DESIGN ACROSS SCALES & DISCIPLINES

Graduate number: MAS.650
Undergraduate (joint subject) number: 4.110
Prereq: None
U (Spring)
2-2-8HASS-A (12 units)

Instructor
Prof. Meejin Yoon  meejin@mit.edu
Prof. Neri Oxman  neri@mit.edu

CLASS TAs
Ammar Ahmed  ammara@mit.edu
Zach Cohen  zdacohen@mit.edu
Angeline Claire Jacques  ajacques@mit.edu
Dijana Milenov  dmilenov@mit.edu
Sarah Wagner  sewagner@mit.edu
Alexander Wiegering  awieg@mit.edu
das_tas@mit.edu

Schedule
Lectures  Tuesday 10:00 AM – 12:00 PM  Room E14-633
Crit A, B, and C  Wednesday 7:00 PM – 8:00 PM  Room 9-217, 9-450,
Crit D, E, and F  Wednesday 8:00 PM – 9:00 PM  and 9-450a
*Class locations are subject to change. Announcements will be made via email.

TA Office Hours  Sunday 12:00 PM – 2:00 PM
               Monday 7:00 PM – 9:00 PM

Website  http://stellar.mit.edu/S/course/MAS/sp18/MAS.650-4.110/
Description

Inspired by Charles and Ray Eames’ canonical Powers of Ten, the course explores the relationship between science and engineering through the lens of design. It examines how transformations in science and technology have influenced design thinking, and vice versa. It offers interdisciplinary tools and methods to represent, model, design and fabricate objects, machines, and systems. Structured as core lectures and lab sessions, the course is organized thematically with topics such as information design, user interaction, digital fabrication, and design ethics.

The course creates a new pedagogical paradigm for learning and education, which cuts across various disciplines and scales to demonstrate that design is not a discipline, but a way of looking at the world; one that promotes the synthesis of interdisciplinary knowledge across scales in order to create objects and systems for the greater good. This is partly due to the fact that big, real-world challenges – such as the race to cure cancer, the mars landing mission and the challenge to design sustainable cities and buildings – require, perhaps more than ever, an interdisciplinary skillset combined with an ability to operate across multiple scales with creativity.

The history of design innovation provides endless examples of cross-disciplinary innovations and individuals. Buckminster Fuller, for instance, was a designer, a futurist, an inventor, an author and a systems theorist. His designs based on the geodesic dome have inspired not only generations of designers, architects, engineers and urban planners but also chemists, material scientists and physicists, who were inspired by his representation of the physical world. Charles and Ray Eames were mid-century American designers working at a range of scales and in a variety of media, from furniture and military aircraft parts to films and exhibitions. Their experiments in design fabrication, and cultural media provide significant references for design education today. An example of the value of learning across disciplines today is found in Siddhartha Mukherjee’s book, Emperor of all Maladies: a Biography of Cancer, which tells the story of how the process of inventing cell dyes to trace the growth of cancerous tissues was actually inspired by textile design.

Design has expanded to include a broad range of scales and disciplines, shifting from the production of objects to the design of experiences, data, networks, territories, and social frameworks. Designers are no longer exclusively committed to design autonomous objects (buildings, cars, furniture and household products), but rather are conceiving and testing whole ecologies of design experiences (robotic construction systems, transportation systems, health care experiences, water distribution, and clean energy). This has prompted Tim Brown, CEO of the design consultancy firm IDEO to state, “Design is too important to be left to designers.” The scope of design ecologies is so broad and so integrated with other disciplines that all disciplines benefit from design inquiry and methods to tackle the new breadth of design problems at hand. Interdisciplinary teams must work together to design the systems, experiences, environments and futures for our increasingly complex world. Design Across Scales responds to this challenge by creating a course that is not a traditional design course for designers, but a design course about culture, science and technology serving as a foundation course for all students regardless of their major.

Requirements

In addition to the one lecture per week by the instructor and guest lecturers, one lab session (a.k.a. crit) per week will be given. This crit session is required and will be used for seminar-style discussions on lecture topics, design critiques, and an offering of optional design skill tutorials. The readings are highly recommended, for all students and required for graduate students. Each student is expected to attend all lectures, be fully prepared for the crit sessions, and spend 2-3 hours per week on assignment tutorials and projects.
Assignments

For Undergraduates, the final grade is distributed as follows: (1) Weekly Assignments completed for each Crit: 20%; (2) class attendance: 20%, (3) Crit participation: 20%, (4) Project Assignment (Total – 40% – broken down into Concept Design (10%), Design Development (10%) and Final Presentation: 20%.

