

Design Principles and Practices

ATEC2384.501.15S Mon, Wed, 5:30pm-6:45pm ATEC 2.602 Spring 2015	Dr. Jillian D. Round, Lecturer I <i>jdr046000@utdallas.edu</i> Office hours Mondays, 4-5 p.m. in ATEC 3.305
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This course surveys over 100 design principles applicable to nearly every design profession. You will gain a foundational understanding of universal laws of design, human factors and design methodologies that you can use throughout your education and career pursuits.

Learning Objectives

Upon successful completion of this course, students will:

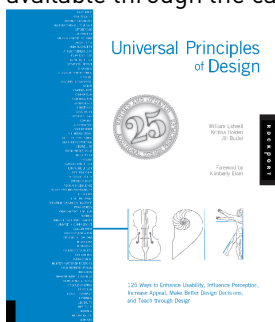
- Be able to identify principles of design in objects, digital and analog
- Articulate steps within the design process and prepare materials related to and around the process
- Critique and judge designs by principles, rather than notions or vaguely-formed opinions

Course Materials

In addition to an open mind, you will need:

- A sketchbook (without lines)
- A sharpie
- 1 pack of Post-its

All readings are available electronically, either through McDermott Library or as an excerpt. The following books are the basis for this course. I will provide glossary terms, but more in-depth understanding can be reached through assigned text. The books are also available through the campus bookstore and kindle:



Universal Principles of Design William Holden



Managing the Design Process: Implementing Design Terry Lee Stone

Course Requirements and Grading

A list of assigned readings and materials is attached. Supplemental materials may be provided or posted electronically. Advance preparation and enthusiastic participation is an important part of the learning experience and critical to in-class discussions.

- 10% Attendance
- 20% Quizzes
- 20% Weekly Assignments
- 25% Semester Project Phases 1-2
- 25% Semester Project Phases 3-4

Semester Project

Select a website, app, online interaction, operating system, or other interactive visual media to redesign.

Your project will be in two parts: a cognitive teardown, disassembling the current design using the principles discussed in class, and a cognitive build-up, your reconstruction of the design. You may work in groups of two to three.

Part 1: Cognitive Teardown

The cognitive teardown allows students to demonstrate an understanding of design principles discussed in class by analyzing and critiquing the design of a product related to their area of interest.

Part 2: Cognitive Build-Up

The cognitive build-up allows students to demonstrate an understanding of the design principles discussed in class by creating a design (or a redesign) for a product related to their area of interest.

Introduction: What is Design?

We define what we mean by 'design'. The following sentence by John Heslett should seem less esoteric by the end of class: Design is to design a design to produce a design.

Week 1
Jan 12, 14

Semester Long Project Overview

Day 2- Introduction to Principles: Less is More

The more stuff in it, the busier the work of art, the worse it is. More is less. Less is more.

Principles (available in pdf online through e-learning)

Form Follows Function – *beauty is purity of function*
Ockham's Razor – *choose simplest of functionally equivalent designs*
80/20 Rule – *80% of products use involves 20% of its features*
Flexibility-Usability Tradeoff – *as flexibility increases, usability decreases*
Horror Vacui – *tendency to fill blank spaces*
Propositional Density – *relationship between design elements and meaning they convey*
Signal-to-Noise Ratio – *choose design that has high signal-to-noise ratio*

Preparation Readings (available online through e-learning)

Garret: *User Experience and Why It Matters*
Buxton: *Sketches Are Not Prototypes* (PDF)
Buxton: *Why Should I Sketch* (online)
Buxton: *The Sketchbook: Your Basic Resource for Recording, Developing, Showing and Archiving Ideas* (online)

Less is More-Cont.

The more stuff in it, the busier the work of art, the worse it is. More is less. Less is more.

Week 2
(No class
Jan 19)
Resume
class Jan 21

Principles (Quiz)

Form Follows Function – *beauty is purity of function*
Ockham's Razor – *choose simplest of functionally equivalent designs*
80/20 Rule – *80% of products use involves 20% of its features*
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In-Class Design Challenge

Be dense: Calculate the propositional density of a logo

Assignment

Quiz: Less is More (Wed)

Design Process

Week 3
Jan 26, 28

We examine a design process that allows you to interpret and intentionally address a problem. A problem should be approachable, understandable and actionable, and it should be clearly scoped—not too big nor too small, not too vague nor too simple.

