## NYUSteinhardt
Steinhardt School of Culture, Education, and Human Development

**EDCT-GE 2015: Interaction Design for Learning Environments**
Department of Educational Communication and Technology
Steinhardt School of Culture, Education, and Human Development
Fall 2014l Tues 6:45-8:25pm l Bldg 2 MetroTechCtr Rm: 813
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## Summary
This design course seeks to empower students to define, defend, and think through the details of a design. If you can clearly articulate what you were trying to do, why you chose your approach, and can map out how you would execute that activity, you will become an effective designer/producer. Not only that, if you are claiming to also create something "educational" – you will want to be able to back up that claim – good designs support good teaching and learning. This course is more than just the hardcore nuts and blots of site maps, wireframes, prototypes, etc. This course is also about the integrity of an interactive experience that focuses on context, a solid rationale, good teaching and learning, and common sense. In short, this course is a hands-on experience in going through the design process, and working within a community of other designers.

| # | Date | Topic | Due |
|---|---|---|---|
| 1 | 9/2 | **Course Overview** | |
| 2 | 9/9 | **Defining the Problem** | Biography and Initial Sketch/Map |
| 3 | 9/16 | **Approaches to Design, Brainstorming and Critiques** | Design Problem |
| 4 | 9/23 | **Ideation: Sketching Alternatives** | Design Approaches and Bug List |
| 5 | 9/30 | **Core Concepts of Design** | Sketching Alternatives |
| 6 | 10/7 | **Design Synthesis** | Group Brainstorm |
| -- | 10/14 | **No Class** | |
| 7 | 10/21 | **Personas + Scenarios + Storyboarding** | Design Synthesis |
| 8 | 10/28 | **Design Rationales** | Scenarios and Storyboard |
| 9 | 11/4 | **Paper Prototyping** | Design Defense |
| 10 | 11/11 | **Intro to Prototyping Tools** | Paper Prototype |
| 11 | 11/18 | **Communication and Evaluation** | Digital Prototype v1 |
| 12 | 11/25 | **Prototyping 2** | Digital Prototype v2 |
| 13 | 12/2 | **Critical Reflection on Design** | Politics of design |
| 14 | 12/9 | **Presentations** | Final Prototype + Design Doc |
| 15 | 12/16 | **Presentations** | |

## Required Texts/Tools
- **Textbooks**:
    - Designing for Interaction (2$^{nd}$ Edition) by Dan Saffer
    - Universal Principles of Design by Lidwell & Holden
- **Sketching Tools**: Each week, you should bring to class a sketchbook and a dark pen, pencil, OR other sketching tool(s) of your choice (e.g., an iPad or another tablet).
- **Readings**: Posted on NYU Classes "Resources" section as links or PDFs

**Optional Books:**
- The Design of Everyday Things by Donald Norman
- Change by Design by Tim Brown
- Prototyping: A Practitioner's Guide by Todd Zaki Warfel

## Grading

I expect that you have: completed the reading, both assigned and additional reading of your own choosing, taken notes in the form of a designer's journal, and answered questions/completed exercises provided by me in preparation of the meeting; and that you participate in a lively class discussion.

| Class Participation | Bottom line: Come to class, stay awake, and do the readings so you can engage in the discussions. | 20% |
|---|---|---|
| Design Journal/ Individual Assignments | Reflections on the readings and design exercises assigned as homework. | 40% |
| Individual Project | The presentation, prototype, and write-up. | 40% |

**Attendance**
Students are expected to attend all classes. Students who miss class should contact the professor, in advance if possible. Students are responsible for any material that was missed. Students are expected to arrive at class on time and to not leave early.

**Academic Integrity**
All students are strongly encouraged to read the NYU Steinhardt Statement on Academic Integrity. A copy is available by email from the instructor or at http://steinhardt.nyu.edu/policies/academic_integrity

# Design Journal
The Designer's Journal is a simple diary of observations and reactions to the readings and examples we will look at in class. In addition, I will be asking you to complete a series of mini-assignments (short "brain-sprints" or simple activity ideas/challenges that may arise during class meetings.

On a week-to-week basis, I want you to keep a journal of discussion topics, observations, mini-assignments, and other information you may gather during the semester.  This journal should be posted on-line, in the form of a blog, so you can incorporate images, links and other appropriate media to accompany your observations.

