

ME110 Spring 2017

Introduction to Integrated Product Development

Syllabus

GENERAL INFORMATION

Faculty:

- *Euiyoung Kim, PhD.*, Jacobs Institute for Design Innovation, 450 Sutardja Dai Hall (CITRIS Building), (224) 795-2839, euiyoungkim@berkeley.edu

Graduate Student Instructors:

- Danielle Poreh, d.poreh@berkeley.edu
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Reader: Jimmy Huang, jimmy_huang@berkeley.edu

Visiting Faculty: *Marcelo López-Parra*, Visiting Professor in Mechatronics, UNAM, mlparra@berkeley.edu

Class Meetings: T TH 12:30-2:00 pm in 310 Jacobs Hall

Optional Discussion/Workshops: 1-2pm F, 210 Jacobs Hall

Office Hours

- *Euiyoung Kim*, 2-4:30pm, #310D Jacobs Hall
- *GSI Hours:* TBD

COURSE DESCRIPTION

This course provides an introduction to the integrated product development processes: engineering design process and conceptual design of products in the thoughtful implementation of human-centered design (Observation, framework, imperatives, and solutions). It provides an experience in preliminary project planning of complex and realistic mechanical engineering systems. Design concepts and techniques are introduced; the student's design ability is developed in a design project or design iteration chosen to emphasize innovation and ingenuity, and provide wide coverage of engineering design topics. Design optimization and social, environmental, economic, and political implications are included. There is an emphasis on hands-on creative components, teamwork, oral presentation, and effective communication of the design process. There is a special emphasis on the management of innovation processes for the development of sustainable products (and/or services), from product definition to sustainable manufacturing and business model canvas. The course will include mandatory oral presentations (individual/group) and portfolio (individual). We highly encourage multidisciplinary team learning experience. Further, we will actively engage professionals from industry and academia as guest speakers.

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

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 will read in each class). Supplemental required course reading materials will also be available on bCourses.

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 conduct new product development processes. There should be used, rental, and ebook versions of the textbook available at reduced cost.

<https://bcourses.berkeley.edu/courses/1457235/pages/cheaper-versions-of-textbook>

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 engineered products. Design concepts 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 engineering and business topics. Innovative thinking is nurtured. Students can expect to depart the semester understanding customer-driven design methods, tools, and processes.

TOPICS COVERED

Students can expect to depart the semester understanding integrated product development processes as well as useful design methods, tools, techniques and organizational structures that support integrated product development practice in the context of the "triple bottom line" - economy, environment, and society. Topics covered include: Product development processes and organization, product planning, high functioning teamwork, CAD modeling (Autodesk Fusion 360), customer/user needs assessment, framework (personas and empathic design), translating the "voice of the customer", concept generation, concept selection, concept development, decision analysis, concept testing, product architectures, design for variety, design for environment, life cycle assessment, design for assembly/ manufacture, prototyping, design costing, information technologies, design optimization, engineering ethics, universal design and entrepreneurship, and innovation.

GRADING

Your course grade will be determined as follows:

- 10% on the quality of your preparation for and participation in class discussions
- 20% on the quality of your individual assignment solutions
- 30% on the quality of your team's work on project-related assignments
- 30% on the quality of your team's final project presentation, report and prototype
- 10% on the quality of your individual design portfolio

CLASS PREPARATION AND PARTICIPATION

Readings 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. 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 noon 30 minutes before each class 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 PRIOR TO THE START OF CLASS ON THE DAY THEY ARE DUE, UNLESS OTHERWISE NOTED. 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

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/>

ME MACHINE SHOP TRAINING

If members of your team need to use the ME student machine shop, you need to go through safety training between (January 25th to March 24th). But slots fill up quickly, so we recommend you sign up as soon as possible. Training details: <http://www.me.berkeley.edu/services/student-machine-shop/shop-training>. For more information on the facilities, see: <http://www.me.berkeley.edu/services/student-machine-shop>.

DESIGN JOURNAL

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 bCourses website if you would like to see what one might look like.

DESIGN PORTFOLIO

Each individual in the class will be recommended to maintain a design journal throughout the semester that can be used to create a design portfolio at the end of the semester. The digital (or hardcopy) design portfolio should be turned in, May 10 (W), on the due date of your team's final during the final week. The design portfolio counts 10% towards your individual grade.

PROJECTS BACKGROUND AND INDUSTRY SPONSORED PROJECTS

The goal of the class project is to learn principles and methodologies of integrated product development in a real world context. Most product development 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 weeks of class to scope out the possible projects and get to know potential teammates.

Some teams in this class will have the opportunity to collaborate with industry sponsors across diverse industry sectors. In these cases, you will learn how to maintain active collaboration with your clients, internal stakeholders, teaching team members, end users and customers on the various topics of painpoints/real-world problems that will be given by sponsors 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>.

COURSE SCHEDULE

The schedule below provides learning goals for each session, along with required readings and individual (I) and team (T) assignments. Unless otherwise noted, the individual assignments should be submitted to the appropriate class bCourses assignments link and the team assignments to the relevant folder in your project bCourses. Unless otherwise noted, **ALL INDIVIDUAL ASSIGNMENTS ARE DUE BY NOON (30MINUTES BEFORE EACH CLASS) ON THE DAY DUE, UNLESS OTHERWISE NOTIFIED IN THE COURSE SCHEDULE IN THE TABLE BELOW.** The team project assignments labeled as “deliverables” **MUST** be turned in at the designated due date. Most of the team project assignments are labeled as “check-ins”. These are “work in progress” team assignments to allow the teaching staff to give you feedback in class. We ask you to upload your “work in progress” on the due date, but they could be turned in or updated by the next class time. We have made every effort to provide you all course details in this syllabus, but we sometimes have to make changes due to unexpected circumstances, such as a change in the visit date of a guest lecturer. Please check bCourses announcements and assignment updates for changes to the schedule.