For Graduate students, the final grade is distributed as follows: (1) Weekly Assignments completed for each Crit: 15%; (2) class attendance: 15%, (3) Crit participation: 15%, (4) Project Assignment (Total – 40% – broken down into Concept Design (10%), Design Development (10%) and Final Presentation: 20%. (5) Additional Graduate Assignment 15%.

Attendance will be taken at lectures and at crit sessions.

February 6 Tues **LECTURE 1: DESIGN ACROSS SCALES - INTRODUCTION**
Prof. Meejin Yoon
Prof. Neri Oxman
Recommended Readings:

February 7 Weds **NO CLASS**
Course enrollment application due by 5:00 PM.

February 13 Tues **LECTURE 2: DESIGN AND RESEARCH**
Prof. Neri Oxman
Recommended Readings:

February 14 Weds Crit Session
February 19 Mons **No TA office hours (President’s Day)**
February 20 Tues **NO CLASS (MIT Monday schedule due to President’s Day). Concept Design 5:00 PM submission due.**

February 21 Weds **Assignment 1 Concept Design critique, Group 1**

February 27 Tues **LECTURE 3: DESIGN AND PRACTICE**
Prof. Meejin Yoon
Recommended Readings:
February 28 Weds  Assignment 1 Concept Design critique, Group 2

March 6 Tues  LECTURE 4: DESIGN THROUGH AGENCY
Increasing the Power of Design through Agency
Prof. Allan Chochinov
SVA MFA in Products of Design Program
Chair and Co-Founder, Core 77
Recommended Readings:
Choose from some of the following:
https://medium.com/@chochinov/top-reads-of-2017-8a7691f73586

March 7 Weds  Crit Session

March 13 Tues  LECTURE 5: DESIGN OF INTERFACES
Notation, Information and Communication
John Snavely
Principal Design Manager, XBox
Recommended Readings:
Lackoff, George and Mark Johnson, Chapter 4: Orientational Metaphors of Metaphors We Live By, 1980.
Norman, Donald. Natural User Interfaces are Not Natural, in ACM Computer Human Interaction; 17(3), 2010.

March 14 Weds  Crit Session

March 20 Tues  LECTURE 6: DESIGN OF REPRESENTATION
Prof. Meejin Yoon
Prof. Neri Oxman
Recommended Readings

March 21 Weds  Mid-review with Prof. Meejin Yoon and Prof. Neri Oxman, 7-10 PM

March 27 Tues  Spring Break (no class)

April 3 Tues  LECTURE 7: DESIGN OF DISCOVERY
3D Fabrication of Biologically Inspired Structures
James Weaver
Senior Research Scientist
Hansjorg Wyss Institute for Biologically Inspired Engineering, Harvard University

Recommended Readings:

April 4 Weds Crit Session

April 10 Tues LECTURE 8: DESIGN OF LIFE
David Sun Kong
Technical Staff, MIT Lincoln Laboratory

Recommended Readings:

April 11 Weds Assignment 2 Design Development critique, Group 1

April 17 Tues PATRIOTS DAY HOLIDAY – NO CLASS

April 18 Weds Assignment 2 Design Development critique, Group 2

April 24 Tues LECTURE 9: DESIGN OF SYSTEMS
SENSEable Cities
Carlo Ratti
Professor of Urban Technologies and Planning
Director, SENSEable City Lab, MIT

Recommended Readings:

April 25 Weds Crit Session

May 1 Tues LECTURE 10: DESIGN OF EXPERIENCE
Lee Moreau  
Principal, Continuum  

Recommended Readings:  
Weinschenk, Susan. 100 Things Every Designer Needs to Know About People. Berkley: New Readers, 2011  
Schneider, Jakobs and Stickdorn Marc. This is Service Design, http://thisisservicedesignthinking.com/  

May 2  Weds  Crit Session  
May 8  Tues  LECTURE 11: DESIGN FOR HUMANITY  
Connectivity as a Human Right  
Nicholas Negroponte  
Co-Founder, MIT Media Lab  
Recommended Readings:  

May 9  Weds  Crit session  
May 15  Tues  Powers of Ten Final Review  
May 16  Weds  NO CLASS  

* Changes to the schedule, if necessary, will be announced via email.  
* Supplemental Graduate Student Assignment due date will be determined in advance of the due date.