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DevInv 190-001 Summer 2017

Design Thinking: Methods, Skills, and Mindsets

Syllabus

GENERAL INFORMATION

Faculty:

Euiyoung Kim, PhD., Jacobs Institute for Design Innovation

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Graduate Student Instructor:

Danielle Poreh, d.poreh@berkeley.edu

Reader: *Monica Lienke*, mlienke@gmail.com

Visiting Graduate Scholar/Mentor:

- *Chengwei Zhang*, Tsinghua University, zcwist@gmail.com
- *Matilde Bisballe Jenson*, NTNU, matilde.jensen@ntnu.no

Class Meetings: T TH 1:00-3:30 pm in 210 Jacobs Hall

Office Hours

- *Euiyoung Kim*, T 3:30-5pm, #310D, Jacobs Hall
- *Danielle Poreh*, Th 11:30am-12:30pm, #210, Jacobs Hall

COURSE DESCRIPTION

Design Thinking: Methods, Skills, and Mindsets creates a structured framework for the implementation of design thinking methods in the context of solving real-world problems with an industry sponsor. Students will go through the entire product development pathway in five modules: human-centered design research (qualitative and quantitative), synthesis of the design research, ideation methods, prototyping and client communication. Within each module, students will learn from a versatile library of proven design methodologies aimed to support the design innovation process. There will be an emphasis on hands-on innovative thinking and professional practice. Students will leave the course with an increased skill set in design methods and the student teams will have chance to have their team project resport (case study) posted on theDesignExchange.org website.

COURSE PARTNER, TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

Course Partnership: TheDesignExchange(thedesignexchange.org) is an online portal that facilitate the capture, analysis, and widespread of use of design thinking, human-centered design, and product development methods associated with early stage design. The website is built based upon a collaborative works between UC Berkeley and MIT. Our course is partnered with

theDesignExchange(tDX) research group and students in this course will get benefit of free registration and support from tDX researchers throughout the semester.

Reading Materials: The primary reading materials will be available on theDesignExchange.org (free, with registration). (See course schedules below to learn what method(s) you need to read before each class). Supplemental required course reading materials will also be available on bCoures.

The *optional* reading material for the class is the textbook *Product Design and Development* (Fifth Edition) written by Karl Ulrich and Steve Eppinger. This book provides a step-by-step overview of how to develop new product/service. We will use this optional textbook when necessary. There should be used, rental, and ebook versions of the textbook available at reduced cost.

bCourses Use: We will make extensive use of the course bCourses website to both communicate information to you and to converse with you about your homework and your projects. You will find the course listed on http://bCourses.berkeley.edu/. Once project groups have been formed, we will set up group pages on which we expect you to store your working documents for your project. The faculty will review the group pages regularly and provide feedback on your work. Historically, teams that heavily use their bCourses pages and communicate frequently get the most out of the course in the class, and we strongly encourage you to use them.

DESIRED COURSE OUTCOMES

This course provides hands-on and real world experience in the development of innovative and realistic customer-driven products/services. Design thinking concepts, methods, skillsets, and techniques are introduced, and the student's design ability is developed in a design project or feasibility study chosen to emphasize ingenuity and provide wide coverage of design, engineering and business topics. Innovative thinking is nurtured. Students can expect to depart the semester understanding customer-driven design methods, tools, and processes.

GRADING

Your course grade will be determined as follows:

20% on the quality of your preparation, participation in class discussions, and class attendance
20% on the quality of your individual assignments and weekly reflections
30% on the quality of your team's work on project-related assignments, and weekly reflections
30% on the quality of your team's final project presentation, case study report and prototype

* Your attendance of each lecture is critical in this particular six-weeks summer course. You will have 1 excused absence with (at least no later than the day before the expected absence) a written email notice to both an instructor, a GSI to avoid penalty. Please note that many absences, late arrivals, early departures throughout the semester may affect your final grade with additional penalty.

CLASS PREPARATION AND PARTICIPATION

Readings and online contents on the e-textbook are meant to guide your thinking about the class assignments. Readings are given in the class schedule; we expect you to come to class prepared to discuss the readings and the suggested questions described in the course schedule. In any given class session, a handful of students may be called upon specifically to answer questions about the readings and lecture topics. If you have prepared in advance according to the syllabus, you will have no problem responding when called upon. Your individual class participation grade will be based upon your in-class remarks during discussions and will be judged by the teaching staff.