Principles

Accessibility – objects should be usable by as many people as possible
Design by Committee – design process based on group consensus
Development Cycle – heuristic steps of discovery
Garbage-In-Garbage-Out – quality output depends on quality info in
Iteration – repeated operations to reach desired result
Life Cycle – stages of product existence
Most Advanced Yet Acceptable – finding most commercially viable design aesthetic
Personas – use archetypes to guide decision making in design process
Prototyping – simplified models to explore ideas
Satisficing – settle for satisfactory rather than optimal solution
Scaling Fallacy – tendency to assume system will also work at different scale
Storytelling – create imagery, emotions and understanding

Reading Preparation (available online through e-learning)

Buxton: *10 Plus 10: Descending the Design Funnel*

Assignment

Quiz: Design Process (Wed 28)

Project: Pitch three (3) ideas for possible redesigns

Aesthetic Bias

Week 4
Feb 2, 4

We examine our natural bias toward beauty and order.

Principles

Aesthetic-Usability Effect – aesthetic design perceived to be easy to use
Attractiveness Bias – why beautiful people excel
Baby-Face Bias – attraction to all things cute
Closure – seeing groups of design elements as one large design element
Constancy – perception of constancy in spite of actual expression
Fibonacci Sequence – sequence of numbers that are sum of two preceding
Golden Ratio – geometric theorem for balance in design
Good Continuation – Gestalt of perceived connectivity of elements
Law of Prägnanz – tendency to interpret ambiguous info
Picture Superiority Effect – remember pictures better than words
Prospect-Refuge – tendency to prefer unobstructed views and areas of concealment
Savanna Preference – aboriginal preference for open spaces
Wabi-Sabi – objects that embody nature and simplicity are more meaningful

Preparation Reading (Online through e-learning)

Anderson: *In Defense of Eye Candy* (online)
Gupta: *Applying Mathematics to Web Design*

Discussion: Infographic Sketching

Assignment

Quiz: Aesthetic Bias (Wed 4)

Project - Phase 1: Begin research into your redesign: competitors

Dimensional Perception Preferences

Week 5
Feb 9, 11

We examine how we perceive the three-dimensional world around us.

Principles

Common Fate – objects in the same direction are related

Defensible Space – space that indicate territory and ownership

Figure-Ground Relationship – perceived objects in front of a field

Orientation Sensitivity – discrimination of directional elements

Three-Dimensional Projection – tendency to perceive world in 3-D

Top-Down Lighting Bias – tendency to understand source of lighting

Visibility – spatial cognitive understanding

Wayfinding – special information to enhance navigation

Presentation: Review Breakdown of final project.

Reading Preparation

99% Invisible Podcast #126: *Walk This Way*

In-Class Design Challenge

You Are Here: Wayfinding Challenge

Assignment

Project - Phase 1: Begin research into your redesign: company history

Aesthetic Toolbox

Week 6
Feb 16, 18

We examine principles that can be used in composing designs, displaying information and creating interfaces.

Principles

Alignment – design elements align along hidden lines

Color – symbolic meanings in color to manipulate and emphasize

Consistency – usability improved when similar parts expressed in similar ways

Convergence – synonym for stability in designed solutions

Highlighting – bringing visual attention to design elements

Iconic Representation – icons improve recognition and recall

Modularity – complex system divided into smaller compatible parts

Normal Distribution – symmetrical data, bell-curve

Proximity – info close together perceived to be related

Rule of Thirds – composition technique for balance

Similarity – elements of similar nature seem related

Symmetry – visual equivalence among elements

Preparation

RadioLab Podcast: *Rippin' the Rainbow a New One*

Charchar: *The Secret Law of Page Harmony*

White: *10 Rules of Color*

White: *What is Color Theory?*

In-Class Design Challenge

Four Icon Story: Tell a famous story using four icons

Assignment

Quiz:

Perception Prefs and Aesthetic Toolbox (Wed)

Project - Phase 1: Research brief

Week 7
Feb 23, 25

Psychology and Aesthetics

We examine our psychology and the limits of our ability to perceive.

Principles

Biophilia Effect – nature views enhance focus and concentration
Cathedral Effect – high ceilings for creativity; low ceilings for detail-oriented thinking
Cognitive Dissonance – tendency to seek consistency in thinking
Depth of Processing – deeply analyzed information is quickly recalled
Framing – manipulating how information is presented
Hierarchy of Needs – stratification of aesthetic needs based on Maslow
Inattentional Blindness – inability to process something in plain view
Mnemonic Device – organize information to make it memorable
Nudge – alter behavior with little changes
Operant Conditioning – perceptual modification via range of stimuli
Priming – activating concepts in memory to influence subsequent behaviors
Threat Detection – natural abhorrence to negative imagery
von Restorff Effect – well placed discontinuity to engage memory

Preparation

99% Invisible Podcast #76: *The Modern Moloch*

Assignment

Quiz: Psychology and Aesthetics (Wed)

Project - Phase 2: List of deliverables

Week 8
March 2, 4

Human Factors

We examine how to optimize how we as humans interact and perform within a system.

