psychological Association (APA) Style Guide. (This and other information regarding the preparation of research papers can be found on the UW website and/or using the following URLs:

   www.lib.washington.edu/research/wri.html,
   http://owl.english.purdue.edu/handouts/research/r_apa.html

Recommended Materials
7.
Recommended URLs for further research: see course website

Quality of student assignments
Papers and other assignments to be submitted in this course are expected to be of the highest quality and written in a scholarly way. The instructors expect correct spelling and grammar to be used in any and all assignments submitted. The Arcade Game Project and Group Design Project are to be written following the guidelines of the American Psychological Association Style Guide (see references above). Also when appropriate, students are expected to illustrate their ideas to supplement the written material. These drawings and sketches are not expected to be perfect, but as a means to enhance communication of your ideas. A high degree of creativity and “thinking outside the box” is also expected. In the course we teach and encourage the use creative problem solving tools (c.f. De Bono in recommended materials).

Grading
Professor Furness will grade the final projects. A teaching assistant will grade the in-class and homework design problems, quizzes and video game projects. The teaching assistant will also work with project groups to critique and provide feedback on the organization and development of the projects. The final grade will be determined based on the following:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Design Problems</td>
<td>20%</td>
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<tr>
<td>Arcade Game Project</td>
<td>30%</td>
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<tr>
<td>Group Interface Design Project-Class Presentation</td>
<td>10%</td>
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<tr>
<td>Group Interface Design Project Report</td>
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Schedule
Table 3 gives a schedule of each class along with individual assignments and group project assignments.

Design Problems
During the course of the quarter several short design problems will be assigned involving a fundamental interface issue. Some design problems will assigned to be done quickly in class (e.g. 5-10 minutes), others outside of class (e.g. during the Lab period). Thorough analysis and creativity are expected for the design problems assigned outside of class. Most design problems can be accomplished with a short one-page write-up with an accompanying sketch.

Arcade Game Project
For this project, take a pocket full of quarters to your local video game parlor or arcade. (Note: it is important to go to an arcade or location-based entertainment environment for this project, as an analysis of the environment will be an important part of your write-up.) Choose a game that you are not familiar with, and read the instructions. Make an attempt to play the game based on the instructions and knowledge you have of how other electronic games are played. Then replay the game (several times, but do not get hooked!) again using additional knowledge that you have obtained from your experiences. This must be a “real” arcade game and not a game on your computer or home video game system. Both the Health Sciences Student Center and Husky Union Building have arcade game rooms; however, you can go wherever you want. Prior to playing the games it is important to read the articles listed below, as you will need to use them to analyze, characterize and critique your game.

Helpful Readings for the Arcade Game Assignment

Usability in Games - http://www.stcsig.org/usability/newsletter/0410-userfriendlygames.html
Arcade Game Project Paper
The student is to prepare a paper (including bibliography & illustrations) for this assignment. Use the APA style guide. The paper should discuss the game, its instructions and interface paradigm. An outline and questions to be answered for this paper is contained in the course website.

Due Date for Video Game Project
Friday, Oct 10

Group Interface Design Project
For this project, you will be assigned to a three or four-person group on Friday September 26. The assignment of groups will be based on an experience/interest questionnaire given on the first day of class. Each group will be assigned a specific interface design problem to work on for the rest of the quarter. In the event that the group desires to work on a different design problem, then it must meet the criteria established by Prof. Furness and there must be a unanimous agreement among members of the group on the new project. A group wishing to change its assigned project must recommend a new project by the end of class on Friday 3 Oct. When you group first meets we recommend that you select a coordinator, compiler and audit-track keeper for your team. Outside class meeting times and locations should also be determined along with a group name. In meeting for the first time and thereafter, it is recommended that the groups use the elements in Table 2. Generally, Lab periods on Fridays will be reserved for special instructions on projects and to permit time for groups to meet.

During the course of the quarter, your group is to perform a background review on the topic including a survey from possible users, design an interface for the particular application chosen, and test and evaluate your design. Students will turn in a functional and physical prototype interfaces as part of the project. The functional prototype demonstrates the function of the interface via flipbook or interactive computer simulation. The physical prototype is a hardware mockup that demonstrates the form of the interface or what it will appear to the user. For the purpose of this class, the interface itself is not as important as the process of designing it. You will be graded based on how well you complete the overall process. Specifically, your grade will be determined by how well the process, as associated with your design, is illustrated and communicated in your final report. Group members will also assess the contribution of each individual group member.

