Examination
ENGR3220 Human Factors and Interface Design
Fall 2013

You may take this exam at a time and place of your convenience. However, you should treat
this exam as a (self-administered) in-class examination rather than a take-home; it is intended
to be completed in single sitting lasting approximately 2.5 hours, though you may want to
leave yourself extra time in case I misjudged. You may give yourself additional time, within
reason, to complete the work, but you should not take the exam over several sessions or use
more than double the allotted time. Complete the exam by the end of Sunday 1 December, and
email it to Lynn (or scan and email it, also dropping off the paper version at my office).

In taking this exam, you may, if you feel it is necessary, consult the texts and readings
assigned in this class as well as any notes you made during the semester (but prior to
beginning the examination). Other than these caveats, this exam is to be taken closed book. In
particular, you may not use the internet except as explicitly indicated (to consult course
readings or to look at the specific interfaces mentioned below). You should not consult any
other books, notes, classmates, electronic or other resources in completing the exam. Note
also that time for consultation of materials is built into the 2.5 hour estimate. Other than the
instructor, you should not discuss this exam with anyone until Tuesday December 3.

You may complete this exam electronically (e.g. as a word document or pdf) or by hand on
paper. If you work on paper, please use a dark pen or some other method that will scan/copy
legibly.

Please put your name on every page of this exam and (if applicable) on any additional pages
that you wish to turn in. Please also number any additional pages and indicate that you
have done so in the appropriate place at the end of this exam.

If there is something unclear about the exam, you may try to contact me. I can often be
reached between 8:30am weekdays/9:30 am weekends and 10:30pm by some means,
including email, IM, or a phone call. If you cannot reach me, simply make a reasonable
assumption and document that assumption in writing on your exam.

After you have completed the exam, please copy the following statement onto the final page,
filling in the appropriate times and dates, and sign your name:

I began this exam at <fill in time and date> and completed it at <fill in time and
date>. In taking this exam, I have behaved in accordance with the Olin honor
code. In particular, I have neither given nor received unauthorized assistance
during the completion of this work. I agree not to discuss this exam in any way
until Tuesday December 3.

If you cannot write out this phrase and sign your name to it, please explain. ¹

Your exam should be turned by emailing it to las by the end of Sunday, December 27. If
you complete the exam on paper, you should email it using the handy dandy scan-to-email
features of the Olin copiers or similar means; in either case, please arrange to leave your
original exam with (or mail it to) Lynn in MH358 by Monday, December 2 (or bring it to class
on Tuesday). Because some of you will not have access to the appropriate technologies, some
slack will be given on these deadlines, but (a) please let me know in advance if at all possible
and (b) please observe the deadline for taking the exam even if your turn-in is later.

DO NOT TURN THIS PAGE UNTIL YOU ARE READY TO BEGIN

¹ This text courtesy of Professor Sarah Spence Adams. It is merely meant to affirm our shared
understanding of the context in which you are taking the exam. Thanks for obliging!
Instructions:

Concise, accurate answers are better than long semi-accurate answers. The amount of space provided is meant to act as a guideline for the length of your answer. Note that these boxes are intended for handwritten answers; typed answers should be shorter!

I recommend that you quickly look through all the questions first and then begin answering them. Some questions are worth more points than others, so budget your time accordingly. **There are 6 questions worth 90 points total.** Partial credit will be awarded.

**PLEASE INDICATE THE TIME AND DATE AT WHICH YOU BEGIN THIS EXAM:**

Part A:

In the first few questions, you will consider the an automated telephone-based prescription refill menu. The following page contains a flowchart diagramming that voice menu. Hopefully the flowchart is straightforward to understand. Just in case, instructions on how to read it are in the box at the bottom of this page. A second copy of the flowchart is attached as an appendix to this exam (along with other images) so that you may separate these pages if you are working on paper.

**How to read the flowchart:**

- Start at the oval marked Start. Follow the arrows.
- Each rectangle represents a piece of spoken text.
- Text in angle brackets <> is intended to be replaced with values based on the database or user input.
- Each circle represents an anticipated piece of user input.
- After each rectangle or circle, interaction flow progresses along the outgoing arrow.
- Each diamond also represents a piece of user input.
- There are two outgoing arrows from each diamond. A label on each arrow indicates under which circumstance it will be followed.
Start

Welcome to the hypothetical pharmacy prescription refill service. Would you like to refill a prescription? Press 1 for yes and 2 for no.

enter single digit

2

Please enter the six digit prescription number that you wish to refill, followed by the pound sign. The prescription number is in the blue box on your on your pill bottle.

enter 6 digits followed by #

1

not found

found

The number you entered was <recite number> and the first three letters of the patient’s last name are <recite first three letters of last name from retrieved prescription>. Is this correct? Enter 1 for yes and 2 for no.

enter single digit

2

I’m sorry. I do not seem to have a prescription numbered <recite number> in my records.