Your entries will vary- sometimes they might be reactions to the weekly readings, other times they might be observations gathered from an installation, website, or technology-based experience.  They my also be very "slice-of-life" oriented- reflections of experiences and observations in your everyday world.

Use the journal to track the weekly reading material. Summarize the most important ideas and questions for each paper and book chapter you have read in approximately one third to one half of a page.  This is not a reaction paper or an excerpt, but rather your synthesis of the main ideas and related questions.  Use these summaries to create a journal (blog or wiki) that is the basis for your discussions in class, for your design document, and, later, a summary of the topics covered in this course.

The purpose of this journal is to remind you to constantly observe, ask questions, and think about the world around you in the context of interaction design.

# In-Class Exercises
We will be engaging in a series of in-class exercises that are group-based. In this way we will learn-by-doing, while also engaging in a group-based design approach.

# Individual Project
The centerpiece of this course is a design project that you will develop, over the course of the semester, from the conception of the problem you want to solve, through design research and ideation, to the stage of a digital prototype. Along the way, you will create a number of artifacts that represent different stages of the design process (sketches, personas, low-fi prototypes, etc.). We will use the class activities and homework to move the projects forward. The project for this class is an *individual* project. The idea is that an individual can focus on a problem each member really cares about—whether because it connects to her research interests or an aspect of her personal life—and then get the experience of going through the steps of systematically developing a solution to that problem. In turn at the end of the semester, each student will have a body of her own design work that she can use in your portfolio or as a starting point for developing the project further.

**Design Problem:** Social software continues to pervade our daily lives, influencing with whom we connect, the news to which we are exposed and the entertainment with which we amuse ourselves. Yet in addition to our online social networks of friendship and shared interests, everyone also lives in a specific physical community -- a neighborhood. Each neighborhood is a locale with a distinct mix of individuals, resources and needs, with the particular complications of space, awareness and privacy that go along right in hand. Considering both the benefits and challenges of physical proximity, what kinds of applications, interactions or services can we design that support and leverage our neighborhoods?

Over the course of the semester, your project will be to design a system to an activity or relationship within the particular context of a neighborhood that is important to you but which is not sufficiently well supported by current tools. This context may take many forms, such as sharing of resources (i.e. a book exchange, carpool system, parking swap), organizing neighborhood events (i.e. a block party, picnic or holiday celebration), providing social support (i.e. sharing duties for childcare or eldercare) or encouraging local civic engagement (i.e. organizing a park clean-up day or community garden). These ideas are a starting point, but do not feel limited by them.

As part of your project, you'll need to define what the specific neighborhood-focused activity is you wish to address and what aspects of it you are trying to support. Think about how that activity is currently supported via technology, what doesn't work about current ways of supporting it, and how your solution will do this better. The specificity of addressing a particular neighborhood allows you to deeply think about what makes the location/community unique and how you would best want to support it. So, dive in and see what you can come up with.

**Scoping**: One way to think about scoping is in terms of the number of steps or interactions that your system will support. Think about the process of shopping on Amazon. You first search, then the results page appears, then you click on a result to see the details for that item, then you add the item to cart, then you click to check out, etc. Each of these steps--entering a search term, clicking on a result, adding an item to cart--is a user interaction. Some of these interactions happen on the same page (e.g., adding to cart and clicking the Check Out button both happen on the item details page), while other interactions move the user to a new page (clicking on an item in the results list open the page with the detailed information for that item).

For your project, you should aim to prototype between **15 and 30 user interactions** (steps through the system) that take place across **5 to 10 panels** (e.g., web pages, screens of a mobile application). Most of the panels should be unique.

**Final note:** this is an *interaction design* class, which means that we are focusing on the front-end or user-facing aspects of technology: web pages, mobile apps, the control interface for home automation systems, etc. There are a lot of interesting problems which have a user-experience component, but which are ultimately not front-end problems. For instance, the order in which Yelp or Amazon results appear is fundamental to the user experience of these systems and is something these companies spend a lot of time thinking about and working on. However, determining the results order would not be a good project for this class since this is an algorithmic problem, not a user interaction problem. Pick a project that lets you develop a set of interesting user interactions, not something that is fundamentally about under-the-hood machinery.

