New Jersey Institute of Technology | Hillier College of Architecture and Design Spring 2025

ARCH 483: ST- From Waste to Building Materials

Design, Build and Entrepreneurship

Moises Quintero Morales | Mq59@njit.edu

<u>Time</u>	Monday: Thursday:	8:30am – 9:50am 8:30am – 9:50am
<u>Location</u>	Central King Build	ling, Room 315
Office Hours	Mondays: 10:00a	m – 11:00am

Course Overview: 3 Credits; 3 Contact hours; Meets twice a week

The study, design, and construction of the built environment inevitably leads to significant repercussions, often manifesting as waste, overconsumption, and environmental contamination. As designers, future architects, and stewards of these spaces, we share the responsibility for these impacts. It is critical that we carefully consider the entire lifecycle of materials, understanding their potential effects on both the environment and the communities we build for.

This course investigates common waste materials and explores how design can offer novel uses for them. By rethinking waste, we not only reduce the amount that enters our landfills and ecosystems but also create opportunities for cost reduction and entrepreneurial ventures.

Wherever possible, we will focus on local materials, and relevant data to make informed decisions. The goal of this course is to challenge the definition of waste, examining what it can become once it outlives its primary use.

Students will start by identifying sources of waste in their daily lives and selecting one for in-depth exploration. They will then identify potential users and leverage their skills—whether in computation, fabrication, or design—to envision and propose an alternative future for that waste. The course emphasizes taking a holistic approach, encouraging students to integrate secondary skills / interests such as cost analysis, branding, accessibility, and engagement with potential stakeholders or collaborators.

Fabrication:

Students are encouraged to complete the necessary fabrication training from all the available NJIT resources. Ideally before or during the first week of the semester.

Students are expected to utilize the fabrication facilities available at NJIT to produce prototypes, mockups, and other materials that will inform their design proposals. Emphasis will be placed on creating a simple, replicable process that considers accessibility. The use of non-toxic, sustainable materials is highly encouraged to align with the course's environmental focus.

Students should also consider additional factors throughout the design process, such as: Who is building it? Where is it being built? And how long do they have to build it? These sub-contexts are crucial for shaping solutions that are not only sustainable but also practical and easily adaptable in real-world scenarios.

Learning Outcomes:

Students will actively engage with their communities to identify local needs and potential users for their projects. Through this process, they will develop skills such as research, interviewing, decision-making, and UI/UX design, alongside community involvement and fabrication techniques.

The most valuable takeaway from this course is the understanding that the world is full of opportunities for innovative solutions—if you keep your eyes open. By fostering a mindset of critical observation and creativity, students will leave with the tools and perspective necessary to address real-world challenges through design.

Grading:

Grades in the course are earned. Students must complete every assignment, however just completing an assignment does not guarantee a passing grade. Students are expected to complete all assignments by the posted due dates. Late work will not be accepted without penalty. Only in special circumstances, such as previously arranged or excused accommodation prior to due dates will work not be penalized.

NJIT Undergraduate grading scale:

А	90-100	Superior
B+	86-89	Excellent
В	80-85	Very Good
C+	76-79	Good
С	70-75	Acceptable
D	60-69	Minimum
F	0-59	Inadequate

Course Requirements:

To successfully complete the course, <u>you must submit the following in groups of 3</u>. Completion alone of does not guarantee a passing grade for the course.

1.	Assignment 01- Preliminary Research: Material and Use case Proposals	15%
2.	Assignment 02 - Production Processes & User Systems Proposals	15%
3.	Assignment 03- Business & Marketing Proposals	15%
4.	Assignment 04 - Fabrication: Minimum Viable Product (MVP)	15%
5.	Assignment 05 - Project Proposal: Final Submission	30%
6.	Attendance & Participation (Individual)	10%

Campus Resources: Check in with each for schedule and availability.

- 1. HCAD Fabrication Website: https://design.njit.edu/fabrication-facilities-and-labs
- 2. Safety Orientation (Room 760): Each lab might require special / different training.
- 3. Laser Lab (Room 760): Laser cutters, Vinyl cutters, resin 3D printers, and more.
- 4. Woodshop (Room 761): Table saw, compound miter saw, drill press, band saws, routers, a variety of handheld power tools, and more.
- 5. DigiFab Lab (Room 767): Three CNC mills, vacuum forming machine, spot welder, machining shear, manual box and pan brake, chop saw, bench grinder, corner notcher, bandsaws, and more.
- 6. Paint Room (Room 759): Spray booths for adhesives, aerosols, a variety of resins, and more.
- 7. Casting Lab (Room 751): Fume hood and industrial air scrubber for dust and fumes such as plaster, concrete, silicone, a variety of resins, and more.

