MIT Department of Architecture

4.041 DESIGN STUDIO: ADVANCED PRODUCT DESIGN
KITS FOR LIFE

Spring 2026 / Tues + Thurs 2-5 / Room: N52-342C
Units: 3-3-6
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In this course we will reimagine how we design, make, use and reuse products for everyday living by taking them apart before putting them together.

This course examines material practices that understand designed objects as an assemblage of parts and equipment that sponsor life's activities. As such, we will take a kit of parts approach to product development.

We will be remixing a readymade, by taking a product apart and reinventing it by introducing your own authored parts. Starting with an existing domestic product and overwhelming it with influences from material cultures outside of the commercial category most commonly associated with it to produce a new hybrid. More specifically, this semester we will be remixing products of culture. These are products generally associated with the production and dissemination of culture and media: speakers, screens, radios, keyboards, midi players etc…

We will study precedents such as Virgil Abloh, Devon Ojas and Sam Chermayeff for inspiration, as practices that have used hybridity as the unique source for inventiveness.

This studio however, adds an additional charge. Considering a greater context where product design is directly linked to ecologically destructive single-use material practices, this studio asks students to design **a reconfigurable kit of parts product**, a future-ready product that gains resilience and shelf-life through it's ability to transform or be customized.

To this end, students are tasked with designing a product that can be personalized, reused, rearranged, reassembled or otherwise reimagined over time.

We will look at precedents from worlds known for their material versatility, borrowing from **outdoor gear** design, nomadic furniture and temporary architectures to look for existing material intelligence, fabrication technologies and clever assemblages that we can build on. We will place particular emphasis on the design techniques associated with flatpacking and **designing for disassembly**, a design approach that due to its anticipations of material change, offers us a more future-minded and ecologically considered approach to design and production.

By engaging directly in hands-on making of these kit products, both physically and digitally, students will be introduced to the tools, technologies and protocols that are essential to the process of product design: from ideation to prototyping to fabrication, all the way to branding and user communication. Through workshops and experimentation, students will learn the following fabrication skills:

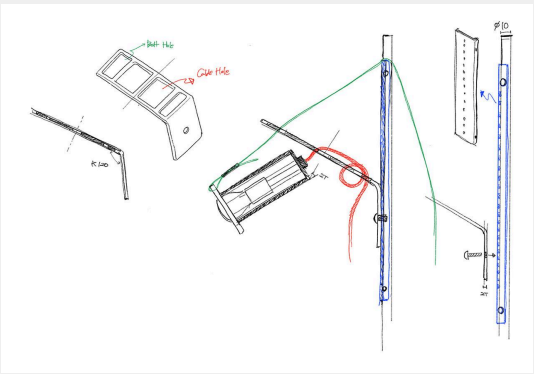
- advanced 3d modeling
- advanced 3d printing
- rapid prototyping
- powder coating
- metal laser cutting
- metal bending
- light welding
- small electronics

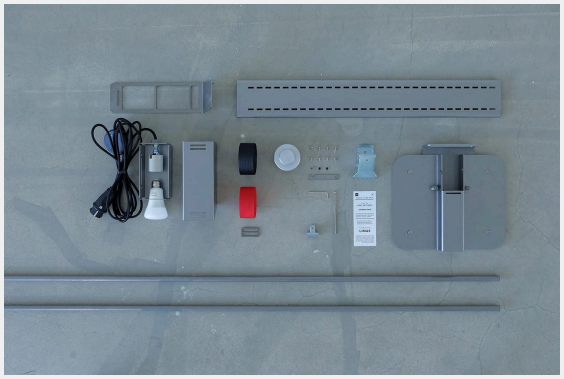
The course will give you access to the materials associated with these techniques, how you decide to put them together and for what purpose will define your project.

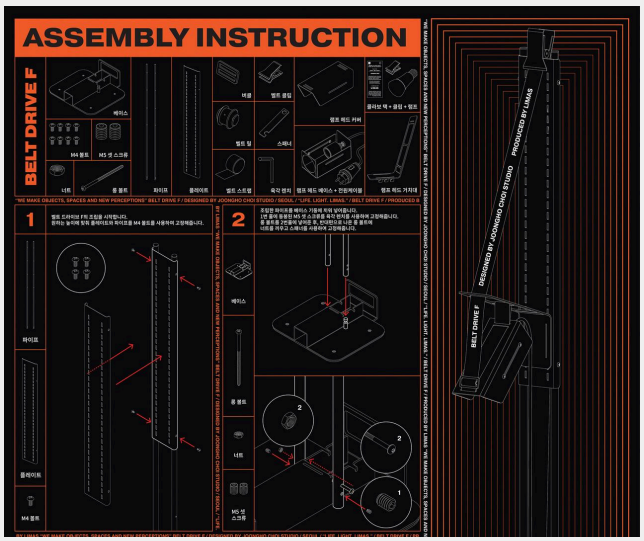
The course consists of 4 exercises that will culminate in a comprehensive, portfolio-ready proposal for a physical product that includes packaging and branding as well as an augmented reality experience.