## Schedule

### Week 1: Course Overview

### Week 2: Defining the Problem

**Readings:**
- Chapter 1 + 2 + 4 in Saffer, D. (2010). *Designing for interaction: Creating innovative applications and devices* (2nd ed.). Berkeley, CA: New Riders.

**Homework due this week:**

*Biography*: Add a one paragraph biography of yourself to the course forum on NYU Classes. Include your prior education, work experience if you have it, and your background in interaction design if you have any. This could be particular skills you have or any software tools you know how to use related to design, prototyping, etc. If you have developed any kind of interactive system before, please note that too.

*Individual Project Design Sketch*: Sketch/map out what you know about how you maintain this relationship over distance. As discussed in class, attempt to tease out the broader system inputs at play that may contribute to specific interactions (i.e. context). The goal here is to engage in framing and reframing potential problems to focus on and to surface assumptions you may want to eventually test out.

## Week 3: Design Critiques

**Readings:**
- Spool, J. (2012) Goods, Bads, and Dailies: Lessons for Conducting Great Critiques
  https://www.uie.com/articles/great_critiques/
- Design Critique and the Creative Process http://www.alistapart.com/articles/design-criticism-creative-process/

**Homework due this week:**

*Individual Project Design Problem*: Submit a 1-page problem statement for your individual project. Specify what particular activity you intend to support in a given neighborhood context. Describe what you believe is done currently do to support this activity, what works well and doesn't work well about that current practice. Finally, think about what the essential functions are that a tool would need to have that would, from your perspective, support this neighborhood activity in a robust way. Your goal is to consider the human and social nature of the problem and what existing designs lack in addressing the problem. You can optionally cite related work or resources that will not count towards your one page limit, but this is not required.

## Week 4: Ideation: sketching alternatives

**Readings:**
- "Chapter 4: The perfect brainstorm" in Kelley, T., & Littman, J. (2001). *The art of innovation: Lessons in creativity from IDEO, america's leading design firm*. New York: Currency/Doubleday.
- Buxton, B. (2007) "The anatomy of sketching" in *Sketching user experiences.* New York: Morgan Kaufmann.
- Dow, S.P., Glassco, A., Kass, J., Schwarz, M., Schwartz, D.L., Klemmer, S.R. (2010). Parallel Prototyping Leads to Better Design Results, More Divergence, and Increased Self-Efficacy. *ACM Transactions on Computer-Human Interaction*, 11(4).
- Case Study: Mullaney, et al. Thinking beyond the Cure: A Case for Human-Centered Design in Cancer Care. *International Journal of Design 6*(3), 2012.

**Homework due this week:**

*Approaches to the Individual Design Problem*: Submit a 2-page write-up that describes at least three different design approaches you could take in addressing your design problem. Try to make these approaches as diverse as possible from one another.  For instance, consider the different types of technology or infrastructure you could leverage, or different strategies that you could embody in your system (e.g., for an application that helps you maintain awareness of the physical condition of elderly members of the community, you might consider whether other caregivers will be interacting with the system; if the relative has sensory or cognitive impairments that will need to be addressed; whether the individual(s) in question would actually use a given type of technology or tool and so forth). Your approaches should be developed within the context of interaction design. Consider how users might interact with a proposed system, what problem it will solve, and why it would be an improvement over existing solutions.

*Bug List*: There are currently many different types of social software, some of which you probably already use to maintain the relationships you decided to focus on. For this assignment, take a critical look at these systems and articulate what their deficiencies are in respect to supporting your target relationship. In the industry, this is called "competitive analysis" and in academia "related work." As you research these systems, compile a list of problems or frustrating aspects of the current solutions to your problem. This list can be a starting point for your thinking of how your own solution can do things better. Submit a link to your list of problems and frustrations with other systems as part of your homework assignment (Bill Buxton calls such lists the "bug list").

## Week 5: Core concepts of design

**Readings:**
- Norman, D. (2002) *The design of everyday things*. Chapter 4 (p 81 - 104); Chapter 7 (p 187-206).
- Selections from Lidwell et all "universal principles of design" Sections: Affordance, Archetypes, Constraints, Consistency, Form follows Function, Flexibility-Usability Tradeoff, Hick's Law, Ockham's Razor.

