

## **4.031: Design Studio: Objects and Interaction**

### **Fall 2022**

#### **Studio Overview**

This course is an overview of design as the giving of form, order, and interactivity to the objects that define our daily experience. Instruction follows the path from project to interactive product through lectures, hands-on workshops, and studio assignments. Students will gain an understanding of the overall design process, with an emphasis on design development and constraints, preparing them for work in a studio environment.

Topics include the observation and critique of objects; interaction design and user experience; design methodologies, representation, and source material; current dialogues in design objects and production; economies of scale vs. economies of means; designing for human behavior; and the role of technology in design.

This course provides a foundation in prototyping skills such as carpentry, digital fabrication, electronics, coding, and interaction. Lectures will provide a technical foundation to enable students to create their products, as well as a foundation in the current dialogues in the design, production, and significance of objects.

#### *Project 1: Bench*

We will start the course by constructing one of Enzo Mari's Autoprogettazione chairs, and proceed to use the techniques you've learned to draw, model, build and critique your own piece of furniture inspired by Vera Molnar and Sol Lewitt's drawing instructions.

#### *Project 2: Clock*

For thousands of years, humans have developed objects to measure and visualize time, yet the experience of time is still highly subjective and requires a physical representation so it can be seen, touched or heard. We will end our course by designing an interactive clock, and providing a foundation in human-computer interaction, prototyping strategies, digital fabrication, and physical computing.

#### **Learning Objectives**

The course is divided into two projects that explore the fundamental skills required in product design today. Students should be able to engage with an increasing level of design research and prototyping through a series of iterative studies and short assignments. Upon completion of this course, the student should have a firm understanding of:

- The structure and flow of a design project (opportunity, research, brief, design development, presentation, working drawings, production, critique);
- Digital and craft-based design and prototyping skills (woodwork, programming and electronics, rapid prototyping and digital fabrication, bending, and other techniques);

- Design communication and language;
- Model-making, mock-up, and prototyping;
- Design criticism and the role of feedback in design development.

## Where to Find Things and Communication

General class materials and grades will be posted on **Canvas**:  
<https://canvas.mit.edu/courses/16303>

General class communication will take place through **Slack**: mit-design-objects.slack.com During the semester, you will all encounter similar problems and questions. Posting those publicly helps everyone in class.

Important communication such as absences, personal problems, and needs should take place directly through **email**: [marceloc@mit.edu](mailto:marceloc@mit.edu)

Your final project deliverables will be submitted on Google Drive. (*Link to be provided after first class*).

## 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 students' work, both in terms of helping their progress and in final grading.

1. **Thesis:** How clearly is the student articulating the conceptual intentions?
2. **Translation of Thesis:** How well is the student using their thesis to develop a design response to given problems, interests, or ideas?
3. **Appropriateness:** How well matched is their choice of representation and prototyping strategy to convey their intentions?
4. **Quality:** How accomplished are they with drawing, modeling, digital representation, fabrication, etc? To what degree does their product convey what they ought to?
5. **Oral Presentation Skills:** How clearly are they presenting their ideas orally, whether at their desk, in class discussions, or to a more formal jury?

6. **Participation in Discussions:** How actively and how constructively are they involved in class discussions, both formally and informally?
7. **Response to Criticism:** How do they effectively take advantage of criticism from instructors, classmates and outside jurors?
8. **Auto-Critical Skills:** To what extent are they able to critique their own work regularly and effectively?
9. **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.

### Grade Distribution

Each of the two projects and class participation will count towards your grade:

Project 1:	40%
Project 2:	50%
Participation	10%

### Studio Culture

Work in the studio will build sequentially. Therefore, your commitment to incremental development on a daily basis is of paramount importance. The demanding nature and pace of studio courses necessitates your regular attendance and requires that deadlines be consistently met. In addition to lowering your grade, late work will prevent you from following the overall structure of the course.

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 the studio is a place for all, it necessitates careful attention to the needs of everyone in it. Please see your instructors or TAs 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 studio is mandatory. **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. Please do reach out early and often if you believe you might have trouble completing the course.

## **Academic Integrity + Honesty**

MIT's expectations and policies regarding academic integrity should be read carefully and adhered to diligently: <http://integrity.mit.edu>

## **Documentation**

Students are expected to visually document and post their assignments, research, prototypes, and any pertinent material. Strategies for visually documenting students' design work will be presented throughout the semester. We strongly suggest you dedicate a sketchbook exclusively for the class.

## **Final Studio Deliverables**

Grades will not be posted for students to view on their grade report until their work has been archived. The projects need to be properly prepared and formatted, and delivered to the Archiving TA. Studio TAs will collect project archives from each student following the review. Submission details will be provided with each assignment.

## Contact Information

**Instructor:**

Marcelo Coelho  
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Chris Dewart  
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**Fabrication:**

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Chris Haynes  
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## Materials List

Please have these materials in studio for every class session so you can sketch and make physical prototypes and mockups:

sketchbook  
pencils  
ruler with mm and in  
olfa knife or exacto blade  
cutting mat  
white glue / wood glue  
super glue  
tape  
scissors

## Software

Rhino/Solidworks/OnShape  
Adobe Creative Suite  
Figma  
Arduino IDE

## Schedule

**\*\*\* tentative schedule, some things may change**

Week 1	Introduction
09/08	Introduction to the course
Week 2	Introduction Assignment 1
09/13	Introduction to assignment 1
9/15	Shop training Begin construction of chair Q Due: Reading of Autoprogettazione
Week 3	Concept Development
09/20	Due: Chair Q Due: Concept Sketches
09/22	Due: Small Scale Models + Updated Sketches Wood Joinery Tutorial
Week 4	Drawing and Prototyping
9/27	Due: Joint Tests Drawing Tutorial
9/29	Mid-Project Critique Due: CAD Drawings
Week 5	Production
10/4	Due: Final Drawings + Final Small Scale Model
10/6	Work Session Surface Finishing + CMF
Week 6	Production
10/11	No Class - Student Holiday
10/13	Due: Final Chair How to document your object

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Week 7	Documentation + Critique
10/18	Due: Critique Dry-Run + Documentation Review
10/20	<b>Due: Assignment 1 Final Critique Documentation Collection</b>
Week 8	Intro Assignment 2 + Concepts
10/25	Introduction Assignment 2
10/27	Due: Concept Sketches Due: Time Readings Introduction to electronics + warm-up exercise
Week 9	Interaction Design
11/1	Due: Electronics readings Due: Electronics Warm Up
11/3	States Machines + Designing for Interaction Due: Detailed sketches + storyboard
Week 10	Digital Fabrication
11/08	Mid-Project Critique Designing for Digital Fabrication
11/10	Work session Due: Early tests and prototypes Tutorial on Rhino > MasterCam > Onsrud Workflow
Week 11	Work-Like
11/15	Work session
11/17	Due: Work-like Enclosure design
Week 12	Look-Like
11/22	Due: Work-like + Look-like prototypes
11/24	No Class - Thanksgiving
Week 13	Work-Like + Look-Like Integration
11/29	Work session
12/01	Due: Final work-like + look-like integration

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Week 14	Documentation
12/06	Due: Group review of documentation tests
12/08	Due: Critique Dry-Run

Week 15	Final Review
12/13	<b>Due: Assignment 2 Final Review</b> <b>All Documentation Collection</b>