

1st Assignment due on Mon 9/18:

- Watch *Between the Folds* Documentary
- Select a physics/science phenomena or engineering principle you're interested in exploring. Explain it to us (through photos, videos, sketches, text)
 - For example: pendulums, waves, hysteresis, Maxwell's demons, gravity, magnetism etc etc.
- Describe how you could make something to measure it?

Final Review Deliverables - Exercise 1 - Assignment 2:

1. Concept Drawings/Diagrams
2. Rules/Procedures
3. Physical Study Models
4. Final Measurement Device
5. Concept/Context/Narrative statement
6. Final Presentation

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4.021 How to Design (Almost) Anything: Fall 2023 || M + W 2-5

4.021: How to Design (Almost) Anything

Class Overview: 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

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

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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

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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

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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 (Sept.6)

Introduction

9/6 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 (Sept.11) **Draw & Iterate**

9/11 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.

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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.

9/13 Studio

Drawing Final Presentations

Exercise 1 Assignment 2 Introduction

Due:

Two additional drawing iterations

Time Lapse video

Presentation

Assignment:

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Week 3 (Sept. 18) Context & Concept

9/18 Studio / Context & Concept Intro / Concept Sketch Desk Crits

Due:

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

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Assignment:

Sketch your phenomenon (describe it visually)

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

9/20 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 (Sept. 25) Draw & Make

9/25 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

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9/27 Studio / Desk Crits / Intro to Adobe

Due:

Digital drawing of concept diagram (Rhino)

Paper studies

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 (Oct. 2) *Make*

10/2 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

10/4 Studio / Desk Crits / Independent Work

Due:

Paper models

Concept diagram with line weights

Assignment:

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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 (Oct. 9) *Interim Review Week*

10/9 *Indigenous Peoples' Day – No Class*

10/11 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.

Week 7 (Oct. 16) *Narrative & Presentation*

10/16 Studio / Narrative & Presentation Intro / Desk Crits

Due:

Full scale paper experiment

Updated diagrams, drawings, concept

Assignment:

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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

10/18 Studio / Documentation Tutorial / Desk Crits

Due:

Sketch or diagram of final measurement device.

Second full-scale paper model

Assignment:

Make the FINAL measurement device.

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

Week 8 (Oct. 23) Review

10/23 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**

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Student Presentations

Due:

Concept/Context/Narrative Statement

Concept Drawings/Diagrams

Rules/Procedures

Physical Study Models

Final Measurement Device

Presentation

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

Week 9 (Oct. 30) **Introduction**

10/30 Studio / Introduction to Exercise 2

11/1 Studio / Desk Crits on Found Object

Week 10 (Nov. 7) **Presentation & Narrative**

11/6 Studio / Concept & Context Desk Crits

11/8 Studio / Desk Crits

Week 11 (Nov. 14) **Iterate**

11/13 Studio / Concept & Narrative Desk Crits

11/15 Studio / Desk Crits

Week 12 (Nov. 20) **Make**

11/20 Studio / Draw Desk Crits

11/22 **Exercise 2 Interim Review**

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Week 13 (Nov. 27) *Draw*

11/27 Studio / Make Desk Crits

11/29 Studio / Desk Crits

Week 14 (Dec. 4) *Concept & Context*

12/4 Studio / Iterate Student Presentations

12/6 Studio / Desk Crits

Week 15 (Dec.11) *Presentation*

12/11 Studio / Student Presentations

12/13 (Last Day of Classes) Studio / Desk Crits

Week 16 (DATE TBD) *Presentation*

TBD Exercise 2 Final Critique

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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

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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? (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.