*Suggested*:
- Plass, J. et al. (2011) *Learning Mechanics and Assessment Mechanics*. http://g4li.org/wp-content/uploads/2011/11/G4LI-White-Paper-01-2011-Learning-Assessment-Mechanics.pdf
- Dickey (2006) *Game Design Narrative for Learning: Appropriating Adventure Game Design Narrative Devices and Techniques for the Design of Interactive Learning Environments*.

**Homework due this week:**
*Sketching Alternatives*: Take a 11"x17" piece of white paper and divide this paper into 40 2"x2" squares. Sketch 40 solutions to your design problem, one in each square, writing a brief caption for each to help someone else understand the idea each sketch conveys.

A few important guidelines:
- Focus on quantity not quality
- No two ideas should be alike
- Include ideas from existing products or prior research
- Every caption should include an active verb, conveying what the solution does to address the problem.
- If you get stuck, think about different contexts in which your system could be used to inspire new ideas
- Submit a link to a digital version of your 40 squares (a scan, a photograph, etc.).

## Week 6: Design synthesis

**Readings:**
- "Chapter 5" in Saffer, D. (2010). *Designing for interaction: Creating innovative applications and devices* (2nd ed.). Berkeley, CA: New Riders.
- "Chapter 1" in Kolko, J. (2011). *Thoughts on Interaction Design* (2nd ed.) Burlington, MA: Morgan Kaufmann (pg. 20 - 39)

**Homework due this week:**
*Group Brainstorm*: You will need to meet with your Individual Project Peer Review Groups sometime during the week. Plan to schedule about 2 hours of out of class time for your meeting. Spend 30-40 minutes per group member brainstorming solutions for each group member's project using the techniques we talked about in class. Type, handwrite, or sketch out the results of your individual brainstorming session and turn them in through NYU Classes (you can scan/photograph sketches or hand-written notes).

## Week 7: Personas, Scenarios & Storyboarding

**Readings:**
- Carroll, J. M. (1999). Five reasons for scenario-based design. In *Proceedings of the 32nd annual hawaii international conference on system sciences - 1999* (pp. 1-11).
- Nathan, L. P., Friedman, B., Klasnja, P., Kane, S. K., & Miller, J. K. (2008). Envisioning systemic effects on persons and society throughout interactive system design. In *DIS '08: Proceedings of the 7th ACM conference on designing interactive systems*. ACM.
- Greenberg et al. Sketching User Experiences: The Workbook. Section 4.4: The Narrative Storyboard (p. 167 - 177)

*[suggested]*
- http://interaction-design.org/encyclopedia/personas.html
- Case Study: http://erskinedesign.com/portfolio/lift-derby/, http://erskinedesign.com/portfolio/apprenticeships/

**Homework due this week:**

*Design Synthesis activity:*
Take the alternatives you sketched out in week 4 and brainstormed on in week 5.  Cluster them into ~3--5 high-level functional categories.  Explain why these are clustered in this way.  What is consistent?  What was redundant?  What is unrelated?  Pick an approach: choose the one functional category that you want to develop for the remainder of the term, and articulate why this is the one chosen (best fit, most realistic address to constraints, etc.)  Type, handwrite, or photograph your results and turn them in through NYU Classes (you can scan/photograph sketches or hand-written notes).

## Week 8: Design Rationales

**Readings:**
*   MacLean, A., Young, R. M., Bellotti, V. M. E., & Moran, T. P. (1991). Questions, options, and criteria: Elements of design space analysis. *Human-Computer Interaction*, 6(3-4), 201-220. (through section 2)
*   Case Study: http://vesperapp.co/blog/how-to-make-a-vesper/

**Homework due this week:**
*Scenario*: Create a set of task scenarios that demonstrate the sequence of actions the user(s) will have to go through in order to achieve their practical goals. You will use these scenarios both to guide your designs and to assess your designs throughout the rest of the project. You should end up with 3 to 5 primary scenarios; more than this will make it difficult to focus. You will also have to make a judgement call about how detailed to make the task descriptions but they should be at least as detailed as the examples in the Carroll reading.