INDIVIDUAL ASSIGNMENTS

We have periodically assigned individual exercises aimed to assess your understanding of the concepts we are teaching. These are due on thad date specified in the course schedule table (See the last section of the syllabus document) unless otherwise noted. Late assignments are discouraged but accepted, heavily penalized at 20% of the total score (2 points out of 10) for each day late.

ALL INDIVIDUAL ASSIGNMENTS ARE TO BE SUBMITTED VIA THE BCOURSES "ASSIGNMENTS" TAB UNDER THE APPROPRIATE HEADING. YOU MAY WANT TO BRING ONE COPY OF YOUR HOMEWORK TO CLASS, AS WE WILL FREQUENTLY ASK YOU TO SHARE YOUR RESULTS (DIGITAL SHARING IS FINE).

JACOBS HALL (Optional, but highly recommended)

Jacobs Hall is well equipped for prototyping in the class. Students will be expected to get a Maker Pass ($75) in lieu of a textbook and go through appropriate safety and equipment training; fee waivers are available for students with financial need. More on equipment access and getting a Maker Pass: http://jacobsinstitute.berkeley.edu/our-space/makerpass/. Also see this page for Jacobs' equipment list: http://jacobsinstitute.berkeley.edu/our-space/labs-and-equipment/ or this one that links to the Maker Pass activation process: http://jacobsinstitute.berkeley.edu/our-space/makerpass/get-maker-pass/. Your $75 Maker Pass will also give you access to the Invention Lab in Sutardja Dai Hall (CITRIS – Center for Information Technology in the Interest of Society). See: http://invent.citris-uc.org/about/

DESIGN JOURNAL (Optional, but highly recommended)

While it's not a mandatory assignment, each individual in the class is highly recommended to maintain a design journal throughout the semester. This journal should include your individual thinking (both imagery and words) pertaining to your project and course learning. Think of it as a diary of sorts. You may sketch pictures, paste in pictures or business cards, write words, create mindmaps, or choose any other approach that works for you to capture your ideas, thoughts, and reflections about your product, your project and course learning. The journal should be used both to capture ideas about the product itself as you move through the process, but also to document thoughts, reflections, and insights on the process of product development, group dynamics, project process, etc. Inventors use journals as it helps to document when they came up with an original idea (useful in the patenting process); engineers do this to work out complex technical details; and designers do this to generate lots of ideas (as ideas feed off of one another); project managers use journals as a management tool to generate "lessons learned" and "best practices" to help run future product development projects more effectively. You can tailor your journal to your own working style and your unique role within your project team. See TheDesignExchange Website to find how to maintain a design journal (https://www.thedesignexchange.org/design_methods/167). There are copies of exemplary design journals on the first lecture slide if you would like to see what one might look like.

DESIGN CHALLENGE (Sponsored Project)

The goal of the design Challenge is to learn principles and methodologies of design thinking, human-centered design, and product development in a real world context. Most design and engineering professionals work under tremendous time pressure and do not have an opportunity to reflect on the development process. In this course, the stress level will be low enough to allow time to experiment and learn. You will be asked to form project teams of 4 to 6 students. Some teams will have the opportunity to work with students from multiple disciplines. You will have opportunities during the first two classes to scope out the possible project direction, objective and get to know your potential teammates. The topic for your design challenge this course will be given by a industry/research sponsor at the beginning of the semester.

LAPTOP, TABLET AND SMARTPHONE POLICY

Class time will focus almost entirely on in-class exercises to bring to life project-based learning. You will need to give your full attention to your teammates, to the work you are being asked to do together, and to what you are taking away from that work. Please do not use your laptops or smart phones in class, unless it is for a class exercise or to take notes (no email, texting, web browsing, Facebook, etc.) Any violation of this policy will lead to a reduction in your participation grade. We love the way Adaptive Path, one of the design firms we work with, describes its policy along these lines:

HONOR THE GATHERING: *In this ever more interrupt-driven digital world, it's a challenge to bring together all the right people at the same time to think, make and solve problems that are too complex for just a few people to figure out. Gatherings of this magnitude need opening ceremonies to acknowledge the value of the time we are about to spend together. Typically these ceremonies don't include marching bands or fireworks (although that would be cool), but there are small and simple actions that help us all recognize that this is a sacred time. These small things include sending out invitations ahead of time, providing food and drink, creating an environment where people can focus without laptops or smart phones, welcoming and orienting people to our day together, and having the client sponsor begin the workshop with essentially an opening blessing for the people gathered and the work we will accomplish. (www.adaptivepath.com)*

BERKELEY'S HONOR CODE: We expect the students to act with honesty, integrity, and respect for others. Note the following link to UC Berkeley's principles of community: http://diversity.berkeley.edu/principles-community.

