

University Of California, Berkeley
Department of Mechanical Engineering

ME 290K A: Innovation through Design Thinking (2 units)

Graduate Course

Syllabus

CATALOG DESCRIPTION

Designed for professionally-oriented graduate students, this course explores key concepts in design innovation based on the human-centered design approach called “design thinking”. Topics cover include human-centered design research, analysis of research to develop design principles, creativity techniques, user needs framing and strategic business modeling.

COURSE PREREQUISITES

Graduate level standing; Prior design course

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL

No formal textbook. Sample readings are:

- *Designing for Growth: A Design Thinking Tool Kit for Managers*, by Jeanne Liedtka and Tim Ogilvie, Columbia Business School, 2011.
- *Peter Guber Interview – The MAGIC is Story* at <http://tinyurl.com/3phk6bl> and the executive summary of the book *Made to Stick* at [Design Thinking .tagonline.org/files/Made_to_Stick.pdf](http://DesignThinking.tagonline.org/files/Made_to_Stick.pdf).
- “Design Thinking: Notes on its Nature and Use,” *Design Research Quarterly* Vol. 2, NO. 1, January, 2007
- “The Principles of Collective Invention,” White Paper by Erika Gregory & Clark Kellogg
- “Learning from Studio,” by Clark Kellogg, *Design Intelligence Knowledge Reports*, January, 2006
- *The Future of Innovation*, by Andrew Razeghi, selected chapters (Slimbooks), 2012
- “PFPS Toolkit,” by Clark Kellogg, Sara Beckman and Helene Cahen
- “Culture of the Charrette,” White Paper by Arnold Wasserman
- “Ethnography Primer,” IDSA, 2010
- *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, by Alexander Osterwalder and Yves Pigneur, 2nd Edition, 2010
- *Design Works*, by Heather Fraser, (Rotman-UTP Publishing)
- “[Creative Thinking Techniques](http://www.virtualsalt.com/crebook2.htm)” (<http://www.virtualsalt.com/crebook2.htm>)

Some of the “readings” will take the form of videos:

- Design Thinking and the Future, Fabio Sergio, Creative Director of Frog Design, <http://www.slideshare.net/frogdesign/faboio-sergio-design-thinking-for-the-future>
- Getting People to Talk: An Ethnography & Interviewing Primer, <http://vimeo.com/1269848>

COURSE OBJECTIVES

Innovating is at the core of successful enterprises today whether start-ups or Fortune 500 companies. It requires diligence, discipline and the credible projections of future trends and competitive forces. It requires imagination, focus and human capital. It also requires shared tools, practices and habits of mind. This course will introduce students to the tools and practices of innovation, deep customer insight, and design thinking in real world applications.

DESIRED COURSE OUTCOMES

The primary goal is to provide students with a set of innovation skills that will allow them to flourish in a climate of complex problem solving and design challenges. Students will develop expertise in innovation skills drawn from the fields of critical thinking, design thinking and systems thinking. Students should be able to apply the skills mastered to real world design problems.

TOPICS COVERED

Design research methods, ethnographic interviewing/observation, analysis and synthesis, reflective thinking, persona and scenario creation, ideation processes, rapid prototyping, collaborative skills and technologies, concept testing, iterative design, business models and narrative communication.

CLASS/LABORATORY SCHEDULE

This class builds on Confucius's notion: *"I hear and I forget. I see and I remember. I do and I understand."* There will be a lot of doing in the class sessions to develop facility with the design thinking tools that students can apply to their own research projects and beyond.

- 4 hours lecture per week for first half of Fall semester

CONTRIBUTION OF THE COURSE TO MEETING THE PROFESSIONAL COMPONENT

The course focuses on "soft" professional skills that are critical for successful design in industry today.

ASSESSMENT OF STUDENT PROGRESS TOWARD COURSE OBJECTIVES

30% on homework assignments
20% on attendance and participation in class
30% on participation in innovation tournament
20% on post-reflection and integration plan into research or capston projects

PERSON(S) WHO PREPARED THIS DESCRIPTION

Professor Alice Agogino, 4/12/13

ABBREVIATED TRANSCRIPT TITLE (19 SPACES MAXIMUM): DESIGN THINKING

TIE CODE: LECT

GRADING: Letter

SEMESTER OFFERED: Fall and Spring (first half)

COURSES THAT WILL RESTRICT CREDIT: None

INSTRUCTORS: Agogino

DURATION OF COURSE:

TOTAL NUMBER OF REQUIRED HRS OF STUDENT WORK PER WEEK: 6

IS COURSE REPEATABLE FOR CREDIT? No

CROSSLIST: No

ME168

Mechanics of Offshore Systems

Day	Date	Lecture	Topic
Thursday	8/29/2013	1	Characteristics of Offshore and Coastal Systems, Maritime Operations
Tuesday	9/3/2013	2	Linear Potential Theory, A Review,
Thursday	9/5/2013	3	The equation of motion and Response Amplitude Operator, Review,
Tuesday	9/10/2013	4	Shallow water hydrodynamics and Bathymetry effects,
Thursday	9/12/2013	5	Loads on Offshore Structures,
Tuesday	9/17/2013	6	Vibratin of Continuous Systems- Introduction
Thursday	9/19/2013	7	Cantilever beams, Beam vibration & natural modes,
Tuesday	9/24/2013	8	Transient response,
Thursday	9/26/2013	9	Wind and Current loads on offshore structures,
Tuesday	10/1/2013	10	Vortex induced vibration,
Thursday	10/3/2013	11	Extreme environment, Rogue Waves
Tuesday	10/8/2013	12	Cables & mooring: Basic catenary in air,
Thursday	10/10/2013	13	Catenary in water,
Tuesday	10/15/2013	14	Mooring systems configuration and design,
Thursday	10/17/2013	15	Wave-drift forces,
Tuesday	10/22/2013	16	Low frequency damping,
Thursday	10/24/2013	17	Dynamic Positioning
Tuesday	10/29/2013	18	Numerical Modeling of Offshore Structures with Mooring
Thursday	10/31/2013	19	Numerical Modeling of Offshore Structure with Mooring (Cont.)
Tuesday	11/5/2013	20	Underwater Acoustics: Introduction to Sonar (Acoustic Waves, Doppler shift, intensity and Decibels)
Thursday	11/7/2013	21	Intro to Acoustics (cont.)+ Sonar Equations,
Tuesday	11/12/2013	22	Transducers, Directionality and Arrays,
Thursday	11/14/2013	23	Transducers, Directionality and Arrays (Cont.)
Tuesday	11/19/2013	24	Ambient noise,
Thursday	11/21/2013	25	Underwater guidance and navigation,
Tuesday	11/26/2013	26	Arctic Marine Structures,
Thursday	11/28/2013		
Tuesday	12/3/2013	27	Ice structure, Ice load on structures,
Thursday	12/5/2013	28	Wave-ice interactions,