

MIT Department of Architecture

**4.01: How to Design, Fall 2024**

Instructors: Skylar Tibbits (sjet@mit.edu) & Adriana Girogis (giorgis@mit.edu)

Teaching Assistant: Oliver Moldow (oim@mit.edu) and Berfin Ataman (berfina@mit.edu)



Marian Picard

**4.021: How to Design**

**Class Overview:**

The course introduces fundamental design principles as a way to demystify design and provide a basic introduction to all aspects of the design process. Through lectures and weekly exercises, students will develop their skills and enable creativity, abstract thinking, representation, iteration and design development. An introductory class intended for students without a design background geared towards enabling more effective collaboration with designers and the ability to apply the foundations of design to any discipline. Limited to 25; preference to Course 4 and 4B majors and Design and Architecture minors, and first and second-year students.

**Structure of the Course - Weekly:**

- **Monday:** Intro presentation on the topic then student presentations/group desk crits
- **Wednesday:** Individual desk crits and discuss next week's assignment

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**Exercise 1: The Design Process**

The first project explores the design process. Each week the class will dive into one aspect of the design process from context to concepts, drawing, making, iterating, building a narrative and finally presenting a design project and its implementation. This path exemplifies a traditional design process where a designer starts with an idea and works through testing, expanding, refining and eventually realizing their idea. Through weekly topics and assignments, students will develop a variety of design skills relating to each stage of this path. The project will start with an exercise on analog drawing, where students will develop a series of rules to generate a 2-dimensional drawing. Then, students will use paper as a material medium with various fabrication methods (folding, layering, crumpling, cutting, weaving, shredding, etc.) to test, expand and refine the initial rules, transforming them from rules for drawing into rules for making. In this stage of the project students will be asked to develop a concept for a measurement device that measures a physics-based phenomena.

Context || Concept || Draw || Make || Iterate || Narrative || Present

**Exercise 1 - Assignment 1**

The first week's assignment is to develop a drawing that features rules & iteration, two elements that are essential to design and that we will explore in various ways throughout the rest of the semester. You will invent a drawing method by developing a series of rules that govern its use.

- Starting with a geometric primitive, or a mark on the page (i.e. point, line, plane, curve, etc.) placed at a location of your choice within a piece of drawing paper, develop rules for transforming or repeating this initial primitive (e.g. move, rotation, reflection, scale, deformation, etc.).
- Expanding from the starting point to the rest of the drawing area, apply these rules in a drawing consisting of at least 100 iterations.

**Exercise 1 - Assignment 1: Deliverables**

1. Set of rules. (An interesting goal is to produce maximum variation with the minimum number of rules.)
2. A first drawing that applies your rules
3. A time lapse video demonstrating your drawing process
4. Two more drawings, based on the studio feedback

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**4.021 Schedule**

**Exercise 1: The Design Process (8 Weeks)**

**Week 1**

**Introduction**

9/4

**Class Introduction / Exercise 1 Intro**

Assignment:

Watch Abstract Series

Develop a series of rules/procedures for your drawing and make the first drawing that executes your rules. Bring your drawing to studio.

**Week 2**

**Draw & Iterate**

9/09

**Studio / Intro to 2D Rhino**

Due: Drawing from week 1

Assignment:

Make 2 more drawings based on your own rules and our feedback in class.

Either modifying your rules each time, or keeping the same rules and modifying your implementation of the rules.

Write your rules down and add them to your google slides presentation.

Take a timelapse video with your phone – creating 1 of the drawings and add it to the presentation. Bring your drawings and presentation to the studio.

9/11

**Studio**

Drawing Final Presentations

Exercise 1 Assignment 2 Introduction

Due:

Two additional drawing iterations

Time Lapse video

Presentation

Assignment:

1. Watch Between the Folds Documentary
2. Select a physics/science phenomena or engineering principle you're interested in exploring. Explain it to us (through photos, videos, sketches, text)

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- a. For example: pendulums, waves, hysteresis, Maxwell's demons, gravity, magnetism etc etc.
3. Describe how you could make something to measure it?

**Week 3**

**Context & Concept**

9/16

**Studio / Context & Concept Intro / Concept Sketch Desk Crits**

Due:

Physics Precedents - videos/photos/text/diagrams, initial concepts.