Spring Semester 2025: (01.21.25 - 05.16.25)

Week 01:	M	01/20	Holiday No Class	
	TH	01/23	Introduction: What is waste and what can be done? Case Studies	
Week 02:	M	01/27	Readings, Personal Moments & Opportunities, Scales	
	TH	01/30	Desk crits / Review Work	
Week 03:	M	02/03	Materials, Users, Research + Analysis	
	TH	02/06	Desk crits / Review Work	
Week 04:	M	02/10	Review: Preliminary Research: Material and Use case Proposals)	
	TH	02/13	Desk crits / Review Work	
Week 05:	M	02/17	Initial Tests, Research + Analysis	
	TH	02/20	Desk crits / Review Work	
Week 06:	M	02/24	Secondary Tests, Research + Analysis	
	TH	02/27	Desk crits / Review Work	
Week 07:	M	03/03	Mockup, Key Production Elements, Research + Analysis	
	TH	03/06	Desk crits / Review Work	
Week 08:	M	03/10	Review: Production Processes & User Systems Proposals	
	TH	03/13	Desk crits / Review Work	
Week 09:	M	03/17	Spring Recess: March 16 – 22	
	TH	03/20	Spring Recess: March 16 – 22	
Week 10:	M	03/24	Production Process Refinement, Research + Analysis	
	TH	03/27	Desk crits / Review Work	
Week 11:	M	03/31	Product Marketing (UN SDGs, Cost Savings, energy etc)	
	TH	04/03	Desk crits / Review Work	
Week 12:	M	04/07	Final Production & Refinement	
	TH	04/10	Desk crits / Review Work	
Week 13:	M	04/14	Review: Minimum Viable Product, Business and Marketing Proposals	
	TH	04/17	Production Mode / Review Work	
Week 14:	M	04/21	Production Mode / Review Work	
	TH	04/24	Production Mode / Review Work	
Week 15:	M	04/28	No Class Studio Reviews	
	TH	05/01	No Class Studio Reviews	
Week 16:	M	05/05	Review: Project Proposals: Final Submission (Canvas, Kepler, Google Drive)	
	T	05/06	Exit Interviews	
	s	05/18	Grades Due	
	2	55,10		

Additions Resources:

Websites

- 1. Benjamin, David. "Net-Zero Buildings": <u>https://www.research.autodesk.com/people/david-benjamin/</u>
- 2. Big Reuse. "Big Reuse (Brooklyn, NY)": <u>https://bigreuse.org/</u>
- 3. Gonzales, Jessica. "Happen Ventures (Newark, NJ)": https://happenventures.com/
- 4. Harvard SEAS. "Gaia Hypothesis": https://courses.seas.harvard.edu/climate/eli/Courses/EPS281r/Sources/Gaia/Gaia-hypothesis-wikipedia.pdf
- 5. Habitat for Humanity. "Habitat Newark Restore" : <u>https://www.habitatnewarkrestore.org/</u>
- 6. Habitat for Humanity. "Morris Restore (Randolph, NJ)": <u>https://www.morrisrestore.org/</u>
- Interaction Foundation. "What is Human-Centered Design (HCD)": <u>https://www.interactiondesign.org/literature/topics/human-centered-design</u>
- 8. Oxman, Neri. "Material Ecology": <u>https://oxman.com/</u>
- 9. Scaff, Julian. "The death and rebirth of human-centered design": <u>https://jscaff.medium.com/the-death-and-rebirth-of-humancentered-design-c70573d668e3</u>
- 10. United Nations. "UN Sustainable Development Goals": <u>https://sdgs.un.org/goals</u>

Text

- 1. Benjamin, David N. Embodied Energy and Design: Making Architecture Between Metrics and Narratives. Columbia University GSAPP. 2017.
- 2. Clifford, Brandon. The Cannibal's Cookbook: Mining Myths of Cyclopean Constructions. Oro Editions. 2021.
- 3. Daynes, Sarah. On Ethnography. Polity Publisher. 2018.
- 4. Ideo. The Field Guide to Human-Centered Design. Ideo.org / Design Kit. 2015.
- 5. Luma Institute. Innovating for People Handbook of Human-Centered Design. Luma Institute. 2012.
- 6. Miles, Ellen. Get Guerrilla Gardening: A Handbook for Planting in Public Places. DK. 2023.
- 7. Meadows, Donella H. Thinking in Systems. Chelsea Green Publishing. 2008.
- 8. Ries, Eric. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Vikin Publisher. 2011.
- 9. Thiel, Peter, and Masters, Blake. Zero to One: Notes on Startups, or How to Build the Future. Crown Business Publisher. 2014.
- 10. Watson, Julia. Lo-Tek; Design by Radical Indigenism. Taschen America LLC. 2020.

Social Medial

- 1. @adrianlee_architecture
- 2. @allen.crippa
- 3. @archdaily
- 4. @bartlettkiosk
- 5. @etharchitecturearchive
- 6. @gsd fablab
- 7. @iaacbcn
- 8. @letsdesigndaily
- 9. @munayprep
- 10. @maelokko
- 11. @robocut
- 12. @thethinking hand
- 13. @we_are_takk
- 14. @yalecea

Academic Integrity:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: *NJIT Academic Integrity Code*.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu."

Generative AI:

This course is open to the integration of generative AI tools in our work, as they can be powerful aids in creativity, problem-solving, and learning. However, to ensure their effective and ethical use, it is important that any AI-generated content or solutions be thoroughly documented. This includes clearly explaining how the AI tools were applied, the data or prompts used, and the methodology behind the need for a generative process. Additionally, all AI-based outputs must undergo testing to ensure accuracy and relevance to the task at hand. Lastly, it is expected students to provide quantified evidence of how generative AI contributes to their work, whether in terms of time saved, quality improvements, or other measurable metrics. This approach ensures transparency, accountability, and enhances the learning experience for everyone involved.

It is important to recognize that using generative AI tools requires a different skill set, which may initially slow progress. At your discretion, assess whether the benefits of using these tools, including their potential for innovation and efficiency, outweigh the learning curve involved.