Please try again.

1

Your prescription will be ready at <time> am/pm <today/tomorrow>. Would you like to order another refill? Enter 1 for yes and 2 for no.

enter single digit

1

less than 2h from now

more than 2h from now

enter single digit

You typed <repeat back time>. Press 1 for am and 2 for pm.

enter three or four digits followed by #

Stop

Thank you for your business. Have a nice day.
Question 1. [20 points] Heuristic Evaluation

Using Nielsen’s heuristics (replicated below and also at the very end of the appendix), conduct a heuristic evaluation of the system. Use severity ratings as you did in your in-class heuristic evaluation. Report up to five heuristic violations, selecting the most severe errors if you identify more than five. If you identify an issue but do not know which Nielsen heuristic it violates, you may create your own label. If you identify fewer than five violations, report on aspects of the design that specifically MEET a Nielsen heuristic so that you still make five reports.

For each issue, list the heuristic or principle violated or met. Be specific as possible as to why the script violates or exemplifies the specified heuristic, principle, or need. Also list the severity of this violation using the same scale as for the in-class heuristic evaluation, or give it a gold star:

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Don’t think this is a usability problem.</td>
</tr>
<tr>
<td>1</td>
<td>Cosmetic problem</td>
</tr>
<tr>
<td>2</td>
<td>Minor usability problem</td>
</tr>
<tr>
<td>3</td>
<td>Major usability problem; important to fix</td>
</tr>
<tr>
<td>4</td>
<td>Usability catastrophe; imperative to fix</td>
</tr>
<tr>
<td>*</td>
<td>(Gold star) This aspect exemplifies best practices under this heuristic.</td>
</tr>
</tbody>
</table>

Nielsen’s Heuristics

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation
<table>
<thead>
<tr>
<th>Severity</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heuristic</td>
<td></td>
</tr>
</tbody>
</table>

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<th>Why?</th>
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</thead>
<tbody>
<tr>
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<td>Why?</td>
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<td></td>
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</tbody>
</table>


<table>
<thead>
<tr>
<th>Severity</th>
<th>Why?</th>
<th>Heuristic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Question 2. [12 points] Voice vs. Verbal

The voice menu that you have just considered is subject to different constraints from a visual menu. List three major differences between spoken and visual menus. These differences should refer to usability properties, affordances, etc. They should be concise, specific, concrete, and crisp. Make it clear why the particular feature you describe is available or absent in each medium.

a.

b.

c.
Question 3. [20 points] Redesign

The telephone menu of the previous questions could be implemented as a visual menu on a web site. Sketch a web site design that addresses the same ground as the telephone menu. That is, the web site should obtain the same data as the telephone menu:

- Obtain prescription number
- Confirm patient information
- Obtain time and date for refill, at least 2 hours from now
- Allow multiple prescription entry

The web site may obtain these data in different ways from the voice menu. It should not require different information from the telephone menu, though it may take advantage of different formats or affordances of visual vs. verbal communication. (For example, the web site should not use a login to look up patient information; this would be a different set of information from the telephone menu.)

If your web site includes more than one page, or if your site varies over time, include whatever interaction flows or overlays you believe are necessary to communicate your intent. You may use more than one page to diagram your design, though it should be possible to fit a good answer into a single page. Remember, if you attach pages, please number them and include your name.
Part B:

Question 4. [8 points] Design Principles

The image below shows a screen shot of the seat selection process on United Airlines. For your convenience, the same image is repeated larger in the appendix to this exam (and those viewing this file electronically may be able to expand the image below online.)

Name two design principles that are exemplified by this design, and explain how it embodies each one. You will get substantial partial credit for appropriately identifying and describing the principle even if you do not recall the precise term.

a.
b.
**Part C:**

The following three screen shots depict the same view – a single day – as displayed in three different calendar systems. The first view is Apple’s iCal; the second is Google calendar; and the third is Microsoft’s webmail calendar. Your answers to the following questions should be based solely on what you can infer from the screen shots below. These images are also repeated at the end of the exam.

