

Class Overview:

How to Design provides an introduction to design processes and frameworks through three acts: the production of a drawing, an object, and a space, each supported by a combination of workshops, lectures, and studio-based physical projects. Students' non-design backgrounds will serve as a point of departure, identifying interests and expertises to bring into dialogue with the course through cross-disciplinary experimentation.

Through these three acts, students will be introduced to histories, techniques, and canonical works across the recent history of drawing and visual studies, fabrication processes and prototyping workflows, and spatial design.

Part I: Draw, 3 weeks, solo work] Feb 2 - 25

The first project explores processes of drawing by looking at systems, rules and generative principles.

- We will begin with an introductory lecture on a range of drawing histories, mediums, techniques, and disciplinary types, tracing drawing as both design instruction and design outcome; an important distinction given the unique position design occupies in relation to adjacent fields of architecture, art, and engineering.
- We will look at examples ranging from drawing as a form of calculation and integral to the foundation of the discipline of engineering itself, to the development of Visual Studies as we know it today from artists such as Gyorgy Kepes, and ending with the process and gesture based drawings of the mid to late 20th century from practitioners such as Sol LeWitt, Carolee Schneeman, and Curtis Roth.
- These drawing types will be discussed in terms of their impact on how meaning is conveyed, the principles and processes behind their construction, and the rich interdisciplinary histories and movements between fields they often trace.

Following this historical and analytic sampling of the ways in which drawing can be understood as a rigorous pursuit, we will embark on a drawing exercise whose aim is to produce a controlled arena for understanding how the tools and media of design have their own agencies – interior principles, orientations, and properties - both in how the drawings are conceived and constructed, and in the media and matter in which they are executed. We will focus on serial and process based drawings as the form of drawing which is mostly purely about drawing itself rather than the representation of other disciplinary interests and information.

- Through desk crits and an initial research assignment, students will select a point of entry – a drawing type, effect, process, or interest, and develop that set of interests through a drawing series.
- Projects will be generated in Rhino and Grasshopper, and executed on pen plotters in a variety of media. Drawings must feature an iterative process producing repetition, seriality, offset, displacement and/or slip and consider how lines interact within the script as well as how they are executed by the pen plotter.
- Variables within the script may determine how lines trim, offset, occlude, reinforce, repeat, obfuscate, hatch, or multiply.
- Variables within the execution of the drawings by pen plotter may include speed, draw order, blunting over time, or force.
- Effects explored by the drawings may include moire, impasto, cross hatching, bleeding, etching, embossing, or layering. How are you acting to divide the sheet of drawing paper? How are various lines, marks, imprints and/or incisions interacting with one another? How do various parts affect a larger whole? How do successive lines interact with each other? This drawing, as any other in architectural design, is a tool of exploration.

FINAL REVIEW: Feb 25

Part II: Make [Physics Fabricator, 6 weeks, solo or pairs] Feb 25 – April 13

This project explores processes of making, breaking or recursive production through a physical, three dimensional system. The notion of systems, rules and generative principles as formative design processes explored in the first exercise is expanded from drawing to object.

- We will begin with an introductory lecture on fabrication processes, looking at precedents from four categories of Art, Products, Architecture, and Science, ranging from the artwork of Olafur Eliasson, the architectural work of Thomas Heatherwick, the photography and videos of Linden Gledhill, the machines and artifacts of Roxy Paine, to familiar fabrication processes and resulting forms of cotton candy.

Students will begin with research into material processes and identify a process, technique, or precedent of interest to build from. These may include scalable fabrication or manufacturing processes such as extrusion, lathing, spin forming, or roto-molding; craft-based processes such as

weaving, coiling, stacking, braiding, felting, or jamming; or material points of departure, looking at ceramics, glass, metal, wood, or fibers.. From this starting point, students will devise process or construct that uses relatively simple analogue processes or movements to translate deceptively simple relationships into complex form. The aim is not to simply produce 2.5D laminations of two dimensional processes, but to produce a system that is fully three dimensional in both input and output.

Investigations may focus on particular material properties and behaviors, emergent principles or patterns such as decay or resonance, or geometric transformations. The objects should not be standardized or standalone, but a series that can reveal variable outputs, forms, and conditions in response to calibrated inputs. Generative processes are able to change and develop through time, expressing a myriad of possible results and forms.

Part III: Build [Inflatable, 5 weeks, group work] April 13 – May 11

The final project asks you to synthesize the conceptual, design and fabrication skills developed in the first two projects and apply them at a new, larger scale. Students will build a large-scale inflatable structure or space, testing the limits of its structural, behavioral, or formal characteristics.