Assignment:

Sketch your phenomenon (describe it visually)

Second pass of your concept for making a paper-based measurement device

9/18

**Studio / Desk crits**

Due:

Selected phenomena

Sketch of selected concept - measurement device & fabrication process

Assignment: Concept for measurement Device

Refine and finalize your concept for the measurement device

How will you make it? How does the fabrication process work? How does the measurement work?

**Week 4**

**Draw & Make**

9/23

**Studio / Representation & Fabrication Intro / Intro to Rhino**

Due:

Refined concepts & sketches

Assignment:

Initial paper studies

Further refine your concept & draw your concept diagram in Rhino

Continue working with paper – experiment with the paper and start to understand how you can manipulate it to produce certain effects, textures, and performances, and how that can inform your fabrication process & concept

9/25

**Studio / Desk Crits / Intro to Adobe**

Due:

Digital drawing of concept diagram (Rhino)

Paper studies

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Assignment:

Start to use your new fabrication process and experiment with the paper understand its formal possibilities.

Update your concept based on what you learn.

**Week 5**

9/30

**Make**

**Studio / Student Presentations**

Due:

Paper models using physics fabrication process

Assignment:

Continue to use your new fabrication process and experiment with paper

Update your concept diagram & revise in Adobe with line weights

10/2

**Studio / Desk Crits / Independent Work**

Due:

Paper models

Concept diagram with line weights

Assignment:

Record your fabrication process as a series of rules/steps/systems

Prepare the presentation for the Interim review (from the template) including concept diagram, vector drawing of the measurement device, precedents/concept/context and small-scale physical models.

**Week 6**

10/7

**Interim Review + Narrative & Presentation**

**Exercise 1 Interim Critique**

Student Presentations

Due:

Presentation that includes a recording of your procedure, concept diagram, vector drawing, precedents, concepts, context and small-scale physical models.

Assignment:

Make the first full-scale experiment with paper.

Update the diagrams/drawings/concept based on feedback.

10/11

**Studio / Narrative & Presentation Intro / Desk Crits**

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Due:

Full scale paper experiment

Assignment:

Prepare a sketch/diagram of what you will do for your final measurement device. Make the second pass at the full-scale paper model. Start fabrication. Work on the diagrams/presentation and think about what the final documentation will be (photos/videos/timelapse) to convey your narrative

**Week 7**      **NO CLASS + Narrative & Presentation**

10/14      **Indigenous Peoples' Day – No Class**

10/16      **Studio / Documentation Tutorial / Desk Crits**

Due:

Sketch or diagram of final measurement device.  
Second full-scale paper model  
Updated diagrams, drawings, concept

Assignment:

Make the FINAL measurement device.  
Update drawings/presentation/narrative based on feedback. Start final documentation – images/videos/timelapse of the project

**Week 8**      **Review**

10/21      **Studio / Desk Crits**

Due:

Draft of exercise 1 final presentation  
Measurement device in progress

Assignment:

Finalize presentation, do final documentation of the measurement device (photos/videos/timelapse), update diagrams, vector drawings and presentation.

10/23      **Exercise 1 Final Critique**

Student Presentations

**Due:**

Concept/Context/Narrative Statement  
Concept Drawings/Diagrams

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Rules/Procedures  
Physical Study Models  
Final Measurement Device  
Presentation

**Exercise 2: This Time in Reverse (8 Weeks)**

<b>Week 9</b>	<b>Introduction</b>
10/28	Studio / Introduction to Exercise 2
10/30	Studio / Desk Crits on Chosen System
<b>Week 10</b>	<b>Presentation &amp; Narrative</b>
11/4	Studio / Concept & Context Desk Crits
11/6	Studio / Desk Crits
<b>Week 11</b>	<b>Iterate</b>
11/11	Veteran's Day - No Class
11/13	Studio / Concept & Narrative Desk Crits
<b>Week 12</b>	<b>Make</b>
11/18	Studio / Draw Desk Crits
11/20	<b>Exercise 2 Interim Review</b>
<b>Week 13</b>	<b>Draw</b>
11/25	Studio / Make Desk Crits
11/27	Studio / Desk Crits
<b>Week 14</b>	<b>Concept &amp; Context</b>
12/2	Studio / Iterate Student Presentations
12/4	Studio / Desk Crits
<b>Week 15</b>	<b>Presentation</b>
12/9	Studio / Student Presentations
12/11	(Last Day of Classes) Studio / Desk Crits
<b>Week 16</b>	<b>Presentation - Date TBD Exercise 2 Final Critique</b>

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**Learning Objectives:**

The course consists of two projects exploring various topics through concepts, drawings and physical fabrication. Students should be able to engage with an increasing level of design exploration through iterative studies and move fluidly between different modes and scales of operation. Conventions of design representation and communication through drawing and modeling will be explored. Students will need to demonstrate basic application of design skills, understanding of conventions, and an ability to sustain an increasing level of design competence in the projects over the semester.