GUEST SPEAKERS

Our class will have several guest speakers from Silicon Valley companies, adademic organizations including designers, engineers, managers, prototypers, etc. who are knowledgable in their domain to provide students with best practices that illustrate how design methods are used in various types of real world projects. For details of a list of guest speakers, please see the course schedule table attached below.

COURSE SCHEDULE

W #	Date	Description	Assignments (I: Individual, T: Team)
MODULE 0: INTRO TO DESIGN THINKING **Methods Covered:** Design Journal			
W 1	7/4 (T)	**No-Class, Academic Holiday** (Independence Day)	**I-1:** Complete student profile survey sent to you via b-course announcement. You will get full credit if you finish the survey on time: **due on 7/3, 11:59pm**
	7/6 (Th)	**Lecture 1. Introduction to Design Thinking, Human-centered Design, Innovation and Methods** **In-Class Watch:** *Video:* Nightline, "The Deep Dive" (aka, "the IDEO Shopping Cart" Video) **In-Class Design Thinking Exercise:** Prevent personal "overspending" in college **In-Class Exercise:** Skillsets Matrix	**I-2**: Bring in two items that you find in your trash or dumpster. Or bring in something you just don't want, but can't figure out what to do with it. Come to class prepared to create new designs from these discards in the "overspending" design exercise: **due on 7/6, 12:30pm.**
MODULE 1: RESEARCH **Methods Covered:** AEIOU, POEMS, POSTA, Closed Card Sorting, Open Card Sorting, Design Ethnography, Focus Group, Community Appraisal, Conversation Café, Competitive Analysis, Conjoint Analysis, 1:1 Interview, User Observation, Usability Testing			
W 2	7/11 (T)	**Lecture 2. Customer and User Needs Assessment (1:1 Interviews & Observations)** **In-Class Team Activity:** T-Shape Activity, 10 bug lists **Read:** Sara Beckman & Michael Barry. "Innovation as a Learning Process: Embedding Design Thinking", California Management Review, http://static1.1.sqspcdn.com/static/f/425112/4863286/1259043624957/2_InnovationAsLearningProcess.pdf Guest Speaker: Soojin Kim, Fronto (Sketching for Everyone)	**I-3:** Complete an individual method selection survey on Module 1: Research. Read descriptions on all methods assigned in module 1 (research). Then, select 3 design methods you would like to use in your team project. Describe why did you choose certain methods over others and why not: **due on 7/11, Noon.** **I-4:** Create a list of 10 "bugs". Please either bring the physical object or a photograph associated with at least one of your "bugs" to class to share with others during class. Designers at the product design firm IDEO use "bug lists" to record their observations of products and situations where products failed to meet the actual conditions of use. This list should include any observation or annoyance that comes to your mind. Note that we are looking for a list of "bugs" (e.g., my vegetable peeler hurts my hand when I peel potatoes) rather than a list of product solutions (e.g., a vegetable peeler with a soft handle). In other words, do NOT invent solutions to the problems you see – just state the problem: **due on 7/11, Noon.** **T-1:** Develop and submit your draft Customer/User Needs Assessment Plan in word format: **due on 7/11, 11:59pm.**

