University Of California, Berkeley

Technology Design Foundations

Design Innovation 190-9 / 290-9 / Mechanical Engineering 290

INSTRUCTORS

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SCHEDULE & LOCATION:

1-week intensive: January 13 - 17, 10AM - 12PM, 1PM- 4PM, 210 Jacobs Hall
Regular semester meetings: Fridays, 10AM - 12PM, 210 Jacobs Hall (Starting January 24)

DESCRIPTION

This course introduces foundational design thinking and design technology frameworks, and encourages students to implement them in a rigorous project-based learning experience. Students are expected to build fluency in the following skillsets through TDF:

- establishing empathy for users and stakeholders;
- framing complex problems as actionable design opportunities;
- design ideation;
- Iteratively prototyping a range of physical and interactive concepts;
- Validate hypotheses using technical and experiential prototypes, and statistical methods;
- Visually and experientially communicating design concepts to inspire audiences and solicit feedback.

Together, these skills are essential to a successful career oriented towards the design of products, services, and experiences enabled by emerging technologies. This course introduces students to design thinking and the basic practices of interaction design. It follows a human-centered design process that includes research, concept generation, prototyping, and refinement. Students will become familiar with design methodologies such as sketching, storyboarding, wireframing, prototyping, etc. It also develops fluency across a range of core technologies and how to operationalize them within a design context. Students will engage with a highly technical but well-scoped semester-long project to create a meaningful product-service system leveraging both hardware and digital technologies.

COURSE PREREQUISITES: This course has no prerequisites.

ENROLLMENT POLICY: Enrollment is by application. Priority is given to students in the GLOBE NTU and SRM programs, and students enrolled in a Mechanical Engineering graduate program.

REQUIRED MATERIALS:

- Electronics Prototyping Kit containing selection of parts for prototyping and designing interactive devices using easy-to-program microcontrollers, sensors, and actuators. These materials will be provided upon your acceptance to the class, but it is your responsibility to buy replacement or supplemental materials necessary.
- You will need a personal laptop capable of running the required software suite of programing and design tools.

COURSE OBJECTIVES:

Upon completing this course, students will:

- Understand and be comfortable executing the key steps in an iterative and human-centered design process, including conducting research, uncovering insights, generating ideas, and developing and testing prototypes.
- Be prepared to work effectively in teams, and have a toolkit of resources to support productive teamwork
- Communicate both conceptual and concrete ideas effectively, using a range of visual and verbal presentation techniques
- Give form to design ideas through prototyping at a range of fidelities, and using a range of materials and tools, including electronics, to convey specific information about a design idea

GRADING POLICIES

15% Attendance and participation
35% Individual Design Work
25% Group Design Work
25% Final project

ATTENDANCE POLICY: Your presence is essential in this course. Attendance and participation will be evaluated daily. Students are entitled to two 'no questions asked' absences (please note that during the intensive week, each 1.5-hour block counts as a 'class'). Thereafter, you will lose 5% of your final grade for each absence. Exceptions will be made for documented medical or personal emergencies.

LATE WORK POLICY: Timely submission of work is essential to keep design work on pace. Submissions will be accepted up to 48 hours after the deadline with a 30% penalty. Submissions will not be accepted more than 48 hours after the deadline. Exceptions will be made for documented medical or personal emergencies.

DISABILITY ACCOMMODATION: If you need disability-related accommodations in this class, have emergency medical information you wish to share with us, or if you need special arrangements in case the building must be evacuated, please inform our teaching staff as soon as possible and provide a DSP letter at your earliest convenience.

PLAGIARISM AND WORK INTEGRITY POLICY: While we routinely learn from and build upon the work of others in class and in our own personal and professional lives, this course expects you to know the difference between citation and plagiarism, and to abide by all University-wide standards of academic honesty. If you feel unclear about this distinction or others like it, feel free to come talk to us, or review the UC Berkeley Center for Teaching and Learning's policies detailed here: https://teaching.berkeley.edu/statements-course-policies

STATEMENT ON DIVERSITY, EQUITY, AND INCLUSION: In line with the Jacobs Institute vision of Diversity, Equity, and Inclusion, we will make every effort to create an inclusive and respectful learning environment. From the Jacobs Institute Website:

"The cultivation of diverse perspectives is of vital importance to the student experience as well as the design fields at large. Since our founding five years ago, the Jacobs Institute has prioritized interdisciplinary, team-based learning—a reflection of our belief that the best insights are gained through collaboration across difference. While Jacobs Hall is a hub for training design leaders through hands-on exposure to cutting-edge tools and ideas, we believe that this learning is only valuable when developed within a diverse community and in service to the broader public interest."

Schedule

Intensive Week, January 13 - 17
Class meets 10AM - 4PM each day with a one-hour lunch break (12-1PM), 210 Jacobs Hall.

Class #	Day	Topic	Activities due (Check bCourses for Corresponding Assignments)
1	**Monday Jan 13**	Innovation as a Learning Process Team Formation User Research Prototypes as Hypotheses	Team Formation Team Norms & Contract Low-fidelity Prototypes
2	**Tuesday Jan 14**	Sensemaking from User Research Framing Design Problems Ideation Value Propositions	Interview 1
3	**Wednesday Jan 15**	Medium-Fidelity Prototypes Prototype Planning and Strategy Storytelling	Design Challenge Framing Interview 2 Concept Development
4	**Thursday Jan 16**	**Design Review I** Critique Concept planning and roadmapping	Interview 3 Medium-fidelity Prototype

5	**Friday Jan 17**	2D- and 3D-Modeling Digital Fabrication I Physical Computing I	Setup key software suites for Friday Jan 17.

Regular Semester

Class meets Fridays from 12PM - 2PM, 210 Jacobs Hall.

Class #	Day	Topic	Activity or Assignment
6	**Friday Jan 24**	Physical Computing II	Digital Fabrication HWI
7	**Friday Jan 31**	Digital Fabrication II	Interview 4 Physical Computing HWI
8	**Friday Feb 7**	Physical Computing III	Interview 5 Digital Fabrication HW2
9	**Friday Feb 14**	Storyboarding, Video Prototyping	Physical Computing HW2
10	**Friday Feb 21**	**Design Review II**	Prototype Video

11	**Friday Feb 28**	UI/UX Prototyping **Guest Lecture TBD**	Interview 6
12	**Friday March 6**	Statistics for Meaningful Hypothesis Validation	UI Flow
13	**Friday March 13**	Web & Mobile Stacks and Interfaces for Sensing, Sensemaking (Data Science), and Actuation **Guest Lecture TBD**	Interview 7 UI/UX Stats Problem Set
14	**Friday March 20**	(No Class - but we will be present for workshopping!) Inspirational and Competitive Analysis & Value Propositions (video lecture)	Cloud API HW
	Friday March 27	Spring Break - no Class	
15	**Friday April 3**	**Design Review III**	Interview 8 Competitive Analysis & Value Proposition Statement Design Statement
16	**Friday April 10**	High-Fidelity Prototyping: Digital Fabrication Workshop	
17	**Friday April 17**	High-Fidelity Prototyping: Physical Computing	

		Workshop	
18	**Friday April 24**	High-Fidelity Prototyping: Video Prototyping Workshop	
19	**Friday May 1**	**Final Review (Last day of Class)**	Exhibition & Final Materials Prep
20	**Wednesday May 7**	**Showcase @ Jacobs Hall (Required)** **10 - 11:30 AM**	EXHIBITION
-	**Saturday May 10**	Final Materials Due, 11:59PM	**Final Deliverables Due**