**Statement of Required Work:**

There are two main exercises that divide the semester in half. Each exercise is made up of shorter weekly themed assignments that build off one another. There are four formal reviews scheduled throughout the semester that are milestones in the sequence of the exercises.

Exercise 1 Interim Review

Exercise 1 Final Review

Exercise 2 Interim Review

Exercise 2 Final Review

**Completion Requirements:**

Completion of each of the exercises, rigor in process and clarity in presentation, as well as the overall progress of the semester (including attendance) will be fundamental to completing the course.

**Evaluation Criteria and Grading:**

The following criteria will be used for the evaluation of students' work, both in terms of helping their progress and in final grading.

(01) Concept: How clearly is the student articulating the conceptual intentions?

(02) Translation of Concept: How well is the student using their concept to develop a design response to given problems?

(03) Representation Appropriateness: How well matched is their choice of representation to their intentions?

(04) Representation Quality: How accomplished are their drawing, modeling, digital representation, etc? To what degree does their representations convey what they ought to?

(05) Oral Presentation Skills: How clearly are they presenting their ideas orally, whether at their desk, in class discussions, or to a more formal jury?

(06) Participation in Discussions: How actively and how constructively are they involved in class discussions, both formally and informally?



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(07) Response to Criticism: How do they effective are they at taking feedback from instructors, classmates and outside jurors?

(08) Auto-Critical Skills: To what extent are they able to critique their own work regularly and effectively?

(09) Attendance – see below.

A: Excellent - Project surpasses expectations in terms of inventiveness, appropriateness, verbal and visual ability, conceptual rigor, craft, and personal development. Student pursues concepts and techniques above and beyond what is discussed in class.

B: Above Average - Project is thorough, well researched, diligently pursued, and successfully completed. Student pursues ideas and suggestions presented in class and puts in effort to resolve required projects. Project is complete on all levels and demonstrates potential for excellence.

C: Average - Project meets the minimum requirements. Suggestions made in class are not pursued with dedication or rigor. Project is incomplete in one or more areas.

D: Poor - Project is incomplete. Basic skills including graphic skills, model-making skills, verbal clarity or logic of presentation are not level-appropriate. Student does not demonstrate the required design skill and knowledge base.

F: Failure - Project is unresolved. Minimum objectives are not met. Performance is not acceptable. This grade will be assigned when you have excessive unexcused absences.

**Studio Culture:**

Work in the design studio will build sequentially. Therefore, your commitment to continual development on a daily basis is of paramount importance. We want to emphasize the importance of your peers as a source of support, inspiration, and feedback. Magnification of your development as a designer is made possible by the collective nature of the class. Group reviews are collective for a reason, as each of you has something to gain from your peers. Our studio is a place for all, and it necessitates careful attention to the needs of everyone in it. Instructors and TAs will hold office hours outside of the listed class time. We will also use software for sketching and drawing during desk crits. Incremental assignment presentations will be uploaded to a shared google slides document so you can refer back to your peer's work throughout the semester.

**Attendance:** Attendance for the full duration of each class is mandatory. The design studio is an exceptional learning environment that requires your presence as well as your input. You are allowed one excused absence for the semester. An excused absence is defined as one that was discussed with and approved by the professor at least 24 hours prior to the date of absence, or a family or medical emergency that is confirmed by your physician or a dean in Student Support Services. Absences beyond the one allotted will result in a decrease in your

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final grade. If you miss six or more studio classes, you will be asked to drop the subject or receive a failing grade.

**Student Support Services:** If you are dealing with a personal or medical issue that is impacting your ability to attend class or complete work, students should contact a dean in Student Support Services (S3). These offices are here to help you. The deans will verify your situation, provide you with support, and help you work with your professor to determine next steps. In most circumstances, students will not be excused from coursework without verification from a dean. Please visit the S3 website for contact information and more ways that they can provide support.