DAY	TOPIC
1 T 1/17	<p>Introduction to Integrated Product Development (IPD), Design Thinking and Innovation</p> <p>We will cover course logistics and requirements and then develop the motivation and framework for the course. Come to class prepared to discuss why new product development is important, what the key activities are, how design thinking and innovation relate, and how new product development frames opportunities for innovation. We will also introduce several start-up companies with new product development opportunities interested in participating in class and suggest other work on campus from which class projects might be sourced.</p> <p>Read: John Kolko, “Design Thinking Comes of Age,” Harvard Business Review, September, 2015, https://hbr.org/2015/09/design-thinking-comes-of-age</p> <p>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/</p> <p>Read: Bansal, Sarika. August 21, 2014. “Innovation Within Reach,” New York Times, Opinion, http://opinionator.blogs.nytimes.com/2014/08/21/innovation-</p>

	<p>within-reach/</p> <p>(Optional) Read: Sara Beckman & Michael Barry. “Innovation as a Learning Process: Embedding Design Thinking”, <i>California Management Review</i>, http://static1.1.sqspcdn.com/static/f/425112/4863286/1259043624957/2_InnovationAsLearningProcess.pdf</p> <p>In-Class Watch: <i>Video:</i> Nightline, “The Deep Dive” (aka, “the IDEO Shopping Cart” Video)</p> <p>Part 1: http://www.youtube.com/watch?v=ooN05Q030Qo</p> <p>Part 2: http://www.youtube.com/watch?v=y_kVSJ7eAw4</p> <p>Part 3: http://www.youtube.com/watch?v=fUz09EkIm64http://opinionator.blogs.nytimes.com/2014/08/21/innovation-within-reach/</p> <p>I-1. Individual Assignment Due: (If you haven’t done yet), complete student profile survey sent to you January 4th, https://goo.gl/forms/AsQuaUQopmBAUWTK2. You will get full credit if you just finish the survey.</p>
<p>2 Th 1/19</p>	<p>Design Journals, Design Thinking Exercises</p> <p>You will learn a concept, elements, examples of a design journal and how to build and keep it alive throughout semester. This journal should include your individual thinking (both imagery and words) pertaining to your project and course learning. We will use waste material for a design project in a studio session today. Each student is asked to 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. Also make a note in your journal of what you did bring in, along with a list of other things you found but left in the trash. Consider the following thought questions:</p> <ul style="list-style-type: none"> • What is the role of a design journal in the design thinking process? • Can design thinking be extended to a business concept as a whole? • How might design thinking affect the activities of entrepreneurship? <p>In class, we will have 50 minute design thinking exercises “Reduce Student Water Usage Challenge”.</p> <p>Read: Assignments from theDesignExchange – Design Journal: https://www.thedesignexchange.org/design_methods/167</p> <p>Read: Tim Brown, “Design Thinking,” Harvard Business Review, June, 2008, https://www.ideo.com/post/design-thinking-in-harvard-business-review</p>
<p>3 T 1/24</p>	<p>The Role of Industrial Design, Integrated Product Design</p> <p>We are all capable of identifying market needs and thus generating ideas for new products, in part by noticing the deficiencies in the products we use in everyday life. To prove to yourself that you can identify market needs, generate a list of at least 20 “bugs.” 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</p>

	<p>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. However, not all bugs, when solved, have the potential to ground a start-up business. Make a quick judgement about which of your bugs, if solved, might lead to improved features (F) of existing products vs. standalone new products (P) vs. form the basis of an entrepreneurial company (C). Upload your bug list to the course website under “assignments” and “twenty bugs”.</p> <p>Read: What is Industrial Design?, How They Do It...Steps 1-32, Industrial Design Society of America (IDSA), http://www.idsa.org/education/what-is-id</p> <p>Read: THRIVING in the “Age of the Customer”, ISDA, http://www.idsa.org/news/insights/thrive</p> <p>Read: “An Ethnography Primer,” AIGA, The Professional Association for Design http://www.aiga.org/ethnography-primer/</p> <p>(Optional) Read: The Intersection of Product Design and Business, https://uxdesign.cc/the-intersection-of-product-design-and-business-fa72aaa12aff#.m0748vqot</p> <p>(Optional) Read: Sara Beckman & Leslie Speer. “Learning about Design: Observations from Ten Years of New Product Development Class Project”, <i>In Proc. of 2006 IDSA National Conference and Education Symposium.</i> (bCourses)</p> <p>I-2. Individual Assignment Due: List of 20 “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. Identify, by putting the appropriate letter beside it, which of your bugs, if solved, potentially leads to a new feature (F), vs. a new product (P), vs. potentially a new company (C). Upload your bug list to the course website under “assignments” and “twenty bugs”.</p>
<p>4 Th 1/26</p>	<p>Design Context, Mission and Planning, Triple Bottom Line</p> <p>Product planning involves developing a strategy for your products in the context of your organizational goals, skill-sets and resources. The Tripple Bottom Line refers to considering three components to an organization’s bottom line: profit, societal benefits, and environmental impact. Which of these matter in a firm context? How are initial market opportunity hypotheses developed? Be prepared to discuss the components of a Mission Statement and how it might reflect the componetns of a Triple Bottom Line.</p> <p>During this class session, we will talk about team dynamics and interactions as being critical to new product development success.</p> <p>Read: Cooper, R.G. and Kleinschmidt, E.J., 1986. An investigation into the new product process: steps, deficiencies, and impact. <i>Journal of product innovation</i></p>

