University of California, Berkeley
Jacobs Institute for Design Innovation
MDes Degree Program

Design Frameworks DES INV 200
Syllabus (version 0.2)
http://www.dubberly.com/courses/frameworks_2024_spring/

2024, Spring, meets Wednesdays
1:30 - 2:59 pm, Jacobs room 210/220, discussion sections (breakouts)
3:00 - 3:29 pm, break
3:30 - 4:59 pm, Jacobs room 310, lecture + activities (full group)

Faculty:
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Design Frameworks is a seminar course (in contrast to a studio course). The goal is to become better at "framing" — making mental models and interpreting them; that is, to expand your vocabulary so as to think more broadly about what-you-are-doing-when-you-design and to share your thoughts more easily with others.

Frameworks are what computer scientist Alan Kay has called "tools for thinking." An ever-evolving set of frameworks form a sort of professional literacy, helping designers understand situations more quickly and work with stakeholders more efficiently.

Frameworks describe relationships or processes that often repeat. We can represent these networks visually as graphs or other diagrams; and because they repeat, we can apply them to new situations as "templates".

Each class meeting in the first session, we will explore a series of "frames" for design — mindsets through which designers approach their practice — for example design as art vs. science vs. politics, rhetoric, and more. http://www.dubberly.com/courses/frameworks_2024_spring/design_as.pdf The core of the course will be a weekly reading and discussion, with each student also contributing reports on related ideas and supplemental readings over the term. In addition to completing each reading, you will also make a concept map highlighting the key ideas. At the end of the term, you will collect your concept maps into a summary booklet.

In the second session, we will explore a "model" commonly found in practice; discuss its origins and implications; and apply it in an in-class exercise. Here, too, students will be responsible for researching and presenting related models.

Weekly Schedule — Session1: Readings about frames of "design as…"

1 01.17   Novak+Gowin, *Learning How to Learn*
            - Dubberly
2 01.24   Meadows, "Thinking in Systems" + CLD video
            - Boulding, Pask
3 01.31   Davis, "Rethinking Design Education"
            - Hesket, Dorst, Maeda
4 02.07   Star+Geismar, "Boundary Objects"
            - Kahn, Johnson+Henderson, Norman (Bridge)
5 02.14   Dubberly+Evenson on Ikujiro Nonaka, "Design as Learning (SECI)"
            - Alexander, Robinson
6 02.21   Schön, "Design as a Reflective Conversation with the Situation"
            - Schön, Shannon, Rand, Munari
7 02.28   Simon, *The Sciences of the Artificial,* pgs 108-138
            - Kuhn, Koberg+Bagnall, British Design Council, Gerstner
8 03.06   Rittel, "On the Planning Crisis" or "Dilemmas" [wicked problems]
            - Winner, Suchman, Jacobs, Costanza-Chock, Papanek
9 03.13   Buchanan, "Wicked Problems in Design Thinking"
            - Saussure, Peirce
10 03.20   Sterling on Stuart Brand, "Pace Layers"
            - Brand, Duffy
11 03.27   Spring Break, no class meeting
            -
12 04.03   Gibson, "Affordances"
            - Dunne+Raby, Dourish, Norman
13 04.10   Bonsiepe, *Interface: An Approach to Design,* pgs 18-41
            - Bush, Kay, Licklidder, Laurel, Verplank
14 04.17   Hayek, "The Use of Knowledge in Society"
            - Yegge, Raymond, Porter, Andreessen, Anderson, Schumpeter
15 04.24   Willis, "Ontological Designing" (last class)
            - Winograd+Flores, Escobar
   05.01   Dead Week, no class meeting
            -
   05.08   Finals Week, Concept map book due electronically
            -
   05.10 ? Grades Due

            We will divide 51 students into 3 sections: 55 / 3 = 17 + 17 + 17
            In the first session, each section will meet with one of the instructors
            to discuss the reading.

            In each section, one student will present a synopsis of the main reading,
            a brief biography of the author, and discussion questions.
            Two other students will present a brief synopsis of a related reading.
            Kevin Ma will create a schedule for the presentations.

Weekly Schedule — Session 2: Models and modeling

1 01.17   Concept maps
- process maps, information primitives. Toast+toaster map exercises.

2 01.24   Causal-Loop Diagrams (CLDs)
- stocks+flows, feedback. Wolves return exercise.

3 01.31   DVF and its variants
- Venns, trees, and Hasse diagrams. DFV exercise.