COURSE ORGANIZATION:

The structure of this course has been divided into 4 exercises 1. Research & Concept Development 2. Material Design & Fabrication 3. Communication 4. Identity







1. **X1 A-C** [INTRODUCED: 2/12 DUE: 3/3]: **RESEARCH & CONCEPT DEVELOPMENT: PARTS APART**
    a. **X1A:** Take it apart: You will select a Readymade, A small domestic machine and you will take it apart and 'repackage' by redesigning the vessel and some components of this product.
        i. **Deliverables:** All deliverables uploaded to GD
            1. Begin by selecting the world you would like your project to engage in: sonic, visual, informational, lighting.
            2. Good options for products: speakers, fans, radios, keyboards, midi players etc…
            3. You will use appropriate tools for the surgical disassembly of this object in order to cause minimal damage on the components. You will document each step.

4. 

b. **X1B**: Select a Remix: Linked here is a Miro board with a series of pre-selected material/aesthetic approaches that are feasible for production in this studio. Each student will select one and adhere to its material/aesthetics as closely as possible. You will use this guiding image to influence how you remix your readymade. Your instructors will guide you.
c. You will then prototype and fabricate components that you will add or otherwise integrate onto your readymade.
    i. **Deliverables**: All deliverables uploaded to GD. 6-12 desktop prototypes of individual parts. Disassembled.
d. **X1C**: Put it back together: Combining elements from the original off-the-shelf product and the parts you created, you will create a new remixed machine.
    i. **Deliverables**: All deliverables uploaded to GD. Rough but working prototype.

2. **X2: MATERIAL DESIGN & FABRICATION: PARTS REDO**: In this assignment you will use the fabrication skills you learned in X1 towards the design of a new 'Kit for Life', a parts-based product for everyday life, of your choosing.
    a. You will begin by selecting an existing product that supports everyday life. Students are welcome to continue working with their selection from X1.
    b. You will now evolve the product. This can happen in many ways: By scaling up, by adding more components, adding more features, taking the material techniques but pointing them towards a different use etc… you will make this decision in consultation with your instructor.
    c. You will then fabricate portfolio-ready versions of each part of your design. **Deliverables**: All deliverables uploaded to GD
        i. 6-12 portfolio-ready desktop-sized individual parts.Disassembled.
        ii. High quality photo documentation of each part as well as parts knolled. (using the photo studio available to you in N52)
        iii. High quality photo documentation of the kit assembled.

3. **X3: COMMUNICATION: PARTS HOW TO:** Now that you have your final product you will produce animations that illustrate how the parts come together to create a working product. There will be an animation workshop.
    a. **Deliverables:** All deliverables uploaded to GD
        i. 2-3 rendered animations. Looped.
4. **X4: IDENTITY: ALL PARTS WRAPPED:** You will wrap up all your work by developing a graphic signature, a branding and an aesthetically decisive packaging that will add cohesion and identity to your product.
    a. **Deliverables:** All deliverables uploaded to GD
        i. Product name
        ii. Fabricated packaging
        iii. Graphic identity with font and visual palette
        iv. Final presentation / slides
        v. Brief 3 sentence text on the project

Important links:

- Xavi Zoom
- Calendar / Bulletin board
- Google Drive
- Miro Board
- Precedents
- Visual references

Tools for making:

- Architecture shops guide

Fabrication:

- You will primarily be using the Arch Fablab and N52 shop.
- Bill McKenna <wdmc@mit.edu> is the point person but each shop has a different lead person.
- You will have access to 3 fabrication shops: Arch Shop, N51 and N52. Orientation required.
- Any Architecture shop and N51 shop questions can be directed to Jennifer O'brien dekinai@mit.edu and Chris Dewart cbdewart@mit.edu
- Any N52/MAD shop questions can be directed to Chris Haynes haynesc@mit.edu

Gear:

- **Camera:**
  - You will have access to N52's photo/video room that has a white & black backdrop as well as LED light panels, tripods etc.
- **3D Printers:**
  - At N52 there is a Connex350, a number of formlabs machines, 2 larger FDMs, a bunch of desktop FDMs and 2 Markforge machines. Arch shops/studios have a number of desktop FDM machines, a Dimension + Zcorp.
- **Lasercutters:**
  - N52 has 2 smaller desktop laser cutters + 2 larger laser cutters and a metal laser cutter. Arch shop has 4 larger laser cutters.
- **Materials:**
  - Students will purchase the materials for their own designs and they will be reimbursed up to $250 (keep your receipts). However, there will be a few materials that will be available to everybody in the studio
  - Lasercutter/milling or general project materials need to be purchased, but usually 3D or 2D printer materials are typically covered by the dept.
- **Other equipment:**
  - N51 has a variety of wood/metal working + an Onsrud 3-axis router and a bridgeport milling machine. Arch Shop has a small shopbot, a robot arm, woodworking equipment, an Omax waterjet + electronics workbench, vacuum former etc.
  - N52 has a 4x4 CNC, a bunch of metal/woodworking equipment, a lathe, milling machine, metal break, shear and an electronics workbench.

Learning objectives:
4.041 is an advanced product design studio in which we will reimagine how we design, make, use and reuse products for living.

- In this studio, you will push the boundaries of what's possible in product design and propose new approaches to how we create products that consider material circularity.
- Students are invited to experiment.
- By engaging research at MIT and beyond in material intelligence, fabrication technology and recycling innovations, you will reimagine today’s concepts of “sustainability”, for a more ecologically-responsible and digitally enabled future.
- Students will learn about designing for disassembly.

Evaluation Criteria:
Below are the criteria used to evaluate student work. Please note that students are graded based on all work done throughout the semester, not just the final presentation.

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?
3. **Representation Appropriateness:** How well-matched is their choice of representational means to their intentions?
4. **Representation Quality:** How accomplished are they with drawing, modeling, digital representation, craft, etc.? To what degree do their representations convey what they are intended 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 Critique and 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.

Grading Criteria:

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 studio session 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.
- 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.

Student support:

If anything is getting in the way of your academics, please know that S3 is happy to help. You can request an appointment or come to a virtual walk-in. The walk-in queue is open from 10-12 and 2-4 on weekdays. Appointments can be virtual or in-person, depending on your comfort and convenience.

Accessibility:

Students who need disability accommodations are encouraged to speak with the faculty member/department administrator early in the semester so that accommodations can be implemented in a timely fashion.

Diversity, Inclusion and Equity:

MIT values an inclusive environment. I hope to foster a sense of community in this classroom and consider this classroom to be a place where you will be treated with respect. I welcome individuals of all backgrounds, beliefs, ethnicities, national origins, gender identities, sexual orientations, religious and political affiliations – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming, and inclusive environment for every other member of the class. If this standard is not being upheld, please feel free to speak with me.

Studio Culture:

Work in the studio will build sequentially. Therefore, your commitment to continual development 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. Your development as a designer is made possible by the collective nature of the studio; working in studio, instead of at home, allows you to participate in the dialogue. Group reviews are collective to give every student the opportunity to engage with others, practice speaking about design, and give feedback. **This is a critical component of every studio course.**

Academic Integrity:
Massachusetts Institute of Technology students are here because of their demonstrated intellectual ability and because of their potential to make a significant contribution to human thought and knowledge. At MIT, students will be given unusual opportunities to do research and undertake scholarships that will advance knowledge in different fields of study. Students will also face many challenges. It is important for MIT students to become familiar with the Institute's policies regarding academic integrity, available at Academic Integrity at MIT: A Handbook for Students.

Safety:
Fabrication can be dangerous. You will have the opportunity to use machines, tools and other methods of fabrication in MIT shops, but only once you have completed required safety trainings. If you would like to experiment with a new fabrication process, please reach out to your instructor about getting necessary trainings. All safety protocols must be adhered to when using shop and fabrication spaces at MIT. If you don't know how to do something safely, just ask a supervisor or instructor. This is your opportunity to learn new methods, so you are not expected to know how to fabricate everything. All spraying of fixative, spray paint or any other aerosol substance should be done in the shop and with proper ventilation. Adhesives and chemicals must be on the approved list provided in most shop spaces. If you can't find the list, ask a supervisor or instructor. Security is a necessary component for a studio that is accessible to you and your colleagues 24 hours a day, 7 days a week. Storage spaces may be provided in studio and doors will be accessible using MIT card access. All protocols and requirements related to COVID-19 safety must be followed in the studio and shop spaces. Please refer to MIT's website for full details as they are continually updated.