	<p><i>management</i>, 3(2), pp.71-85.</p> <p>Scan: Google Preview of The Triple Bottom Line, Andrew Savitz and Karl Weber, http://bit.ly/npd-tbl</p> <p>Read: Collaborative Plan on bCourses (start on your individual plan to bring to class)</p> <p>Read: “The Trouble with Teamwork” on bCourses.</p> <p>Read: https://www.thedesignexchange.org/design_methods/167</p> <p>I-3. Individual Assignment Due: Project proposal (PDF format) as a one page document is due noon before class.</p> <p>Your one-page proposals (PDF) should include:</p> <ul style="list-style-type: none"> • A brief, descriptive project title (2-4 words) • Your name, phone number, e-mail, and school/department affiliation • A description of the market opportunity you have identified. Your description may include any of the following: Documentation of the market opportunity, shortcomings of existing competitive products, and/or definition of the target market and its size. Please do not present product ideas at this point. Our strict focus in this phase of the course is on the market opportunity – the unfilled need or unsolved problem – and not on solution concepts. <p>These proposals will be posted to a location where all participants in the class can see them after the proposal presentation on 1/31.</p>
<p>5 T 1/31</p>	<p>Proposal Presentation Students will be given an opportunity to pitch their project ideas in the studio. Details of presentations below.</p> <p>I-4. Individual Assignment Due: Project proposal (2 ppt slides due by noon on 1/30 and presented today),</p> <p>Come to class prepared to give a VERY SHORT (i.e., 40 seconds), yet convincing, presentation of your project proposal. Please prepare two slides that you can present in 20 seconds each that clearly communicate the market opportunity on which you would like your classmates to work with you. We will collect all of the slides into a single presentation that we will run with PowerPoint’s timed presentation feature. Your slides should communicate the following:</p> <ul style="list-style-type: none"> • The first slide MUST include your name and school/department affiliation. • A verbal and visual demonstration of the product opportunity you have described in your proposal. Given that the audience will be able to read your written proposal at their leisure, you might spend your time explaining the richness of the market opportunity or demonstrating existing competitive products.

	<ul style="list-style-type: none"> • The slides are due absolutely NO LATER THAN noon on Monday noon, 1/30 so that we can get the full presentation assembled for the studio on 1/31
6 Th 2/2	<p>Customer and User Needs Assessment, Project Voting Due</p> <p>An introductory overview will be provided for a range of user design research methods. More details on specific methods will be provided in future classes.</p> <p>Read: Assignments from theDesignExchange – User observation: https://www.thedesignexchange.org/design_methods/236 AEIOU: https://www.thedesignexchange.org/design_methods/139 POEMS: https://www.thedesignexchange.org/design_methods/77 POSTA: https://www.thedesignexchange.org/design_methods/209 Watch Video: Getting People to Talk: An Ethnography & Interviewing Primer, http://vimeo.com/1269848</p> <p>I-5: Project Preferences due by 11:59pm, Thursday, February 2. Via a Google form, you should list the FIVE projects on which you would most like to work in order of preference. If you would like to work with a particular group of classmates, please submit their names as well. They must submit your name as well for us to assign you all to the same team. We will process your preferences and assign teams. There is a good chance we will ask you to vote a second time after we have eliminated some of the projects in the first round, so stay tuned.</p> <p>I-6. Individual Assignment Due: Observation and AEIOU Framework. After this lecture, go outside and capture a set of observations around a topic area of your choice. Go to the world and take photos, videos of people in real world. It can be done in any place where personal privacy isn't a big issue, such as campus, public places, cafes, shopping malls, grocery stores, airports, etc. Once it's done, create an AEIOU Observation framework that captures activities, environments, interactions, objects, and users in your observation. This assignment is meant to develop your skillset to interpretate your observations in a systematic way so that you ultimately learn how to capture insights, and establish a point of view over an interesting story. (due 2/7 noon before class)</p>
7 T 2/7	<p>Team Project Launch, Value Proposition, Collaboration Plan</p> <p>During this class session, we will talk about team dynamics and interactions as being critical to new product development success. You will be given team launch exercise to work on during the class. We will be assisted by an expert from industry in business models and strategy, Eugene Noh, CITRIS Foundry Partnerships Lead, NSF I-Corps Recruiting Lead, UC Berkeley.</p> <p>Read: http://businessmodelalchemist.com/blog/2012/08/achieve-product-market-fit-with-our-brand-new-value-proposition-designer.html Read: Value Proposition Canvas, http://www.peterjthomson.com/2013/11/value-proposition-canvas/value-proposition-canvas-questions/. Template on bCourses. Read: “The Trouble with Teamwork” on bCourse</p>

	<p>T-1. Project Deliverables Due: Mission statement (short mission written in functional terms), value proposition and collaborative plan. This can be uploaded at the end of the class or before midnight(11:59pm), 2/7(Tue), if you need more time.</p>
8 Th 2/9	<p>Research Methods a Customer/User Needs Assessment Plan We will then work on developing a customer/user needs assessment plan that answers the following questions:</p> <ul style="list-style-type: none"> • Who is your customer and is there an early adopter segment of your customer base? • How will you access your customers and how should your approach differ in a start-up vs. large company context? • What methods will you use to collect information (e.g., interviews, observations, surveys)? • What types of information will you gather? • How reliable is customer feedback in the early stages of development and how should it affect your decision-making? • How will you document your information gathering (e.g., notes, audio recording, photos, videos)? <p>Read: “Five Keys To Successful Design Research”, http://www.core77.com/hack2work/2009/09/five_keys_to_successful_design.asp</p> <p>Read: Translating Customer Interviews handout, from Ulrich & Eppinger, Product Design and Development, bCourses.</p> <p>Read: Assignments from theDesignExchange – Contextual inquiry: https://www.thedesignexchange.org/design_methods/315 1 on 1 Interview: https://www.thedesignexchange.org/design_methods/138 Personas: https://www.thedesignexchange.org/design_methods/74 Composite characters: https://www.thedesignexchange.org/design_methods/313</p> <p>Read: An Introduction to personas and how to create them, http://www.steptwo.com.au/papers/kmc_personas/</p> <p>Recommended Reading: Interviewing Users: How to Uncover Compelling Insights, by Steve Portigal. This is a great reference book and is available in digital form. Or Read: http://www.portigal.com/from-sxsw-diving-deep-best-practices-for-interviewing-users/</p> <p>I-7. Individual Assignment Due: Choose a product or service that competes with or serves a similar purpose to the one your project team is developing. Interview (2) potential or current user of the product or service about what they like and dislike about the product. This interview can be done very informally in 20-30 minutes as a practice exercise. Record what your interviewee says and translate your customer statements into needs statements (see the Ulrich and Eppinger handout on bCourses). Prepare a one-page summary of what you have learned about the interview process. Submit the transcript of the interview, interpretation of customer needs and your page of lessons learned to the assignments tab under customer interview. (due at noon before the class)</p>
9 T	<p>Frameworks for Understanding Customer Needs</p>

