We are asked to work across scales, between disciplines, and beyond expectations. That is the premise for this course.

Inspired by the 1977 Charles and Ray Eames’ film, Powers of Ten, we begin with the idea that scale is no longer merely a function of space, time, and distance, but has expanded to include physical, perceptual, and even performative dimensions that demand a closer look. Today, design is not a single discipline, but a function of multiple perspectives and practices that collectively help us better understand—and ideally address—some of the world’s greatest challenges.
# 4.110 DESIGN ACROSS SCALES

## SYLLABUS

<table>
<thead>
<tr>
<th>Course Information</th>
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<tbody>
<tr>
<td><strong>Course Year:</strong> Spring 2020</td>
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<tr>
<td><strong>Credit Hours:</strong> 2-0-10 U (Lecture)</td>
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<tr>
<td><strong>Lecture Schedule:</strong></td>
<td>Monday 10:00-12:00 AM in E14-633 (MIT Media Lab – 6th Floor)</td>
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<tr>
<td><strong>Weekly Lab Schedule:</strong></td>
<td>Wednesday 7:00-9:00 PM (4 sections)</td>
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<td><strong>Locations:</strong></td>
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<tr>
<td>Lecture: E14-633</td>
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<tr>
<td>Lab Section 1: 1-371</td>
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<td>Lab Section 2: 1-375</td>
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<td>Lab Section 3: 1-379</td>
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<td>Lab Section 4: 1-273</td>
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<thead>
<tr>
<th>Instructor Information</th>
<th>Lee Moreau <a href="mailto:LMoreau@MIT.edu">LMoreau@MIT.edu</a></th>
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<tbody>
<tr>
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| Questions? | Please submit any course-related questions to this TA listserv address: das_tas@mit.edu |

## Course Description

*Design Across Scales: Design as a Humanist Discipline*

Today, designers are no longer exclusively creating autonomous objects, but are working—both individually and collectively—on everything from fabrication methods to transportation systems to clean energy sources. We are asked to interpret data, build networks, embed social frameworks, and consider what it means to be at all times mobile. We are tasked with producing sustainable products, with constructing resilient cities, and with imagining a future not yet seen.

We are asked to work across scales, between disciplines, and beyond expectations. That is the premise for this course.

Inspired by the 1977 Charles and Ray Eames’ film, Powers of Ten, we begin with the idea that scale is no longer merely a function of space, time, and distance, but has expanded to include physical, perceptual, and even performative dimensions that demand a closer look. Today, design is not a single discipline, but a function of multiple perspectives and practices that collectively help us better understand—and ideally address—some of the world’s greatest challenges.

All of this obliges us to ask serious questions about the things we put out into the world. Does data represent an exclusive form of cultural capital? Can energy be conceived of as a truly renewable resource? How can we better understand economies of scale, up-cycling and reuse, and progressive methods of manufacture while protecting and preserving local materials? How do we approach making things for people whose lives are shaped by conditions that predate—and all too often restrict—our participation? And what happens when the things we produce result in unintended consequences?
Now more than ever, these operational, cognitive, and creative challenges demand a truly interdisciplinary skill set, one that benefits from new voices and vocabularies, urging us to consider not only our own inventions but their impact on the people we serve. How can we reconcile need against greed, personal voice against public choice? How do we even begin to think about equitable access, environmental stewardship—in short, about soul across scale?

With a weekly class, visiting lecturers, and regular (weekly) group lab sessions, we will consider together how design works across a range of frequencies, from micro to macro, the atomic to the astronomical. We'll look at cartography, and choreography; at color, and cultural dynamics; at agrarian ideas that reframe principles of land use; and at what it means to consider legibility as a spatial conceit. We'll look at the body as a machine, at the machine as a tool, and at tools themselves as idioms for seeing, thinking, listening, sharing, building, and designing a better world for us all.

Each of the course's four multi-week assignments creates a framework for exploration and self-discovery. They are meant to challenge our assumptions about the design process. There are no "right" answers for any of these exercises, so it will be up to each student to create their own frameworks for evaluation and decision-making.

### Design Problems

- Exercise 1: Critter
- Exercise 2: Game
- Exercise 3: Polyphony
- Exercise 4: Voyager

Students will frequently be asked to work in teams of 2-4 people, therefore effective collaboration and teamwork will be necessary to fulfill the course requirements.