Principles

Affordance – physical design telegraphs use and function
Desire Line – traces of use that indicate preferred methods of interaction
Entry Point – obvious point of entry into a design i.e., front door
Expectation Effect – leading the audience to an expected result
Forgiveness – help users avoid and minimize of consequences of errors
Freeze-Flight-Fight-Forfeit – ordered sequence of responses to acute stress
Interference Effects – conflicting cognitive processes slow down thinking
Mapping – cognitive understanding to initiate actions
Mental Models – cognitive understanding based on experience
Mimicry – transferring understood properties to new things
Performance Load – greater the effort, greater chance of failure
Performance vs. Preference – optimum gives way to preference
Progressive Disclosure – sequentially disclosed information
Readability – quick understandability
Recognition Over Recall – memory for recognizing things better than for recalling
Serial Position Effects – info at ends more memorable than middle

Preparation

McRaney: *Confirmation Bias*

In-Class Design Challenge

Interface Reducation

Assignment

Quiz: Human Factors (Wed)

Information Architecture

Week 9
March 9, 11

We examine how to organize, label and otherwise architect information within complex information systems.

Principles

Chunking – clustering information & elements to make memorable
Comparison – represent two or more variables in a controlled way
Confirmation – designed barriers to take next steps
Constraint – designed limitations to guide user
Control – put user in the drivers seat according to expertise
Feedback Loop – information return to modify future behavior
Fitts' Law – time to move target is size and distance
Five Hat Racks – ways to organize information
Gutenberg Diagram – general pattern of eyes reading information
Hick's Law – time increases as alternatives increases
Hierarchy – complex information organized and structured visually
Layering – organize info into related groups
Legibility – visual clarity, contrast, spacing etc.

Preparation

Norman: *User-Centered Design*

In-Class Design Challenge

Dollar Redesign: Redesign the US Dollar to make it accessible to as wide an audience as possible

Assignment

Quiz: Info Architecture

Project - Phase 2:
Preliminary Plan

March 16-21st Spring Break

Sex Appeal

We examine factors that contribute to our innate animal magnetism -- physical traits and psychological conditions.

Week 10
March 23, 25

Principles

Classical Conditioning – associate stimulus with physical or emotional response
Contour Bias – preference for contours instead of sharp angles or points
Face-ism Ratio – ratio of face to body influences perception
MAFA Effect – tendency to prefer facial features close to average of population
Red Effect – women wearing red more attractive; men more dominant
Uncanny Valley – anthropomorphic forms unappealing when very similar to humans
Veblen Effect – tendency to find product desirable because of high price
Waist-to-Hip Ratio – preference for particular ratio of waist size to hip size

In Class Movie

Assignment

Quiz: Sex Appeal (Wed)

Project - Phase 2:
Strategy Document

Week 11 March 30, April 1	Presentation: Project Update <i>Present your cognitive teardown of the object you are redesigning to your classmates and obtain feedback.</i> Preparation <i>Biederbeck: The Four Essentials of a Design Critique</i> <i>McDaniel: Design Criticism and the Creative Process</i>	Assignment Project - Phase 2: Present cognitive teardown and initial prototypes
Week 12 April 6, 8	Prototype Explorations <i>Explore various approaches to your redesign and obtain user feedback.</i> Preparation <i>Warfel: Eight Guiding Principles</i> <i>Warfel: Testing Your Prototype</i>	Assignment Project - Phase 3: Begin high-fidelity prototyping
Week 13 April 13, 15	High-Fidelity Prototyping <i>Explore simple methods to create high-fidelity prototypes.</i> In-class Movie /Discussion	Assignment Project - Phase 3: Continue work on high- fidelity prototypes
Week 14 April 20, 22	Final Presentations <i>Obtain feedback on your semester project before presenting. Dec.1</i> <i>Begin presentations of final projects. Dec.3</i> Preparation <i>Duarte: Slideology, 4-61</i>	Assignment Project - Phase 4: Produce final prototypes
Week 15 April 27, 29	Final Presentations <i>Present your semester redesign project</i>	Assignment Project - Phase 4: Present work

We will not meet for final exam week.

Schedule is subject to change upon instructor's discretion.