2/14	<p>In this class we will present different ways of analyzing customer and user needs data. In “design thinking” terms, we call this framing and reframing. We’ll use this class time to work with you on applying some of the framing and reframing tools to your project data. Please bring all of your customer and user needs data – interview notes, photographs, etc. – to class with you to use in these in-class exercises. Make sure to bring specific quotes from your users. Readings and exercises in this module will focus on <u>interpreting, analyzing and framing your design research</u> as described in Analyze of theDesignExchange</p> <p>In-class Activity:</p> <p>Read: Assignments from theDesignExchange – Why-How Laddering: https://www.thedesignexchange.org/design_methods/337 Empathy Maps: https://www.thedesignexchange.org/design_methods/61 Customer Journey Mapping: https://www.thedesignexchange.org/design_methods/8 Spectrum Mapping: https://www.thedesignexchange.org/design_methods/86 2 x 2: https://www.thedesignexchange.org/design_methods/37 Reframing: https://www.thedesignexchange.org/design_methods/82 Powers of Ten: https://www.thedesignexchange.org/design_methods/78</p> <p>Read: “Get Inside the Lives of Your Customers” on bCourses. Read: Turn Customer Input into Innovation, http://hbswk.hbs.edu/archive/2815.html</p> <p>T-2. Project Deliverables Due: Submit your draft Customer/User Needs Assessment Plan and 3 different frameworks. This can be uploaded at the end of the class or before midnight(11:59pm), 2/14(Tue) if you need more time.</p>
10 Th 2/16	<p>Translating the Voice of the Customer (Creating Imperatives for Business Opportunities)</p> <p>In this class we will move a little ahead of where your project should be to introduce you to the next step of the process – translating customer and user needs information into specifications and imperatives. We’ll introduce the basic concepts of generating specs and imperatives, and then have you do some exercises with your project data to play with the concepts. An example from frugal innovation will be covered as an example in class.</p> <p>Read: Assignments from theDesignExchange – Competitive Analysis: https://www.thedesignexchange.org/design_methods/154 Customer Journey Mapping: https://www.thedesignexchange.org/design_methods/8 Read: Bansal, Sarika. August 21, 2014. “Innovation Within Reach,” New York Times, Opinion, http://opinionator.blogs.nytimes.com/2014/08/21/innovation-within-reach/ Read: “Consumer Insight Maps: The Map As Story Platform In The Design Process”, http://piim.newschool.edu/journal/issues/2011/01/pdfs/ParsonsJournalForInformationMapping_Erwin-Kim.pdf</p>

	<p><u>I-8. Individual Assignment Due:</u> Identify what you think are your users' top 5 needs. Between this session and the next, you will compare these needs with those that your teammates have developed before presenting these as part of your Peer Review noon before class.</p>
<p>11 T 2/21</p>	<p>Peer Review I: Mission and User Needs</p> <p>Your project should now have completed a first pass at the following activities:</p> <ul style="list-style-type: none"> • Gather raw data on customer needs (through whatever means you deem most appropriate to your potential market). • Generate a list of customer needs for your product and organize it hierarchically into primary, secondary and tertiary needs. • Identify three or four needs that you feel are important, but latent and not addressed by current products. • Translate these needs into specifications and imperatives. <p>Most of you will find that your Mission Statement continues to evolve throughout the product development process as you learn more about your target market and gather feedback from faculty, customers and others. You should continue to update your Mission Statement as you gather new inputs (archiving the old ones on bCourses).</p> <p>This will be the first of three peer reviews you will have on your product development project. During class we will pair you up with another team or two to present and give feedback to one another. Come prepared to share:</p> <ul style="list-style-type: none"> • Your mission statement, • A brief review of the means used to collect customer and user needs information, • A summary of the identified customer and user needs, • One of your most interesting use scenarios, and • A summary of lessons learned in the process to date. <p>This is an opportunity to receive feedback from and give feedback to your classmates. It is also an opportunity to learn about new product development processes by observing what others have done and learned from their projects. You might want to check out the Stanford Product Design alumni wiki on critique: http://stanfordpd.pbworks.com/Critique. Below is a summary of the guidelines CCA uses on engaging in critiques.</p> <p><u>WHAT WE CRITIQUE</u></p> <ol style="list-style-type: none"> 1. Content: Does it make sense? Is it clear? Does it communicate what the designer claims? Is it interesting? 2. Process: Did the designer exploit the process(es) enough? Could more work have been done? 3. Grounding/defense: Can all of the designer's decisions be adequately defended? <p><u>HOW WE CRITIQUE BE CONSTRUCTIVE.</u></p> <p>We're all guilty of delivering too many barbed comments. Try to be constructive in your criticism (Something like "This part is successful because—; this part isn't because—; Maybe you could think about—"). Don't say every piece of work is great. The result is that nobody learns anything. It's not about "good" and "bad", more "successful" and "unsuccessful." (Reserve "good" and "bad" for your dog.)</p>