### Evaluation Criteria

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<tr>
<th>Requirements</th>
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<td>Each student is expected to attend all lectures and spend approximately 10 hours per week on assignments and projects outside of class.</td>
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#### Grading Criteria

- Attendance for all lectures and lab sessions is mandatory.
- Most of the assignments in this course will be iterative in nature. Students will be expected to take risks, attempt new things, work in new ways, and play out a number of scenarios before arriving at the optimal solution. The design process takes work.
- In most cases, you are expected to present substantial new work at each class. Make progress every week.
- The design process is progressive in nature. Late work is not acceptable and will affect grading.

Students will be graded on originality of concept, quality of design work, clarity of communication, participation in class activities and lecture discussions, ability to work as a team, and helpfulness to other students in class.

For students, the final grade is based on:

- 30% Class Attendance and Participation (Showing up and contributing to the course’s positive chemistry.)
- 30% Communication of Concepts and Ideas (Clarity of thought and communication.)
- 20% Conceptualization and Execution of Design (Great ideas rendered beautifully.)
- 20% Teamwork and Collaboration (Working well with others.)

Note: For assignments or projects requiring teamwork, each student will be graded individually based on their performance.
4.110 DESIGN ACROSS SCALES

Course Schedule:

The course is assumed to be based upon a 14-week semester and breaks down as follows. Each exercise identifies its particular meeting schedule and work requirements:

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Week 1
Monday 2/03
Introductory Lecture: Design Across Scales and Charles and Ray Eames
Wednesday 2/05
Weekly Lab
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Week 2
Monday 2/10
Guest Lecture: Frances M. Ross, PhD
Ellen Swallow Richards Professor in Materials Science and Engineering, MIT
Assign Exercise 1: Critter
Assignment Deadline: Friday 2/21, with highlights presented during the Lecture on Monday 2/24
Wednesday 2/12
Weekly Lab
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Week 3
Tuesday 2/18
Guest Lecture: Skylar Tibbits
Founder, Self-Assembly Lab and Associate Professor of Design Research, MIT
Note: This class will meet on Tuesday for this week only, per MIT’s academic schedule.
Wednesday 2/19
Weekly Lab
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Week 4
Monday 2/24
Guest Lecture: David Kong, PhD
Director, Community Biotechnology Initiative at the MIT Media Lab
Wednesday 2/26
Weekly Lab
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Week 5
Monday 3/02
Guest Lecture: Dava Newman, PhD
Apollo Program Professor of Aeronautics and Astronautics and Engineering Systems, MIT
Assign Exercise 2: Game
Assignment Deadline: Wednesday 3/18 workshop in Lab, with final edited submission on Friday 3/20
Wednesday 3/04
Weekly Lab
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Week 6
Wednesday 3/11
Guest Lecture: Jessica Helfand
Founder, Design Observer and the author of Face: A Visual Odyssey
Note: This class will meet on Wednesday during our Lab Session to accommodate the speaker’s schedule.
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Week 7
Monday 3/16
Guest Lecture: Joseph Coughlin, PhD
Director, AgeLab, MIT
Wednesday 3/18
Weekly Lab
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Week 8
Monday 3/23
NO CLASS – Spring Break

Wednesday 3/25
NO LAB – Spring Break

Week 9
Monday 3/30
Guest Lecture: Jorge Moreno
Global Design Director, Whirlpool Corporation

Assign Exercise 3: Polyphony
Assignment Deadline: Wednesday 4/08 for group presentation during Lab

Wednesday 4/01
Weekly Lab

Week 10
Monday 4/06
Guest Lecture: Natasha Jen
Partner, Pentagram

Wednesday 4/08
Weekly Lab

Week 11
Monday 4/13
Guest Lecture: Meejin Yoon and Eric Höweler
Partners, Höweler + Yoon Architecture

Assign Exercise 4: Voyager
Assignment Deadline: Friday 5/08, with final presentation during the Lecture on Monday 5/11

Wednesday 4/15
Weekly Lab

Week 12
Monday 4/20
NO CLASS – Patriot’s Day

Wednesday 4/22
Weekly Lab

Week 13
Monday 4/27
Guest Lecture: Miho Mazereeuw
Director, Urban Risk Lab, MIT

Wednesday 4/29
Weekly Lab

Week 14
Monday 5/04
Guest Lecture: John Mather, PhD
Senior Astrophysicist, NASA Goddard Space Flight Center

Wednesday 5/06
Weekly Lab

Week 15
Monday 5/11
Conclusion and Final Project Presentations

Note: Guest speaker appearances are subject to change due to schedule or weather-related conflicts.