4 02.07   User Conceptual Models
- Scheiner's Digital Machine. Washing machine exercise.

5 02.14   2-by-2s (2x2s)
- SWOT, Willing+Able, TP/TNvsFP/FN. Jacobs SWOT exercise.

6 02.21   Shannon's Model of Communication
- OSI, stacks, platforms, Maslow, iceberg. Telegraph exercise.

7 02.28   Problem spaces (latent spaces)
- Design process models. Juicer space exercise.

8 03.06   Transfer functions
- Flow, Coherence-vs-Flexibility. Trade-offs exercise.

9 03.13   Learning curves
- Porter's value chain, futures cone. Dictionary exercise.

10 03.20   Pace Layers and time
- Duffy's shearing layers, lifecycles. Grad-School Pace-Layer exercise.

11 03.27   Spring Break, no class meeting

12 04.03   Final project presentations
-

13 04.10   Final project presentations
-

14 04.17   Final project presentations
-

15 04.24   Final project presentations (last class)
-

     05.01   Dead Week, no class meeting

     05.08   Finals Week, Final project revisions due electronically

     05.10 ?   Grades Due

Process

Students will read a series of articles (and book chapters) and then create concept maps
or outlines representing the main ideas described in each reading.
The class will discuss the readings and how they relate to one another.
At the end of the course, students will compile a booklet including all their concept maps.

Guest speakers may visit to describe their ideas.

Grading

Weekly concept maps will be graded plus/check/minus.
Assignments receiving a minus should be revised.

The overall course grade will be calculated as follows:
- 20% for in-class participation (discussions and exercises)
- 20% for weekly reading notes (concept maps)
- 20% for presentations on main and related readings
- 40% for final project

In-class participation is affected by contributing to discussions;
missed readings and lack of preparation will also be noted.
No incomplete will be given, except in extenuating and unforeseen circumstances,
and you must have already completed a substantial portion of the course,
with a passing grade.

Grade scale from the Academic Catalogue:
A = Outstanding achievement, A– = Less so
B = Good achievement, B+ = More so, B– = Less so
C = Satisfactory achievement, C+ = More so, C– = Less so
D = Poor achievement
F = Failure

You may earn extra credit for:
- finding new models or frames and reporting on them
- reporting on examples of models applied in practice
- creating concept maps of additional readings

One path to an "A" is to complete all the assigned work and also to make a concept map for
each of the secondary readings, and compile all the maps into a PDF.

Course Policies

Participation is a key part of the class, and participation requires attendance.
Thus, attendance is required, unless a student is sick.
Tardiness and unexcused absences will affect grades.

Reading assignments and class discussions: There will be reading assignments each week, available on the internet or handed-out in class. You are expected to complete all readings and related concept maps before class. You are also expected to actively participate in discussions.

Integrity: You are requested to abide by the University of California's
Academic Integrity Policy.

This syllabus is a living document.
And this version is an unfinished draft.
We will release an update by the first class.
In addition, some aspects will change over the semester.

###

Weekly Readings — Citations and Links

Everyone is to read and map the texts in black;
the texts in gray are related and read by assigned students.

1 01.17 *Learning How to Learn*, Novak, J., and Gowin, B., Cambridge University
Press, 1984. Chapter 2, pgs 15-54.
http://www.dubberly.com/courses/design_theory_2017/01._a_
Learning_How_To_Learn.pdf

Dubberly, H., "Models of Models,"
http://www.dubberly.com/courses/design_theory_2016/01._c_Models_of_
Models.pdf

Dubberly, H., "Creating Concept Maps"
https://www.dubberly.com/wp-content/uploads/2010/03/ddo_creating_
concept_maps.pdf

2 01.24 *Thinking in Systems*, Chapter 1, "The Basics," Meadows, D., pgs 11-34.
https://wtf.tw/ref/meadows.pdf

"General Systems Theory: The Skeleton of Science, Boulding, K.
https://www.panarchy.org/boulding/systems.1956.html

"The Architectural Relevance of Cybernetics," Pask, G.
https://www.dubberly.com/courses/design_theory_2017/10._a_Pask_
Cybernetics.pdf

3 01.31 "Rethinking Design Education," Davis, M., *She-ji*, 2023.
https://www.dubberly.com/wp-content/uploads/2023/09/
FDE_Rethinking.pdf