	<p>THE GREAT BIG NO-NO The phrase “I like it” without an explanation is forbidden. Learning to talk clearly and perceptively about other people’s work takes effort and practice. The more you do it, the more eloquent you will become.</p> <p>FINALLY, It is far easier to determine if a concept, typeface, size, color, position, relationship, etc. is appropriate, awkward, elegant, oblique, or nasty if you have something to compare it to. You will learn more quickly (and become a better designer) if you make a habit of bringing multiple solutions to class for critiques.</p> <p>T-3. Project Deliverables Due: Updated value proposition, updated customer/user needs analysis and, based on the latter, updated market hypothesis for further testing, As with all project deliverables, include a team short discussion of the process you used, lessons learned, and any observations you have about your team. We also ask that you upload feedback from the peer review. This can be uploaded at the end of the class or before midnight(11:59pm), 2/21(Tue) if you need more time.</p>
<p>12 Th 2/23</p>	<p>Concept Generation: Creativity & Brainstorming This class session will focus on brainstorming and “ideation” techniques used by new product development teams to generate product ideas from their understanding of customer wants and needs and of the available technologies. We will use in class exercises to help you move from your individual concept ideas to team ones.</p> <p>Read: Assignments from theDesignExchange – 6-Up Sketches: https://www.thedesignexchange.org/design_methods/317 Visual brainstorming: https://www.thedesignexchange.org/design_methods/136 Brainstorming : https://www.thedesignexchange.org/design_methods/111</p> <p>Read: “Creative Thinking Techniques” (http://www.virtualsalt.com/crebook2.htm)</p> <p>I-9. Individual Assignment Due: Each team member is to INDIVIDUALLY generate 10 concepts and post to your website noon before the class and bring to class. A “half-sheet” form will be provided on bCourses for you to use.</p> <p>T-4. Project Deliverables Due: Submit your concepts to your team folder and the clustering exercise you did in class. Upload a spreadsheet of your collective concepts to your project folder. Add any new ones from the class activities today or before midnight(11:59pm), 2/23(Th) if you need more time.</p>
<p>13 T 2/28</p>	<p>Concept Generation: Structured Methods This class will focus on structured methods for concept generation, such as Morphological Matrices, Functional Decomposition, etc. After reviewing your teams’ original 10 individual concepts, double the number through brainstorming and structured methods (e.g., for a team of 5, you should strive for a total of 100 concepts). We will have Julia Kramer, a graduate researcher, BEST lab, as a guest speaker to co-lead this section.</p> <p>Read: Assignments from theDesignExchange – 3-12-3 Brainstorm: https://www.thedesignexchange.org/design_methods/106 6-3-5 brainwriting: https://www.thedesignexchange.org/design_methods/107 Attribute listing: https://www.thedesignexchange.org/design_methods/109</p>

	<p>Do-Redo-Undo: https://www.thedesignexchange.org/design_methods/121 Biomimicry: https://www.thedesignexchange.org/design_methods/311</p> <p>Read: “Morphological Charts”, http://www.ifm.eng.cam.ac.uk/research/dmg/tools-and-techniques/morphological-charts/</p> <p>Scan: “Creax Function Database”, http://function.creax.com/ Scan: “Biomimicry Institute”, http://www.biomimicryinstitute.org/</p> <p>Optional View Video: Janine Benyus TED talk: Biomimicry in action. https://www.ted.com/talks/janine_benyus_biomimicry_in_action?language=en#</p> <p>T-5. Project Deliverables Due: Double the number of concepts through brainstorming and structured methods. After class in your next team meeting, expand your concepts using both brainstorming and structured methods and a spreadsheet with all of the concepts generated. We recommend that they be clustered into theme areas. A team of 5 should expect to have around 100 concepts. <u>Upload an updated spreadsheet of your collective concepts to your project folder.</u> Also submit any metaphors and related concepts generated during in-class exercise. Upload to bCourses after class or before midnight(11:59pm), 2/28(Th) if you need more time.</p>
<p>14 Th 3/2</p>	<p>Technology Trend and Innovation We will also provide industry practices by a guest speaker from Deloitte Digital (http://www.deloittedigital.com/us/).</p> <p>Robert Schmid is currently the Chief IoT Technologist at Deloitte Digital. During his time at Deloitte, he created and led the IoT practice, growing it to an extended network of over 1,000 members. Prior to his time at Deloitte, Schmid was the CEO & Founder of c1oudbase, a value-based consulting business to digital, technology strategy, and implementations. He has also served as the Technology Strategist of the Salesforce.com Foundation, the CIO of Activision, and the CTO of PedAlign. During his time at Activision, he transitioned the company from an in-house infrastructure to 50% cloud based, led merger system integration resulting in a 70% reduction of applications, and much more. Please refer to Schmid's LinkedIn for more information. He will give a talk about IoT(the Internet of Things)-centric, Mixed, Virtual, and Augmented Reality as example technology-driven approach.</p> <p>Read: http://www.deloittedigital.com/us/</p>
<p>15 T 3/7</p>	<p>Product Architecture, Product Platforms We will focus our discussion in this session on the definition of product architecture and the implications of product architecture decisions for product development, marketing, customers, etc. How might your product benefit from a product architecture/platform strategy? What role will emerging technologies play in strategic thinking about product platforms? How can you manage the trade-off between differeaciton and commonality? Identify product platforms you are familiar</p>