During the course of the quarter, the group will provide interim reports of interface design steps as noted below.

Phase 1: Project Prospectus
Each group is to write a two-page prospectus outlining the specific interface problem that it will be addressing and a preliminary description of the features (e.g. what is it supposed to do) of the interface application. Each group will be asked to meet with the teaching assistant to discuss the project based on this proposal so that they may ask any questions which they have and so that the TA can provide them with some directions and pointers to the literature.
Due: Monday, 6 October

Phase 2: Background Review/Design Issues/Performance Requirements
Each group is to prepare a brief (3-5 pages) background review related to the design problem. This review is to be derived from two sources: 1) review of relevant literature from the web, library and other sources such as the recommended materials: 2) survey of prospective users (perhaps using a structured interview or questionnaire). This background review should include references to relevant user, technology and environmental issues. At least 5-7 peer reviewed journal documents should be accessed. Web searching is good but you must access journals in the library. Relevant documentation, URLs and resources should be cited. For the survey, groups should form a panel of possible users (preferable seven in number but at least five). A questionnaire or some form of structured interview needs to be formulated (see references and lecture notes for suggestions). The interview/survey must be administered and analyzed. From the background reviews the group will define the design issues associated with the interface and a preliminary set of performance requirements (i.e. how is it supposed to perform the various functions). The instructors
will then critique these reviews and make the appropriate recommendations. They will then be returned so
that they may be incorporated into the final paper.
**Due: Wednesday, 15 October**

**Phase 3A: Persona**
In order to assist in the design of your interface, your group will develop a prototypical user of your
interface. This theoretical person is to be described in detail: gender, age, family associations, background,
physical attributes, vocations and avocations. Provide a photograph of this representative person. From
here you will be designing the interface for your persona. These aspects will be discussed in class prior to
completion of this assignment.
**Due: Monday, 20 October**

**Phase 3B: Scenario (narrative/sketches) and storyboard**
Using the prospectus, background review and persona, each group will prepare materials to describe the
operation and impact of their interface. This step consists of three parts: 1) narratives: write a story
describing a the day of the life of person described in your persona using his/her old way of doing things
and then a second story using your new interface; 2) sketches: develop sketches that illustrate and
emphasize relevant aspects of the narrative (these need not be finished drawings); 3) storyboard: then from
the narrative and sketches, develop a storyboard. Storyboarding design tools may be used in the exercise.
Examples of good storyboards will be shown in class.
**Due: Monday 27 Oct.**

**Phase 4: Task analysis, system maps and screen designs**
For this step your group will perform an analysis of the tasks performed in using the interface and develop a
diagram (system map) that shows the flow of interaction between the user and the machine. Additionally,
groups will draft the visual and audio (and other modalities) presentations that the user will see (or hear)
related to each state in the system map. Examples of system maps and screen designs will be given in class.
**Due: Monday, 3 November**

**Phase 5A: Interface Representation: Flipbook or simulation**
In order to test the interactive aspects of your interface, each group will build a notebook that simulates a
*functional* interaction of the interface. Put this in the form of a flipbook, which is a loose-leaf notebook that
shows the screen designs and allows the user to pretend to ‘operate’ the interface by conditional flipping
between ‘screens’ depending upon control input (e.g. pushing a screen button or verbal input etc.). As an
alternative to the flipbook you can develop a computer simulation that shows the interaction, but this may
take more time and have less flexibility at this stage of your development.
**Due: Friday, 7 November**

**Phase 6A: Interface Evaluation: Field Trials-1**
Each group is to use the flipbooks and/or computer simulation developed in Phase 5A to evaluate the
usability of their interface with prospective users. Ideally, seven users should be used, but at least a
minimum of five. It is essential that the users be given a scenario to follow including the accomplishment of
specific tasks using the interface. The main objective of Phase 5A is to obtain an initial assessment of the
goodness of the interface and identify any problems. After these results are obtained, then the group will
redesign the interface (probably making it simpler) and incorporate that redesign into a computer
simulation (or improved flipbook and mockup) as stated in Phase 5B.
**Due: Monday 17 November**

**Phase 5B: Interface Representation: Prototypes**
After the evaluation of the flipbook or simulation conducted in Phase 6A, the project group will improve
and rebuild the interface representation into prototypes. These prototypes represent both the *form* and
*function* of your interface design. The *functional* prototype is a computer simulation (or improved flipbook)
for assessing user interaction with your interface. The *form* prototype is a physical (non-functioning)
mockup of your design that communicates the appearance (shape, size, weight, color etc.) of your interface.
The prototypes will be evaluated in Phase 6B.
Due: Monday, 24 November