<table>
<thead>
<tr>
<th>Monday</th>
<th>September 5, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor Day</td>
<td>all-day</td>
</tr>
<tr>
<td>Labor Day</td>
<td>all-day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thursday</th>
<th>September 8, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commute</td>
<td>8:30 AM to 10:45 AM</td>
</tr>
<tr>
<td>Approve Sharer’s timecard for month just ended</td>
<td>9 AM to 9 AM</td>
</tr>
<tr>
<td>JH?</td>
<td>9 AM to 9:45 AM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Friday</th>
<th>September 9, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>6th of Eliu, 5776</td>
<td>all-day</td>
</tr>
<tr>
<td>fac lounge</td>
<td>4 PM to 5 PM</td>
</tr>
<tr>
<td>Candle lighting</td>
<td>6:47 PM to 7:05 PM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Saturday</th>
<th>September 10, 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Question 5. [15 points] User Needs

Based solely on the screen shots above, identify at least one aspect of each calendar in which its interface is preferable to that of the other two. Extrapolate from this a user need that that calendar better serves. Explain clearly why the calendar you choose is superior to the other calendars with respect to that user need. If your reasoning relies on a specific task or user group, make it clear as to what that task or who those users might be. Also make clear what aspect of the interface responds to this need. Do not rely on aspects of the calendar system that are not visible here, e.g., the integration of any of these calendars into a larger system.

A need that Apple’s iCal interface (as shown here) serves better is...

A need that Google Calendar interface (as shown here) serves better is...
A need that Microsoft’s webmail interface (as shown here) serves better is...
Question 6. [15 points] Critique and Redesign

Consider the specific detail of moving forward/backward one day on each of the three calendar interfaces depicted above. None of these interfaces gets the forward/backward buttons quite right. Here are the positions of the buttons on each of the three calendars:

- Apple: triangles on each side of the “Today” button
- Google: triangles in boxes to the right of the “Today” button
- Microsoft: small blue triangles above 8am

State one thing that is wrong with each of these designs (not necessarily the same thing in each case).

The Apple iCal forward/backward controls are problematic because...

The Google calendar forward/backward controls are problematic because...
The Microsoft webmail forward/backward controls are problematic because...

Given these problems, sketch a redesign of the relevant portion of the web page that provides a better solution for the forward/back controls. You do not need to sketch the entire page, just enough to make your redesign clear.

Redesign:
This is the end of the exam. Any pages following this one may be removed from
the exam if you find them useful to have separately; they need not be turned in
with your exam. They are simply copies of images from the body of the exam
for ease of use in a printed copy.

If you have added pages to this examination to show extra work, etc., please
number them consecutively following this page and indicate here the final page
number:

PLEASE INDICATE THE TIME AND DATE AT
WHICH YOU FINISH THIS EXAM:

Please copy the honor code declaration (from the front page of the exam)
below and sign your name.
Welcome to the hypothetical pharmacy prescription refill service. Would you like to refill a prescription? Press 1 for yes and 2 for no.

1. Enter single digit

2. Please enter the six digit prescription number that you wish to refill, followed by the pound sign. The prescription number is in the blue box on your on your pill bottle.

1. Enter 6 digits followed by #
   - Not found
   - Found

   The number you entered was <recite number> and the first three letters of the patient's last name are <recite first three letters of last name from retrieved prescription>. Is this correct? Enter 1 for yes and 2 for no.

1. Enter single digit

2. Would you like to pick up this prescription today or tomorrow? Press 1 for today and 2 for tomorrow.

1. Enter single digit

1, 2. What time would you like to pick up your prescription?

Please allow at least two hours for us to fill your prescription. Type in the hour, followed by the minutes, followed by the pound sign.

Your prescription will be ready at <time><am/pm><today/tomorrow>. Would you like to order another refill? Enter 1 for yes and 2 for no.

1. Enter single digit

2. Less than 2h from now
   - More than 2h from now

   You typed <repeat back time>. Press 1 for am and 2 for pm.

1. Enter single digit

1. Enter three or four digits followed by #
0. Don't think this is a usability problem.
1. Cosmetic problem
2. Minor usability problem
3. Major usability problem; important to fix
4. Usability catastrophe; imperative to fix

*. (Gold star) This aspect exemplifies best practices under this heuristic.

**Nielsen’s Heuristics**

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