	<p>with and bring them or an image to class. Be prepared to discuss the relationship between product architecture and mass customization.</p> <p>Read: Ulrich, K., 1995. The role of product architecture in the manufacturing firm. <i>Research policy</i>, 24(3), pp.419-440.</p> <p>Read: Robertson, D. and Ulrich, K., 1998. Planning for product platforms. <i>MIT Sloan Management Review</i>, 39(4), p.19.</p> <p>(Optional) Reading: scan Pine’s classic article on mass customization on Google Books: http://books.google.com/books?id=2_3PMY4LQHkC&source=gbs_navlinks_s</p> <p>In-class Watch: Kobi: Fully Autonomous All Season Lawn Maintenance Robot, https://www.youtube.com/watch?v=-QseARzCk4s</p> <p>Optional Read: ch. 10 Product Architecture. (Product Design and Development)</p>
<p>16 Th 3/9</p>	<p>Intro to CAD in Fusion 360 (Part 1-Basic Level)</p> <p>Fusion 360 is a 3D CAD tool that connect the entire product design and development process in a single cloud-based platform that works on both Mac and Window. We will be joined by guest speaker Jeff Lee, Cal ME graduate, from Autodesk. He will provide a module allows you to build on solid models throughout 2 workshops. In this workshop, you will learn how to model a basic part using Autodesk’s newest product design platform, Fusion 360.</p> <p>No experience with CAD (computer-aided design) or Fusion is needed for this workshop. Participants will leave the workshop:</p> <ul style="list-style-type: none"> • understanding basic part modeling in Fusion 360 • understanding the browser and timeline features in Fusion 360 • understanding general project/data management in Fusion 360 • equipped with a general overview of Fusion 360 workspaces (Modeling, Rendering, Sculpt, CAM, Simulation, etc) <p>Please download Fusion 360 on your lap top before the class. An .edu e-mail address may be needed. http://www.autodesk.com/education/free-software/featured. You can sign in or create an Autodesk account to get free educational access to download and start running it on your computer.</p> <p>T-6. Project Deliverables Due: Submit your 3D assignment to bCourses after class or before midnight(11:59pm), 3/9(Th) if you need more time.</p>
<p>17 T 3/14</p>	<p>Concept Selection and Testing</p> <p>We will learn design methods for concept screening, concept scoring and testing as a means of selecting among competing ideas for products you might develop using conjoint analysis.</p> <p>Read: Assignments from theDesignExchange – Usability testing: https://www.thedesignexchange.org/design_methods/232 Usability report: https://www.thedesignexchange.org/design_methods/263 Weighted matrix: https://www.thedesignexchange.org/design_methods/103</p>

	<p>Read: “Extremely Rapid Usability Testing”, (http://grouplab.cpsc.ucalgary.ca/grouplab/uploads/Publications/Publications/2009-ERUT.JUS.pdf)</p> <p>I-10. Individual Assignment: Identify 2 competitive products that best meet your users’ 5 needs for a benchmarking exercise in class. Upload to bCourses as an individual assignment noon before class and bring to class to share with your team.</p> <p>T-7. Project Deliverables Due: You should now have at least 80 concepts for a 4 person team and 100 concepts for a 5 person team. These should be in your project bCourses/Concept Generation folder. By class time you should have organized the concepts you have to date into a spreadsheet, removing redundant or infeasible ones. You should have your team’s prioritized list of your top 5 needs. If your users haven't prioritized triple bottom line needs to the top list, include those that your team feels is important. Your team also work on your individual concept selection assignment and upload an integrated matrices to the project bCourses/Concept Selection folder after class or before midnight(11:59pm), 3/14(T) if you need more time.</p>
<p>18 Th 3/16</p>	<p>Prototyping: Low-Fidelity We will introduce tools and techniques for prototyping and testing your product concepts. Bring to class more discarded items that would normally go to landfill to add to our supply of prototyping materials.</p> <p>Read: Assignments from theDesignExchange – Live Prototyping: https://www.thedesignexchange.org/design_methods/318 Wireframe: https://www.thedesignexchange.org/design_methods/36 Prototyping: https://www.thedesignexchange.org/design_methods/257 Read: “Prototyping Is The Shorthand Of Design”, http://uwdata.github.io/hcid520/readings/Kelley-Shorthand.pdf Read: Sandhu, Jaspal S. “Measure early, measure often: rapid, real-time feedback in design for social innovation”. Jan. 2013: http://poptech.org/e3_jaspal_sandhu</p> <p>T-8. Project Deliverables Due: Submit photographs of any prototypes you create in-class after class or before midnight(11:59pm), 3/16(Th) if you need more time.</p>
<p>19 T 3/21</p>	<p>Medium Fidelity Prototyping (In class activity) Review of low prototyping methods. We will have guests present examples of medium fidelity prototyping.</p> <p>Read: Rapid Prototyping Methods on theDesignExchange - Rapid Prototyping: https://www.thedesignexchange.org/design_methods/24 Laminated Object Manufacturing: https://www.thedesignexchange.org/design_methods/18 Direct Shell Production Casting: https://www.thedesignexchange.org/design_methods/10 Fused Deposition Models: https://www.thedesignexchange.org/design_methods/15</p> <p>I-11. Individual Assignment: Please complete: team (peers) evaluation survey</p>