Phase 6B: Interface Evaluation: Field Trials-2
Having completed the field trials in Phase 6A and built the improved interface in Phase 5B, then the group should go through another evaluation step with a panel of prospective users. It is best if this panel of subjects is different from those in Phase 6A. Both form and functional prototypes should be evaluated. From this second evaluation of the interface, the group will define the final configuration of the interface for incorporation into the final report and class presentation. (Reminder: Each evaluation should involve at least five prospective users (preferably seven). Also, the user groups should be different between the two phases.)

Due: On 1 December, a five minute report to the TA and class on progress on 6A, 5B, & 6B steps of the group project. These steps have no specific due dates and don’t have to be turned in but instead incorporated into the final report. It is recommended that both sets of field trials be completed by Friday 30 November so as to provide sufficient time writing the final report.)

Phase 7: Final Interface Configuration
From the two phases of interface evaluation the group will define what it believes is the best interface configuration by stating what needs to be done to optimize the last interface design. It is not necessary for the group to build this final design but to state clearly what final improvements are needed and why, given the finding of your evaluation.

Due: This results of this phase are to be presented in Phase 8, Final Presentation, and incorporated into the Final Report in Phase 9.

Phase 8: Project Presentation to the Class
During the Lab of Friday 5 December, each group will present a summary of their work in a ten-minute presentation to class members, instructors and a panel of judges. This presentation should quickly summarize the need or problem, the design of the resulting interface and include an explanation of why your design is the best solution for the problem. You should also include the findings from working with prospective users. It is recommended that each group rehearse their presentations to insure that everything is presented succinctly and within the 10 minute time limit (strictly enforced). Each project presentation will be graded independently and on its own merits by a panel of judges. Judges will include faculty and outside professionals associated with user interface design.

Phase 9: Final Project Paper
The final paper should completely detail the design developed by the group. As stated earlier, the focus should be on the interface design process. The course instructor will use this paper as the primary tool for evaluating the design. The report should be approximately 15 pages in length (1 1/2 line spacing) with an appendix that includes the steps of the design process that have been previously submitted. It is also requested that the mockups and flipbooks be turned in as well. The final report should have the sections as outlines in the course lectures on Phase 9. In general the paper should contain the following information.

- Statement of the interface design objective
- Description of limitations of existing ways of doing things
- Describe new interface
- Features of the interface
- What assumptions have you made in designing the interface
- What are the performance requirements of the interface
- Projected users of the interface
- Results of user testing (i.e. evaluation of the interface)
- Areas for improvement of the interface (e.g. what you haven’t done)
- Critique of interface design process (good parts and what can be improved)
- What you learned from the course experience (each group member should individually contribute their own assessment)
Final Project Grading

The project grade will be assigned using the criteria shown in Table 1 below. As stated above, each individual’s grade on the group project will be based upon a combination of the project grade and the assessment by group members of the contribution that each member made to the project. In this way group members may get a higher or lower grade than that of the group project. Individual group members will hand in their assessments by separate sealed envelop to the instructor at the time when the final report is submitted. (Use the form attached to this syllabus.) The grade you receive on the final project will be the group project grade adjusted up or down based upon the assessment of your group members. It is important for all group members to contribute equally.

Due: 5:00P on Monday, 8 December at Dr. Furness’ office (AERB 141A)

Best project prize
A prize of a $50.00 gift certificate to each group member will be given to the team producing the best interface design. The determination of the winning group will be based upon the project report graded by Prof. Furness and presentation results from the panel of judges. An announcement of the winning group will be made during the Christmas break after grades have been submitted.
Table 1: Grading Criteria for INDE/TC 455 User Interface Design Final Project