*Storyboard*: Design a storyboard that shows how a user or users will interact with your design. The storyboard should highlight important aspects of how your design will be used along with transitional frames that show how a user will navigate through the system. Submit at least 1 storyboard with 5 frames (or 2 storyboards with 3-5 frames). The scenario is the story or script of how a user will use your system and the storyboard is a graphic depiction for how the story will play out in the system. A storyboard is an early version of paper prototypes of the screens in your system.

A note: to make storyboards useful, try to think about what you can learn from drawing your solution out, over what you can get from just a narrative scenario. In other words, a storyboard should be a little more than just a drawn scenario. Try to represent physical environment or other type of context (e.g., location of other people) which might help you think through how your system needs to work.

## Week 9: Paper Prototyping

**Readings:**
*   Moggridge, B. (2007) "Prototypes." In *Designing Interactions*. Cambridge, MA: The M.I.T. Press, pp. 682-723. (Through NYU eBrary)
*   Chapter 8 in Saffer
*   Rettig, M. (1994). Prototyping for tiny fingers. *Communications of the ACM*, *37*(4), 21-27.
*   Case Study: Wii: http://iwataasks.nintendo.com/interviews/#/wiiu/miiverse2/0/0

**Homework due this week:**
*Design defense*: Using QOC (MacLean et al) as inspiration, work through the design considerations for one critical feature of your project, based on your scenarios/storyboards.  In ~1-2 pages of text, describe your design rationale: articulate 3 different approaches to this feature and consider the tradeoffs between these approaches and which one you want to adopt.

## Week 10: Introduction to Prototyping Tools

**Readings:**
GUI Prototyping Tools: http://c2.com/cgi/wiki?GuiPrototypingTools

+ Selection of tutorials targeted at specific tools

**NOTE**: No reading response due this week!

**Homework due this week:**

*Paper Prototype*: The goal of this assignment is to learn how to use low-fidelity prototyping in the early stages of design. Using paper, sticky notes, scissors, tape, and any other supplies you may want to use, create a paper-prototype of your project solution. Focus on tasks and interactions. You do not have to prototype the whole system, but try to prototype as many of the interactions you are planning to implement in your medium-fi prototype as you can. Prototype at least 10 screens and at least 10 interactions (interactions can be as small as clicking a button to select an item and as large as searching for an item and having an entirely new screen show up). Try to have a reasonable balance of some bigger and some smaller interactions--I want to see a rich and diverse set of interactions in your prototypes. To make this exercise as useful to you as possible, make sure to prototype all the interactions about which you are uncertain and for which you'd like to get feedback from your peers and me. In your writeup, describe the design decisions you made, what did or did not work well in the process, and what you might do differently if you redesigned your prototype. Your write-up should be at least 1 page of single-spaced text plus a **video** (using a phone camera is perfectly fine) of your paper prototypes. *Bring your prototype to class for Week 10*.

## Week 11: Communication and Evaluation

**Readings:**
- "Chapter 3: Design Strategy" in Saffer, D. (2010). *Designing for interaction: Creating innovative applications and devices* (2nd ed.). Berkeley, CA: New Riders.

**+TBA [case study/example proposal document, posted on NYU Classes in advance]**

**Homework due this week:**
*Digital Prototype Version 1*: First version of digital prototype. This should be based on your scenarios and storyboards and your designs from earlier assignments. Figure out what tools you want to design your prototype in and start to translate your storyboard into an interactive prototype. Your final digital prototype should have at least 15 interactions, where an interaction is defined as having a trigger (e.g. click, button) cause an event (e.g. new screen). Your digital prototype should look polished and visually appealing, but the focus is on the interactions. It should look like something that you would be excited to show a client, or colleague, or boss.

## Week 12: Prototyping 2

**Readings:**
- pp. 245-260 in Buxton, B. (2007). *Sketching user experiences*. (sketchinguserexperience4.4.pdf)
- Rudd, J., Stern, K., & Isensee, S. (1996). Low vs. High-fidelity prototyping debate. *Interactions*, 3(1), 76-85.

**Homework due this week:**
*Digital Prototype Version 2*:  Keep plugging away on your digital prototypes. Upload link to the current state of your project. (Version 1 and 2 are not graded individually; they are a process steps to ensure you are making progress on this large deliverable.)