- The structure must be at least 6 feet in length in at least one dimension. The inflatable must be large enough to engage a bodily or spatial interaction and must exhibit two active states, in contrast to an ‘on’ and ‘off’ state.
- Structures should actively deploy and be able to maintain each state. Students should consider questions such as: How does your structure change, transform, or move? How is the system produced and assembled? How do the system’s movements initiate or decay? How are the state changes initiated? What is its final form and how does it reach it? How does your system create, define, or occupy space? How does it meet the ground? How does it engage the body? Does it partition, reorient, encircle, or occlude?

Students will begin by building maquettes, models, and small-scale prototypes before constructing a final, full-scale structure.

MIT Department of Architecture

4.021 How To Design

Spring 2026, MW 2:00-5:00

Instructors: J. Roc Jih, Nof Nathansohn

Teaching Assistants: Zaynab Eltaib, Ahzin Nam

4.022 Schedule (tentative and subject to change)

PART I – DRAW | Drift (3 Weeks)

Week 1

2/02 Introduction to the course
Registration

Self-Introductions

Skills and backgrounds survey

Launch Part 01: Draw (Drift Drawing)

In-class work session

2/04 Desk Crits: Review possible design project agendas
Workshop: Grasshopper & Rhino
In-class work session

Week 2

2/09 In-class work session
Workshop: Introduction to pen plotters
Workshop: Material Cart Preview

2/11 desk crits

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Week 3

2/16 President's Day Holiday – no class. Monday schedule of classes to be held on Tuesday.

2/17 MIT Museum Archive Visit
pin-up of student work
Workshop: Drawing Media

2/18 desk crits

Week 4

2/23 In-class work session

2/25 DRAW FINAL REVIEW

PART II – MAKE | Physics Fabricator (6 Weeks)

Week 5

3/02 Launch Part II: MAKE (Physics Fabricator)

Workshop: 3D modeling softwares

Assignment: Gather research interests

Pin-up: casual presentations of possible research topics

3/04 Assignment: Identify single research topic supported by a collection of precedents, histories, processes, and principles

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3/06 Add Date: last day to add full-term subjects to registration

Week 6

3/09 In-class work session and desk crits
Assignment: identify materials needed for prototyping. Class trip to Blick
and Artist and Craftsmen Supply

3/11 Desk crits
Assignment: 3 prototypes

Week 7

3/16 Pin-up

3/18 Desk crits
Assignment: 3 well developed prototypes

Week 8

3/23 Spring Break

3/25 Spring Break

Week 9

3/30 In-class work session

4/01 Physics Fabricator Midreview
Assignment: 3 prototypes

Week 10

4/06 Pin-up of student work

4/08 In-class work session
Assignment: 3 prototypes per student

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Week 11

4/13 Physics Fabricator Final Review

Part III – BUILD | Habitat (5 Weeks)

4/15 Launch Part III: BUILD (Inflatable)

Introductory Lecture

In-Class Work Session

Assignment: Identify precedents and transformation strategies

Week 12

4/20 Patriots Day - Holiday

4/22 Guest Lecture: Pneuhaus

In-Class work session, desk crits

Week 13

4/27 Workshop: Inflatable Construction Techniques

In-class work session, desk crits

4/29 In-class work session, desk crits

Week 14

05/04 Project 03 Midreview

05/06 In-class work session, desk crits

Week 15

5/11 In-class work session, desk crits LAST DAY OF CLASS

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FINAL REVIEW WEEK

TBD Project 03 Review 1:30-4:30 Room 7-304

Learning Objectives:

The course consists of three projects exploring various topics through drawing, physical fabrication and large-scale building. Students should be able to engage with an increasing level of design research 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 research in the projects over the semester.

Completion Requirements:

Completion of each of the exercises, rigor in process and clarity in representation, 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 student's work, both in terms of helping their progress and in final grading. (01) Thesis: How clearly is the student articulating the conceptual intentions? (02) Translation of

Thesis: How well is the student using their thesis to develop a design response to given problems? (03)

Representation Appropriateness: How well matched is their choice of representational means to their intentions? (04) Representation Quality: How accomplished are they with 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? (07)

Response to Criticism: How do they effectively take advantage of criticism 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.

Attendance: Attendance for the full duration of each class is mandatory. The studio is an exceptional learning environment that requires your virtual presence as well as your intellectual presence. You are allowed three excused absences 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 three allotted will result in a decrease in your final grade. If you miss six or more studio classes, you will be asked to drop the subject or receive a failing grade.