<table>
<thead>
<tr>
<th>EVALUATION CATEGORY</th>
<th>MAX POINTS</th>
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<tbody>
<tr>
<td>PROBLEM CHARACTERIZATION</td>
<td>15</td>
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<tr>
<td>Statement of Interface Design Problem</td>
<td></td>
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<tr>
<td>Analysis of design problem</td>
<td></td>
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<tr>
<td>Background Review</td>
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<tr>
<td>Appropriateness</td>
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<td>Thoroughness</td>
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<tr>
<td>Survey</td>
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<tr>
<td>DESIGNING THE INTERFACE</td>
<td>45</td>
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<td>Design Process</td>
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<td>Narrative</td>
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<td>Sketches</td>
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<td>Storyboards</td>
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<td>Task Analysis</td>
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<td>System Maps</td>
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<td>Screen Designs</td>
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<td>Flip Books</td>
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<td>Prototypes</td>
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<td>Functional prototype</td>
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<td>Physical mockup</td>
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<tr>
<td>EVALUATION OF THE DESIGN</td>
<td>25</td>
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<tr>
<td>User Observations</td>
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<tr>
<td>Appropriateness</td>
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<tr>
<td>Thoroughness</td>
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<tr>
<td>Extent of analysis</td>
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<tr>
<td>Design recommendations</td>
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<tr>
<td>OTHER CONSIDERATIONS</td>
<td>15</td>
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<tr>
<td>Use of process (Appendices)</td>
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<tr>
<td>Originality</td>
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<td>Creativity in solutions</td>
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<tr>
<td>Clarity in presentation</td>
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<tr>
<td>TOTAL POINTS FOR ALLOCATION</td>
<td>100</td>
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</table>
Meet people properly.

It all starts with the introduction. Then, exchange contact information, and make sure you know how to pronounce everyone’s names. Exchange phone #s, [email addresses] and find out what hours are acceptable to call during.

Find things you have in common.

You can almost always find something in common with another person, and starting from that baseline, it’s much easier to then address issues where you have differences. This is why cities like professional sports teams, which are socially galvanizing forces that cut across boundaries of race and wealth. If nothing else, you probably have in common things like the weather.

Make meeting conditions good.

Have a large surface to write on, make sure the room is quiet and warm enough, and that there aren’t lots of distractions. Make sure no one is hungry, cold, or tired. Meet over a meal if you can; food softens a meeting. That’s why they “do lunch” in Hollywood.

Let everyone talk.

Even if you think what they’re saying is stupid. Cutting someone off is rude, and not worth whatever small time gain you might make. Don’t finish someone’s sentences for him or her; they can do it for themselves. And remember: talking louder or faster doesn’t make your idea any better.

Check your egos at the door.

When you discuss ideas, immediately label them and write them down. The labels should be descriptive of the idea, not the originator: “the troll bridge story,” not “Jane’s story.”

Praise each other.

Find something nice to say, even if it’s a stretch. Even the worst of ideas has a silver lining inside it, if you just look hard enough. Focus on the good, praise it, and then raise any objections or concerns you have about the rest of it.

Put it in writing.

Always write down who is responsible for what, by when. Be concrete. Arrange meetings by email, and establish accountability. Never assume that someone’s roommate will deliver a phone message. Also, remember that “politics is when you have more than 2 people” - with that in mind, always CC (carbon copy) any piece of email within the group, or to me, to all members of the group. This rule should never be violated; don’t try to guess what your group mates might or might not want to hear about.

Be open and honest.

Talk with your group members if there’s a problem, and talk with me if you think you need help. The whole point of this course is that it’s tough to work across cultures. If we all go into it knowing that’s an issue, we should be comfortable discussing problems when they arise -- after all, that’s what this course is really about. Be forgiving when people make mistakes, but don’t be afraid to raise the issues when they come up.

Avoid conflict at all costs.

When stress occurs and tempers flare, take a short break. Clear your heads, apologize, and take another stab at it. Apologize for upsetting your peers, even if you think someone else was primarily at fault; the goal is to work together, not start a legal battle over whose transgressions were worse. It takes two to have an argument, so be the peacemaker.

Phrase alternatives as questions.

Instead of “I think we should do A, not B,” try “What if we did A, instead of B?” That allows people to offer comments, rather than defend one choice.

(http://www.alice.org/Randy/timetalk.htm)
GROUP Name__________

GROUP PROJECT:

Please provide a grade to yourself and each member of your group in terms of participation and contribution to the project. Please be fair and honest in your evaluation. Each category should add up to 100 points.

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<thead>
<tr>
<th>NAME</th>
<th>PARTICIPATION</th>
<th>CONTRIBUTION</th>
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<tbody>
<tr>
<td>YOU:___________</td>
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Total  100  100

What are the specific contributions that you made to the project?

Any comments about how your group functioned?
Please provide completed form in a sealed envelop to Professor Furness in AERB room 141A by 5:00P on Monday Dec 8, 2008.