	before midnight, 3/21(T).
20 Th 3/23	<p>Peer Review II: Prototyping and Feedback</p> <p>Your project should now have completed a second pass at the following activities:</p> <ul style="list-style-type: none"> • Concept generations (20 concepts per each member in your team) • Create several frameworks for your teams • Low-medium fidelity prototypes <p>Most of you will find that your prototypes continues to evolve throughout the product development process as you learn more about your target market and gather feedback from faculty, customers and others. You should continue to update your mission statement as you gather new inputs (archiving the old ones on bCourses), and upgrade your prototype. This will be the second of three peer reviews you will have on your product development project. During class we will pair you up with another team or two to present and give feedback to one another. Come prepared to share the activities listed above. This is an opportunity to receive feedback from and give feedback to your classmates. It is also an opportunity to learn about new product development processes by observing what others have done and learned from their projects.</p> <p>T-9. Project Deliverables Due: Submit photographs of your latest prototype, frameworks built, and concept selection, testing processes after class or before midnight(11:59pm), 3/23(Th) if you need more time.. As with all project deliverables, include a team short discussion of the process you used, lessons learned, and any observations you have about your team. We also ask that you upload feedback from the peer review II.</p>
3/27-31	Spring Break
21 T 4/4	<p>Intro to CAD in Fusion 360 (Part 2-Advanced)</p> <p>Fusion 360 is a 3D CAD tool that connect the entire product design and development process in a single cloud-based platform that works on both Mac and Window. We will be joined by guest speaker Jeff Lee, Cal ME graduate, from Autodesk. He will provide a module allows you to build on solid models throughout 2 workshops. In part 2, you will also learn about Fusion’s cloud-based benefits, as well as a brief overview of the various workspaces (Modeling, Rendering, Sculpt, CAM, Simulation, etc).</p> <p>No experience with CAD (computer-aided design) or Fusion is needed for this workshop. Participants will leave the workshop:</p> <ul style="list-style-type: none"> • understanding basic part modeling in Fusion 360 • understanding the browser and timeline features in Fusion 360 • understanding general project/data management in Fusion 360 • equipped with a general overview of Fusion 360 workspaces (Modeling, Rendering, Sculpt, CAM, Simulation, etc)

	<p>T-10. Project Deliverables Due: Submit your 3D assignment to bCourses after class or before midnight(11:59pm), 4/4(T) if you need more time.</p>
22 Th 4/6	<p>Design for Production: Design for Scaleability</p> <p>Whether you are designing a manufactured good, virtual product, software or service, product development teams must consider the produceability of their design and whether or not it can be scaled to their addressible market. Design for produceability originated in design for manufacturing concepts of the last century, and is one of the many “design fors” that a product development team must consider. In this class session we’ll talk about the various “design for x” activities, including manufacturing. Be prepared to perform a class exercise in design-for-assembly.</p>
23 T 4/11	<p>Design for Environment: "The Natural Step" green design method (Part 1)</p> <p>We will be joined by guest speaker Jeremy Faludi, a specialist in sustainable design, http://www.faludidesign.com</p> <p>What does designing products for environmental soundness entail? This class is the first of two workshops on sustainable design methods. It introduces you to The Natural Step. You will use an abbreviated version of it to reframe your product and consider new design strategies.</p> <p>Read: from bCourses: Kambrook Kettle case study: “Mainstream appliance meets eco-design” (<i>Journal of Sustainable Product Design</i>)</p> <p>(Optional) Reading: Ch. Design for Environment (Product Design and Development)</p> <p>(Optional) Reading: Designing Cradle to Cradle Certified Products for the Circular Economy, http://education.c2ccertified.org/lms/</p> <p>I-12-a. Individual Assignment: This homework is in two parts; each part is due soon after class on Tuesday and Thursday. This homework is a survey on your experiences of the two green design workshops to be held this week. Your responses are not graded; you will get full credit if you just finish the surveys. Please do the survey twice--once for each workshop. You can find it here: http://tinyurl.com/ME110feedback. We would prefer that you do the survey for the Tuesday workshop as soon as possible after class on Tuesday. Same for the Thursday workshop. Both should be done no later than Friday, Apr 14, 11:59pm. The survey is at: http://tinyurl.com/ME110feedback</p> <p>T-11-a. Project Deliverables Due: Take photos of your table during the workshop, at the end of every activity. Turn in the photos you took. Please clearly name the files "Workshop_1_Step_1", "Workshop_1_Step_2", etc. If you have extra images, you can label them "Workshop_1_Step_1a" or as you see fit. Turn in your photos to bCourses after class or before midnight(11:59pm), 4/11(T) if you need</p>

	more time.
24 Th 4/13	<p>Design for Environment: Biomimicry (Part 2)</p> <p>This is the second workshop by Jeremy Faludi on sustainable design methods. It introduces you to the biomimicry method. You will use an abbreviated version of it to generate sustainable redesign ideas for your product. Class will be spent with you learning the method and performing it on your product, in your teams.</p> <p>View Video: Janine Benyus TED talk: Biomimicry in action. https://www.ted.com/talks/janine_benyus_biomimicry_in_action?language=en#</p> <p>Optional: Autodesk Sustainability Workshop pages on biomimicry: http://sustainabilityworkshop.autodesk.com/products/biomimicry</p> <p>I-12-b. Individual Assignment: This homework is in two parts; each part is due soon after class on Tuesday and Thursday. This homework is a survey on your experiences of the two green design workshops to be held this week. Your responses are not graded; you will get full credit if you just finish the surveys. Please do the survey twice--once for each workshop. You can find it here: http://tinyurl.com/ME110feedback. We would prefer that you do the survey for the Tuesday workshop as soon as possible after class on Tuesday. Same for the Thursday workshop. Both should be done no later than Friday, Apr 14, 11:59pm. The survey is at: http://tinyurl.com/ME110feedback</p> <p>T-11-b. Project Deliverables Due: Take photos of your table during the workshop, at the end of every activity. Turn in the photos you took. Please clearly name the files "Workshop_2_Step_1", "Workshop_2_Step_2", etc. If you have extra images, you can label them "Workshop_2_Step_1a" or as you see fit. Turn in your photos to bCourses after class or before midnight(11:59pm), 4/13(Th) if you need more time.</p>
26 T 4/18	<p>Communicating Actionable Design Research and Peer Review III</p> <p>This starts our module on methods and tools for communicating actionable design research., design results that can have impact.</p> <p>Read: Roschuni, C., E. Goodman, A.M. Agogino, "Communicating Actionable User Research for Human-Centered Design, Special Issue on Studying and Supporting design Communication, <i>Journal of Artificial Intelligence for Engineering Design, Analysis and Manufacturing</i>, Vol. 27 (Special Issue 02, 2013), pp. 143-154. doi:10.1017/S0890060413000048. (on bCourses)</p> <p>Read: Communicate Methods on theDesignExchange - Envisionment Videos: https://www.thedesignexchange.org/design_methods/251 Storyboarding: https://www.thedesignexchange.org/design_methods/30</p> <p>Also, this will be the third (and last) of three peer reviews you will have on your product development project. During class, you will be asked to develop a 3mon. "elevator pitch" in class. This is an opportunity to receive feedback from and give feedback to your classmates.</p>