	7/13 (Th)	**Lecture 3. Design Context, Mission and Planning** **In-Class Team Activity:** Value Proposition, Mission Statement **Read:** John Kolko, "Design Thinking Comes of Age," Harvard Business Review, September, 2015, https://hbr.org/2015/09/design-thinking-comes-of-age **Read:** Timothy Morey, "Why management consulting firms are getting into design, December, 2016, https://designmind.frogdesign.com/2016/12/strategy-as-a-creative-act-ii-the-limits-to-management-consulting Guest Speaker: Eugene Noh, Foundry Partnerships Lead, UC Berkeley (Value Proposition) **Read:** Value Proposition Canvas, http://www.peterjthomson.com/2013/11/value-proposition-canvas/value-proposition-canvas-questions/.	**T-2:** Complete a survey on Module 1: Research. Select 3 design methods your team decided to use in your team project. Describe why did your team choose certain methods over others and why not: **due on 7/13, 11:59pm.** **T-3:** Submit your weekly report including results of your works with 3 selected design methods in word format. This weekly report write-up is meant to be a reflection piece where your team can review how the project has progressed as a group, and impacted your design outcomes within each of the 5 modules. Teams should justify why and how they decided to select particular methods and describe the results and outcomes from using each method. Include all meaningful insights and comprehensively discuss learnings and next steps. Please include documentation (pictures, interview transcripts, sketches, diagrams, frameworks, and etc): **due on 7/17, Noon.**
MODULE 2: ANALYSIS **Methods Covered:** Why-how Laddering, Empathy Map, Spectrum Mapping, 2x2 Matrix, Reframing, Powers of 10, Customer Journey Mapping, How Might We, Mind Map, Contextmapping, Affinity Diagramming, Atomize, Concept Map, Touchpoint Matrix, Task Analysis, and Kano Analysis			
W 3	7/18 (T)	**Lecture 4. Frameworks for understanding customer needs** Guest Speaker: Alan Van Pelt, Design Strategist (Needs Framing)	**I-5:** Complete an individual method selection survey on Module 2: Analysis. Read descriptions on all methods assigned in module 2 (analysis). Then, select 3 design methods you would like to use in your team project. Describe why did you choose certain methods over others and why not: **due on 7/18, Noon.**

	7/20 (Th)	**Lecture 5. Translating the Voice of the Customer** Creating Imperatives for Business Opportunities Peer Review I	**T-4:** Updated Mission statement (short mission written in functional terms), value proposition, and customer needs Assessement Plan in ppt or keynote format: **due on 7/20, Noon.** **T-5:** Complete a survey on Module 2: Analysis. Select 3 design methods your team decided to use in your team project. Describe why did your team choose certain methods over others and why not: **due on 7/20, 11:59pm.** **T-6:** Submit your weekly report including results of your works with 3 selected design methods in word format. This weekly report write-up is meant to be a reflection piece where your team can review how the project has progressed as a group, and impacted your design outcomes within each of the 5 modules. Teams should justify why and how they decided to select particular methods and describe the results and outcomes from using each method. Include all meaningful insights and comprehensively discuss learnings and next steps. Please include documentation (pictures, interview transcripts, sketches, diagrams, frameworks, and etc): **due on 7/24, Noon.**
MODULE 3: IDEATE **Methods Covered:** 6-Up Sketches, Visual Brainstorming, Brainstorming, 3-12-3 Brainstorming, 6-3-5 Brainwriting, Attribute Listing, Do-Redo-Undo, Biomimicry, Weighted Matrix, Forced Analogy, Design Heuristics, The Anti-Problem, Borda Count Voting, Design the Box			
W 4	7/25 (T)	**Lecture 6. Concept generation & Clustering I** Creativity & brainstorming, structured/unstructured methods Concept Clustering Exercise Guest Speaker: Julia Kramer, theDesignExchange, UC Berkeley	**I-6:** Complete an individual method selection survey on Module 3: Ideate. Read descriptions on all methods assigned in module 3 (ideate). Then, select 3 design methods you would like to use in your team project. Describe why did you choose certain methods over others and why not: **due on 7/25, Noon.** **I-7:.** Each team member is to INDIVIDUALLY generate 10 concepts and post to your team website noon before the class and bring to class. A "half-sheet" form will be provided on bCourses for you to use in pdf or jpg format: **due on 7/25, Noon.** **T-7:** Complete the excel spread sheet template with all concepts generated and submit to the bCourse in excel format: **due on 7/25, 11:59pm.**