Design: A Very Short Introduction, Chapter 1, Hesket, J.
https://www.dubberly.com/courses/perspectives_2022_fall/heskett.pdf

Notes on Design: How Creative Practice Works, Dorst, K. pgs 7-53.
https://www.dubberly.com/courses/perspectives_2023_fall/Notes_on_
Design_-_How_Creative_Practice_Works.pdf

"Computational Design," in Design in Tech Report, Maeda, J.,
Link ??? https://designintech.report/

4 02.07 "Institutional Ecology and 'Translation' of Boundary Objects Amateurs
and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39,"
Star, S. and Griesemer, J., Social Studies of Science, 1989, pgs 387-414.

https://www.dubberly.com/courses/design_theory_2017/04._a_Star_Griesemer_1989.pdf

"Locating Value with Alignment Diagrams," Kalbach, J. and Kahn, P., http://www.piim.newschool.edu/journal/issues/2011/02/pdfs/ParsonsJournal ForInformationMapping_Kalbach-James+Kahn-Paul.pdf

"User Conceptual Models," Johnson, J. and Henderson, A.
Link-to-come

"Gulf of Evaluation and Gulf of Execution," Norman, D., https://www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction/gulf-of-evaluation-and-gulf-of-execution

5	02.14	"Design as Learning—or 'Knowledge Creation'—the SECI Model," Dubberly, H., and Evenson, S., https://www.dubberly.com/wp-content/uploads/2013/06/Dubberly_Design-as-learning.pdf

Notes on the Synthesis of Form, Alexander, C., Chapter 6, pgs 73-83. http://www.dubberly.com/courses/design_theory_2017/06._a_Alexander_73 -83.pdf

"The Analysis-Synthesis Bridge Model," Robinson, et al., 2008. http://www.dubberly.com/wp-content/uploads/2016/02/ddo_interactions_ bridgemodel.pdf

6	02.21	The Reflective Practitioner, Schön, D., Chapter 3, "Design as a Reflective Conversation with the Situation," pgs 76-104. https://www.dubberly.com/courses/design_theory_2017/09._b_Design_as_ Reflection.pdf

"The Design Process," Schön, D., *Varieties of Thinking,* Ch. 7, pgs 110-140. https://www.dubberly.com/courses/design_theory_2017/09._a_The_ Design_Process.pdf

"The Mathematical Theory of Communication," Shannon and Weaver, https://www.dubberly.com/courses/design_theory_2017/03._a_Shannon.pdf

"Design and the Play Instinct," Rand, P. https://www.csus.edu/indiv/e/estiokom/design_play_instinct.pdf

Design as Art, Munari, B., pgs 25-51. https://www.dubberly.com/courses/perspectives_2022_fall/munari.pdf

7 02.28   *The Sciences of the Artificial*, Simon, Herbert, pgs 108-138.
           http://www.dubberly.com/courses/design_theory_2017/07._a_
           The_Sciences_of_the_Artificial.pdf
           The full book is here: https://monoskop.org/images/9/9c/Simon_Herbert_A_
           The_Sciences_of_the_Artificial_3rd_ed.pdf

           The Structure of Scientific Revolutions, Chapter ?, Kuhn, T.
           Link-to-come

           The Universal Traveler, Koberg, D., and Bagnall, J., pages 16-100.
           http://www.dubberly.com/courses/perspectives_2023_fall/universal-
           traveler.pdf

           "History of the Double Diamond," British Design Council,
           https://www.designcouncil.org.uk/our-resources/the-double-
           diamond/history-of-the-double-diamond/

           "Designing Programmes," Gerstner, K.,
           Link-to-come

8 03.06   "On the Planning Crisis," Rittel, Horst, (1972): 390–396.
           http://www.dubberly.com/courses/design_theory_2017/08._b_Rittel:_
           On_the_Planning_Crisis.pdf

           "Do Artifacts Have Politics," Winner, L.
           https://www.jstor.org/stable/20024652?seq=3

           "Do Categories Have Politics," Suchman, L.
           https://www.researchgate.net/publication/213799662_Do_Categories_Have
           _Politics_The_LanguageAction_Perspective_Reconsidered
           Need full PDF???