	<p>T-12. Project Deliverables Due: You will be asked to develop a 3 min. “elevator pitch” in class. Upload your final to your bCourses folder noon before the class.</p>
<p>26 Th 4/20</p>	<p>Entrepreneurship, Business Models, and the Start-Up Ecosystem</p> <p>There are many different business models that underlie successful entrepreneurial ventures, only some of which rely on traditional concepts like intellectual property protection. What kind of business model is appropriate for your project, if you were to transform it into a real entrepreneurial venture? Can and should your project be protected as intellectual property? We will have a preliminary business model canvas for your project. We will be assisted by an expert from industry in business models and strategy, Eugene Noh, CITRIS Foundry Partnerships Lead, NSF I-Corps Recruiting Lead, UC Berkeley.</p> <p>Read: UC Berkeley Disclosure Form, http://ipira.berkeley.edu/invention-disclosure-information http://ipira.berkeley.edu/invention-disclosure-information</p> <p>Read: Business Model Canvas, http://www.businessmodelgeneration.com/canvas</p> <p>T-13. Project Deliverable Due: Upload the business model canvas you developed during class after the class or before midnight(11:59pm), 4/20(Th) if you need more time..</p>
<p>27 T 4/25</p>	<p>Visualization, Portfolio and UX Design</p> <p>Short introduction to UX Design. Learn how to develop your own Design Portfolio. We will also hold an optional portfolio tutorial session.</p> <p>Guest speaker Chan Kim, Senior UX Design, Oracle will lead a session to give a talk about User Experience Design, Portfolio Development.</p>
<p>28 Th 4/27</p>	<p>Studio: Presentations, Storytelling and Pitching</p> <p>As you approach the end of the semester, you should start thinking about how you will communicate your project outcomes to clients and potential investors. In this session we’ll review good presentation and storytelling techniques, and let you start practicing applying them to your capstone projects. Be prepared to pitch your product today as a class exercise.</p> <p>Read: Chapter 1, “What Sticks?” in <i>Made to Stick</i>, http://www.heathbrothers.com/download/mts-made-to-stick-chapter1.pdf (you may need to register for free)</p>
<p>29,30 T/Th 5/2&4</p>	<p>Reading Review Recitation Week</p> <p>Teaching staff will be available for feedback on teams’ design progress and presentations. Presentations will be held during the Design Showcase at the Jacobs Institute for Design Innovation on Th May. 4th, 11:30am-1:30pm. We will invite outside professionals as design judges for feedback. The teaching staff will be available on 5/5 to give you feedback on your final deliverables.</p>

	<p>The Design Showcase uses a tradeshow format. You will need to prepare a few “teaser slides” at the start, then a tradeshow booth presentation. Remember that most of the judges will not be familiar with your project at all, never having seen any of your previous work, so you have to tell them a story about why there’s a need, how you focused on the customer to discover the detailed needs, and how you benchmarked and explored a wide range of potential solutions to come up with the best product. Your presentation should include:</p> <ul style="list-style-type: none"> • Your mission statement • A summary of your customer/user needs analysis, market hypothesis and business model • A couple of concepts you considered as alternatives to the one you developed, along with a justification for your final selection • Key design or technical features that address the needs and differentiate your product • Tripple bottom line analysis: financials, societal and environmental • A demonstration of your product prototype • A list of the most important lessons you learned about the NPD process and teams <p>An effective presentation includes a slide presentation along with a display of a working prototype. Be sure to include all areas covered in the judging form (to be posted on bCourses). Typical questions a judge might want answered.</p> <ul style="list-style-type: none"> • What motivated the idea? • Who are the competitors and what products are out there now? • What need or needs are lacking in the current products out there? • Define what success is – financial, societal, environmental, etc. • What ideas did you discard, and will your final product idea meet the customer needs? • How did you decide on the final concept? • Why did you decide on the prototyping methods used and what kind of feedback did you receive?
<p>W 5/10</p>	<p>Final Reports (Online or in-Person 450 Sutardja Dai Hall)</p> <p>I-13. Individual Assignment: Turn in the design portfolio you have developed throughout the semester due noon 5/10(W).</p> <p>I-14. Individual Assignment: Please complete 2 individual surveys (due noon 5/10(W)):</p> <ol style="list-style-type: none"> 1) Team evaluation survey: Evaluate participations of peers in your team 2) The final course satisfaction survey will be sent to your Berkeley email address. The survey is meant to better understand how you created portfolios and whchi methods/guest lectures were most helpful. <p>T-14. Final Project Deliverables: Turn in your final presentation (or the</p>

	documentation of your tradeshow display), summary report (no more than 10 pages), photo of your prototype and/or the actual prototype, if appropriate. As required for all Project Deliverables, include a team lessons learned as well. (due noon 5/10(W))
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