	7/27 (Th)	**Lecture 7. Concept generation & clustering II & selection** Double the number of concepts through inclass from 10 to 20 per each member Reclustering	**T-8**: Submit your concepts to your team folder and the clustering exercise you did in class. Upload a spreadsheet of your collective concepts and clusters to your project folder. Add any new ones from the class activities today in excel format: **due on 7/27, 11:59pm.** **T-9:** Complete a survey on Module 3: Ideate. Select 3 design methods your team decided to use in your team project. Describe why did your team choose certain methods over others and why not: **due on 7/27, 11:59pm.** **T-10:** Submit your weekly report including results of your works with 3 selected design methods. This weekly report write-up is meant to be a reflection piece where your team can review how the project has progressed as a group, and impacted your design outcomes within each of the 5 modules. Teams should justify why and how they decided to select particular methods and describe the results and outcomes from using each method. Include all meaningful insights and comprehensively discuss learnings and next steps. Please include documentation (pictures, interview transcripts, sketches, diagrams, frameworks, and etc): **due on 7/31, Noon.**
MODULE 4: BUILD **Methods Covered:** Live Prototyping, Wireframe, Rapid Prototyping, Laser Cutting, 3-D Printing, Water Jet Cutting, Direct Shell Production Casting, Laminated Object Manufacturing, Fused Deposition Models, Tangible Prototype, Experience Prototype, Service Prototype, Additive Manufacturing			
W 5	8/1 (T)	**Lecture 8. Build: Low-Fidelity** Guest Speaker: Matilde Bisballe Jensen, NTNU Read: Tim Brown, "Design Thinking," Harvard Business Review, June, 2008, https://www.ideo.com/post/design-thinking-in-harvard-business-review	**I-8:** Complete an individual method selection survey on Module 4: Build. Read descriptions on all methods assigned in module 4 (build). Then, select 3 design methods you would like to use in your team project. Describe why did you choose certain methods over others and why not: **due on 8/1, Noon.**

	8/3 (Th)	**Lecture 9. Build: Medium-Fidelity** **Peer-Review II** Guest Speaker: Matilde Bisballe Jensen, NTNU & Chan Kim, Oracle	**T-11:** Complete a survey on Module 4: Build. Select 3 design methods your team decided to use in your team project. Describe why did your team choose certain methods over others and why not: **due on 8/3, 11:59pm.** **T-12:** Submit your weekly report including results of your works with 3 selected design methods in word format. This weekly report write-up is meant to be a reflection piece where your team can review how the project has progressed as a group, and impacted your design outcomes within each of the 5 modules. Teams should justify why and how they decided to select particular methods and describe the results and outcomes from using each method. Include all meaningful insights and comprehensively discuss learnings and next steps. Please include documentation (pictures, interview transcripts, sketches, diagrams, frameworks, and etc): **due on 8/7, Noon.**
MODULE 5: COMMUNICATE **Methods Covered:** Envisionment Videos, Storyboards, Service Blueprint, Business Model Canvas, 7 Ps Framework, Usability Report, Personas, Composite Characters, Design Roadmap			
W 6	8/8 (T)	**Lecture 10. Communication** Communication Activity Design Roadmapping Portfolio Development **Read:** Kim, et. al., (2016). Design Roadmapping: A Framework and Case Study on Planning Development of High-Tech Products in Silicon Valley. *Journal of Mechanical Design*, *138*(10), 101106. **Read:** Business Model Canvas, http://www.businessmodelgeneration.com/canvas Guest Speakers: Eugene Noh, I-corp, Foundry, UC Berkeley	**I-9:** Complete an individual method selection survey on Module 5: Communicate. Read descriptions on all methods assigned in module 5 (Communicate). Then, select 5 design methods you would like to use in your team project. Describe why did you choose certain methods over others and why not: **due on 8/8, Noon.**

	8/10 (Th)	**Lecture 11. In-Class Exercies:** Skillsets Matrix **Final Review**	**T-13:** Complete a survey on Module 5: Communicate. Select 3 design methods your team decided to use in your team project. Describe why did your team choose certain methods over others and why not: **due on 8/10, 11:59pm.** **T-14:** Submit your weekly report including results of your works with 3 selected design methods in word format. This weekly report write-up is meant to be a reflection piece where your team can review how the project has progressed as a group, and impacted your design outcomes within each of the 5 modules. Teams should justify why and how they decided to select particular methods and describe the results and outcomes from using each method. Include all meaningful insights and comprehensively discuss learnings and next steps. Please include documentation (pictures, interview transcripts, sketches, diagrams, frameworks, and etc): **due on 8/11, 11:59pm.**
	8/11 (F)	**Jacobs Hall Mini-Showcase**	The Final showcase will be held during the Design Showcase at #310, the Jacobs Hall on (F) **Aug. 11th 10am-Noon.**
	8/12 (S)	**Final Deliverables** Online or in-person 450 sutardja Dai Hall	**I-10:** Complete a summative survey (link will be provided through bCourses): **due on 8/12, 11:59pm.** **Final Project Deliverables:** Turn in your final presentation (or the documentation of your tradeshow display), Case Study, photo of your prototype and/or the actual prototype, if appropriate: **due on 8/12, 11:59pm.**