           Title-to-come, Jacobs, J.
           Link-to-come

           Design Justice, Costanza- Chock, Sasha, pgs 1-68.
           https://library.oapen.org/viewer/web/viewer.html?file=/bitstream/handle/
           20.500.12657/43542/external_content.pdf

           Design for the Real World, Papanek, Victor, pgs 14-95.
           https://monoskop.org/images/f/f8/Papanek_Victor_
           Design_for_the_Real_World.pdf

9 03.13   "Wicked Problems in Design Thinking," Buchanan, R.,
           https://web.mit.edu/jrankin/www/engin_as_lib_art/Design_thinking.pdf

Saussure
https://www.dubberly.com/courses/design_theory_2017/02._a_Saussure_1-17.pdf
https://www.dubberly.com/courses/design_theory_2017/02._b_Saussure_65-122.pdf

Peirce
https://www.dubberly.com/courses/design_theory_2017/02._c_Peirce_98-119.pdf

10 03.20   "Pace Layers," Sterling, B.,
Link TK???

"How Buildings Learn," Brand, S.
Link-to-come

"Shearing Layers," Duffy, F.
Link-to-come

11 03.27   Spring Break, no class meeting

12 04.03   "The Theory of Affordances," in *The Ecological Approach to Visual Perception,* Chapter 8, Gibson, J. J., pgs 127-144
https://www.dubberly.com/courses/design_theory_2017/04._b_Gibson%20Theory%20of%20Affordances.pdf

"Design as Critique," Dunne, A., and Raby, F., *Speculative Everything*.
http://www.dubberly.com/courses/frameworks_2024_spring/

"What We Talk About When We Talk About Context," Dourish, P.,
https://www.dubberly.com/courses/design_theory_2017/05._b_Dourish_Context.pdf

"Affordance, Conventions, and Design," Norman, D.,
https://dl.acm.org/doi/pdf/10.1145/301153.301168

13 04.10   *Interface: An Approach to Design,* Bonsiepe, G., pgs 18-41.
http://www.dubberly.com/courses/systems_2017_fall/05._Bonsiepe.pdf

"As We May Think," Bush, V.
https://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/

"A Personal Computer for Children of All Ages," Kay, A.,

https://mprove.de/diplom/gui/Kay72a.pdf

"The Computer as a Communications Device," Licklider, JCR and Taylor, B.
http://worrydream.com/refs/Licklider%20-%20The%20Computer%20as%20
Communication%20Device.pdf

"Human Computer Interaction," Laurel, B.,
Link-to-come

"Interaction," Verplank, B.,
https://vimeo.com/83683447

14 04.17   "The Use of Knowledge in Society, Hayek, F.,
https://www.cato.org/sites/cato.org/files/articles/hayek-use-knowledge-
society.pdf

"Google Platforms Rant," Yegge, S.,
https://gist.github.com/ttton/6101734

"Cathedral and the Bazaar," Raymond, E.,
https://firstmonday.org/ojs/index.php/fm/article/download/578/499?inline=1

"How Smart, Connected Products Are Transforming Competition," Porter, M.,
https://hbr.org/2014/11/how-smart-connected-products-are-transforming-
competition

"Why Software is Eating the World, Andreessen, M.
https://a16z.com/why-software-is-eating-the-world/

"The Long Tail," Anderson, C.
https://www.wired.com/2004/10/tail/

15 04.24   "Ontological Designing," Willis, A.,
https://www.academia.edu/888457/Ontological_designing

Understanding Computers and Cognition, Chapter 12, Winograd+Flores
Link-to-come

Pluriverse, Escobar, A.
Link-to-come

###

Assignment: Weekly Reading Concept Map

For *each* weekly reading, create a concept map —
describing the key ideas in the reading.

Start by reading the text;
highlight key ideas;
make a list of terms to include;
and build a structure linking them.
Be sure to label all the links.

Some readings feature clear models.
Make sure to include any key models in your diagram.
You may also include key passages from the readings;
be sure to use quote marks and include a citation

Include your name, date, the title of the reading and its author or authors.
Also include a headline for your concept map, in the form of a sentence.
The headline should summarize the point of the reading as you see it.

Format: 11x17 inches.

Save all your weekly maps!
You will need them for a final project — a booklet collecting all your maps.

Suggestions:
- Keep it neat, but don't obsess over the form; the content is what's important.
- Adobe Illustrator is a good tool, but other drawing tools may be used.
- Paint programs, such as Photoshop, are not the right tools.
- Plan to spend 1-2 hours on each reading and 1 - 2 hours on each map.

Due:
Each Wednesday, bring a printed version of your concept map to class.

