4.101: Exploring Design: Thinking through Making

Class Overview: This class introduces students to the creative design process through acts of making & breaking. The studio environment provides a dynamic laboratory to explore ideas related to form, space, materials, systems, and structures through physical, project-based activities. This class emphasizes the translation of concepts into constructs--thinking through making, and making through thinking. This course is specifically created to play off of students’ non-design education by introducing a domain of investigation whereby students can learn to design through the lens of cross-disciplinary experimentation. Three primary exercises will help develop student’s techniques of drawing, fabricating and building.

DRAW: Serial Drift
The first project explores processes of drawing by looking at systems, rules and generative principles. Students will look at precedents from Sol LeWitt, Josef Albers, Emma McNally and other practitioners who have engaged in serial drawing projects.

Drawings must feature an iterative process producing repetition, seriality, offset, displacement and/or slip. Consider how lines interact within the script as well as how they are executed by the laser cutter. 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 laser cutter may include speed, power, degree of focus, and draw order.

Drawings should exhibit concepts of division, sequence, hatch, fill, moiré, or progression. 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.

Quantity of iteration is critical for serial drift to emerge. While variations between one drawing and the next in the sequence may be subtle, each variation must be annotated and produced on the laser cutter. Students will produce a 6”x6”x6” stack of drawings executed on smooth Bristol paper over the course of 4 weeks, using a provided template.

FAB: Physics Fabricator
The second 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.

Students will construct a Physics Fabricator: a 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 geometrical transformations. The object is not a construct that produces a standardized object, but a construct that can produce variable outputs in response to calibrated inputs. Generative processes are able to change and develop through time, expressing a myriad of possible results and forms.

The produced physical material systems will then be carefully investigated by means of technical drawings (diagrams, plans, sections, catalogues, exploded axons). Through drawing, a systematic understanding of the form, principles, behaviors, and metrics of the system will be developed and explicated.

BUILD: Structures
The final project focuses on building large-scale structures and testing the limits of their structural, behavioral, or formal characteristics. Through their previous precedents, generative drawings and newly formed material processes,
the students will develop physical structures that explore and exploit relationships between form, material, and behavior, designing structures that break, fail or transform in unusual or productive ways. The student’s installations will help realize the spatial possibilities inherent within their generative drawings as well as their material processes from project 2. This project questions not only how uniquely designed formal and material systems can anticipate and reimagine failure to construct rather than destruct, but how such systems can recast the definition and metrics of performance itself.
4.022 Design Techniques and Technologies: Thinking through Making, Spring 2019, MW 2:00-5:00
Instructor: Jeremy Jih, Danniely Staback
Teaching Assistants: Sen Dai, Marisa Waddle

4.101 Tentative Schedule:

Exercise 1: (4 Weeks)
Week 1 (Feb. 4)
2/6 Studio / Exercise Introduction & Software Tutorials
Week 2 (Feb. 11)
2/11 Presentations
2/13 Desk Crits
Week 3 (Feb. 18)
2/18 No Class (President’s Day)
2/20 Presentations/Desk Crits
Week 4 (Feb. 25)
2/25 Presentations/Lecture
2/27 Desk Crits
Week 5 (Mar. 4)
3/4 Desk Crits
3/6 Exercise 1 Final Review
3/8 (MIT Add Date)

Exercise 2: (4.5 Weeks)
Week 6 (Mar. 11)
3/11 Exercise 2 Introduction
3/13 Studio / Research Presentations
Week 7 (Mar. 18)
3/18 Studio
3/20 Studio
Week 8 (Mar. 25 Spring Break)
3/25 No Class
3/27 No Class
Week 9 (April 1)
4/1 Exercise 2 Interim Review
4/3 Studio
Week 10 (April 8)
4/8 Studio
4/10 Exercise 2 Final Review

Exercise 3: (5.5 Weeks)
4/11 Exercise 3 Introduction
Week 11 (April 15)
4/15 No Class (Patriot’s Day)
4/17 Studio
Week 12 (April 22)
4/22 Studio
4/24 Studio
4/25 (MIT Drop Date)
Week 13 (April 29)
4/29 Studio
5/1 Exercise 3 Interim Review
Week 14 (May 6)
5/6 Studio
5/8 Studio
Week 15 (May 14) (No New Assignments – Project Development)
5/14 Studio
5/16 Final Review

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.

Studio Culture: Work in the studio will build sequentially. Therefore, your commitment to incremental development on a daily basis is of paramount importance. It is important that you take advantage of the studio environment. You have been given a studio space; please use it. Magnification of your development as a designer is made possible by the collective nature of the studio. Working in studio, instead of at home, will allow you to participate in the dialogue of the studio setting. Group reviews are collective for a reason. Each of you has something to gain from your peers. Since studio is a place for all, it necessitates the careful attention to the needs of everyone in it. Please see your instructors if there are any problems that you are unable to resolve on your own. All spraying of fixative, spray paint or any other substance should be done in the shop. Security is a necessary component for a studio that is accessible to you and your colleagues 24 hours a day, 7 days a week.

Attendance: Attendance for the full duration of each class is mandatory. The studio is an exceptional learning environment that requires your physical 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.