## Week 13: Critical Reflection on Design

**Readings:**
- Kelly, K (2009) "Triumph of the Default" **http://www.kk.org/thetechnium/archives/2009/06/triumph_of_the.php**
- Winner, L. (1986). Do artifacts have politics? In *The whale and the reactor*, pp. 19-39. Chicago: University of Chicago Press.

**Homework due this week:**
*Politics of design:* Earlier this year, Google released Google Glass, a wearable computer attached to eye glasses that contains a camera that can be used to unobtrusively take a picture of anything the user is looking at. There has been a lot of commentary about Glass since it was first released, ranging from enthusiastic endorsements to serious concerns about how the technology will change social relationships, people's expectations of privacy, and our relationship with technology. In one two pages of text, think through what you see to be the important implications of a widespread use of technologies such as Glass. What kinds of issues—social, political, and personal—come up? When and how do the design decisions in Glass help Google the company versus helping the individual users of the technology?  When and how are interaction designers responsible for these kinds of ethical trade-offs?

## Week 13 + 14: Presentations

**Readings:**
none

**Homework due this week:**
The final prototype and write-up are due at midnight before class. Presentation is (obviously) due in class. Late submissions will have points deducted. If you aren't able to meet this deadline and you have special circumstances, please contact me by December 2nd to discuss.

*Final Medium Fidelity Prototype*: Upload a link to your prototype or a video of your prototype to forum on NYU Classes. During class next week, everyone will do a brief presentation of their project. I will video your presentations (for my private use to make sure I have time to grade them fairly). Bring your laptop to class next week if you need a PC.

*Final Write-up*: Your write-up should be 3-5 pages single-spaced with sketches and screen shots as appendices, these don't count for the page limit. Please don't feel the need to add as many screenshots as you possibly can. Select ones that convey useful information. Focus on quality and polish as if you were delivering it to a client.

Suggested outline for write-up:
1. Problem statement.
2. Solution overview
3. Describe the final design
    a. Describe the functionality (i.e., what you can do with it)
    b. Provide a description of the main parts of the design flow. This is important because it will provide you with a record of how the design worked or was intended to work, long after the implementation no longer works. It could in principle also act as a deliverable to hand off to an implementer.
    c. What was left unimplemented?
    d. Sketching techniques and approaches
    e. Tool(s) you used to develop the design
    f. Pros and cons of these approaches and tools for your project
4. Design Evolution
    a. Describe how your design changed from initial sketches, brainstorming, low-fidelity prototype, to final design
    b. Show what the major changes were and why they were made.
    c. Relate your design process and choices to the readings.
5. Measuring Success
    a. Learning objectives

*Please upload your write-up as a PDF document to the Assignments section of NYU Classes* (i.e., not the forum, as have been doing for previous assignments). Make sure that your write-up contains the link to your prototype.

***Presentation details***
Presentation length: **10 minutes**. This length will need to be strictly followed to ensure that everyone gets a chance to present their project and that we finish the class on time.

Presentation content: The main purpose of the presentation is to showcase to the class what you have been working on this term. To do this effectively in such a brief time, I'd suggest something like the following structure:
- A brief description of what problem you tried to solve in your project and why this problem is important.
- A high-level overview of your solution. (e.g., "I created a prototype for a mobile-phone application that enable users to do X, Y, and Z.")
- A walkthrough of one of two key features of the application. You can do this with screenshots in your slides, or you can create a video that walks the audience through these features. Please don't try to do a live demo! With short presentations, a live demo just won't work well. Script what you want us to see and then either video-record it or practice to do the walkthrough effectively with slides.
- The design rationale for an important design decision you had to make during the project. This is to give us a flavor of the kind of thinking that went into the project.

The above is a suggested format, but this format is not required. If you think you can give an effective introduction to your project using a different format, go for it. Feel free to do whatever you think will give your peers and me a good understanding of what you did and how you thought about your project. As long as it doesn't take any longer than 10 minutes.

Logistics: please bring your presentation on a thumb drive OR arrange in advance to use the class laptop. We'll need to transition between people pretty quickly.

## <u>Credit</u>
Thanks to Frank Miglioreli at NYU, and folks at the University of Michigan for making their syllabi available. Parts of this syllabus are taken from their courses.