###

Assignment: Present a Primary or Related Reading

Project:
Research the authors life and work — and create a presentation:
- about 5 minutes in length
- at least 12 slides (not more than 18)
- each slide should have a headline (as a sentence, not just a one word title)
- each image should have a caption
- should include images of the author (and their work if they are a designer)
- relevant quotes from them and about them
- images and quotes should list sources (citations)
- keep the graphic design simple, let your subject shine

Key slides are:
- 1. Title slide: Name of author, name of the article, in small type: your name, date
- 2. Timeline: birth, school, where they worked, etc.
- 3. A list of major influences on their work
- 4. What they are known for and why they "matter"
- 5. Their "philosophy" or point-of-view
- 6. Major idea 1
- 7. Major idea 2
- 8. Major idea 3
- 9. Your concept map of the reading
- 10. What else they have written
- 11. Critique: Why you like their work (or don't)
- 12. Three questions for discussion

Format:
Landscape format slides, 9x16 aspect ratio, in Google slides, Keynote, or PDF.

Purpose:
- Kick-off the group discussion
- Add perspectives on the main reading

###

Assignment: Final Project

[Place holder, more to come.]

Create a presentation "framing" a possible thesis project.

Section 1:
Choose three possible frames from our readings,
e.g., design as art, science, or politics.
Write a design brief for your thesis project in terms of each frame.
You should have three related but different briefs.

Section 2:
Apply three models from the course to your proposed project.
You must apply the DVF model and the Pace Layer model.
Pick a third model that you believe might be helpful.

###

In-class Exercise 1: Toast + Toaster Map

TK

Cf. Tom Wujec: How to Draw Making Toast
https://www.ted.com/talks/tom_wujec_got_a_wicked_problem_first_tell_me_how_you_make_toast?language=en

One person, one page, no words
Group, post-it notes, no talking

In-class Exercise 2: Wolves return to Yellowstone

TK

Cf. BBC documentary etc.
Find from previous courses

In-class Exercise 3: DFV

TK

Cf.

In-class Exercise 4: Washing Machine User Conceptual Model

TK

Cf.

In-class Exercise 5: Jacobs SWOT

TK

Cf.

In-class Exercise 6: Telegraph + Message Sending

Find a partner.

Create a device and system to send a message.
Could be a telegraph.
Or flags.
Or lights.

Cannot be shouting.
Cannot be writing the message.

Also create a code.
Represent your code in a code sheet or code table.
Your code should include all the Roman letters (uppercase).
And it will need a space.

Consider if you need any other "special characters".

Practice sending one-sentence messages,
e.g., "See the dog run."

In class you will be given a message to send as a test.

Due:
x

Purpose:
- Understand what a platform is and how to program it.
- Understand coding and communicating.

###

In-class Exercise 7: Represent a Solution Space for Juicers

Project:
Select a common object or tool.

Find at least 5 examples.
Take photographs (or find photos).
Enlarge or shrink the images so that they are pretty much the same size.

Arrange the photos in a 2D plane.

Consider a logic for your arrangement.
How are the objects related?
How are they different?
What are the "dimensions" of this "solution space"?

Add a title in the top left.
List the relevant dimensions.
Include your name.
Bring a print to class.

Due:
x

Purpose:
- Understand the concept of solution space
- See artifacts as part of a continuum or manifold of possibilities

###

In-class Exercise 8: Trade-offs

TK

Cf.

In-class Exercise 9: Dictionary / Paper Challenge

Materials:
- A ream of standard copier paper (8.5 x 11 inches).
- Three office dictionaries weighing a total of about 10 pounds
- A ruler
- A clock with a second hand
- A white board for recording

Project:
Using just two sheets of paper,
create a structure to support all three dictionaries.

The goal is for the dictionaries to be as high off the surface of a desk as possible.
The structure must be stable enough to stand for at least 30 seconds.

Tape, string, glue, and other materials or fastener are not allowed.

You have 30 minutes.

Suggestions:
Experiment and iterate!
You can only use two sheets of paper at a time.
But you can have as many attempts (and as much paper) as you like.

Reflection:
For the next class, reflect on the dictionary / paper challenge:
- What happened?
- What was the process?
- How might we diagram it?
- What shape might you represent what happened?

Purpose:
- Exercise the design process.
- Reflect on the process in order to build a mental model.
- Make representations of the process.

###

In class Exercise 10: Grad-School Pace Layers

TK

Cf.

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