4.153| Architecture Design Core III

SYLLABUS

TEACHING TEAM

Associate Professor J. Yolande Daniels

Associate Professor of Practice, J Jih

Lecturer, Adam Modesitt

Teaching Fellow, Samuel May

T.A.S

Vincent Jackow, MArch 26

Thomas King, MArch 26

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STRUCTURES INSTRUCTORS

Associate Professor Holly Samuelson (Coordinator)

Keith Lee, PhD candidate, Building Technology

BT T.A.

Nebyu Haile

CARBON-CONSTRUCTIVE RECIPROCITIES

4.135 | Architecture Design Core Studio III is the concluding studio of the MArch1 Core Program. It is integrated with Building Technology 4.463 and cross listed with the undergraduate program.

Carbon Constructive Reciprocities describes how cooperative and constructive climate actions by one component can trigger reciprocal, positive actions to create a powerful feedback loop that accelerates efforts to address climate change.

Carbon is an essential element. The Earth would be as lifeless as the moon without it. All life on Earth is carbon-based; carbon is the fundamental element required to form the structures of all known living cells. The constant movement of carbon (atoms) links all parts of the ecosystem together. Carbon (atoms) flow between Earth's atmosphere, oceans, land, and living organisms through the carbon cycle. Carbon flows in processes from photosynthesis (taking CO2 from the atmosphere into plants) to cellular respiration (releasing CO2 from plants and animals) to decomposition (releasing carbon from dead organic matter into the soil) to the burning of fossil fuels (releasing carbon into the atmosphere) to the exchange of gases between the ocean and atmosphere.

Carbon is stored in minerals, rocks, and sediment. Carbon is stored in the ocean, atmosphere, and biosphere in living organisms and soils. The human impact on the climate and life on Earth comes from carbon emissions—the release of stored carbon--primarily in the form of carbon dioxide (CO2) from burning fossil fuels. The carbon buildup from emissions enhances the Earth's natural greenhouse effect, leading to global warming and climate change, which causes severe weather, rising sea levels, and ecosystem disruption. Human activities are the primary cause of this imbalance by releasing carbon at a rate that natural processes cannot absorb, resulting in environmental and social consequences like ocean acidification, food scarcity, and economic instability.

Building construction practices impact the future capacity of cities and their inhabitants. The UN has reported that the building and construction industries contribute 37% of global emissions and that resource extraction is a significant cause of the climate crisis. The Carbon Constructive Reciprocities framework encourages architectural design explorations that advance an integrated approach toward buildings and the environment and provides the opportunity to envision reciprocal and regenerative constructive systems and urban ecosystems. Studios will explore building strategies that address the flows of carbon in building lifecycles and the ecosystem. Students are encouraged to explore alternatives to extractive practices in building design and construction by investigating reciprocal and regenerative approaches through scalar and time-based material explorations toward a semester-long building project for the design of a 27,000sf Environmental Center in South Boston.

STUDIO SECTION STATEMENTS

Each studio section will work from the same course framework and review deliverables while reflecting the qualitative approach and directions of the individual critics. Studio instructors will work with each student group and individual to support the development of a design process that emphasizes the exploration of design options through drawings and models, experimentation and clarity in representations, and the exploration of material and construction techniques. All students are encouraged to work in teams.

Micro-Meso-Macro

J. Yolande Daniels

Visible 60 miles away, the 88 xenon searchlight beams of Tribute in Light emit 300,000 watts on 9/11 extending into the atmosphere for a week attracting birds and disrupting migrations. The Gaia hypothesis of Lovelock, Whitehead, and Richardson proposed that the Earth functions as a single, self-regulating system actively maintaining conditions suitable for life. This view contends that collaborative and coordinated actions (and the flow of carbon) maintain balance in nature.

Micro Meso Macro expands upon the Carbon-Constructive Reciprocities framework, to consider possibilities for architectural design to coordinate across environments and species. Students are encouraged to explore architectural potential in the design and assembly of atmospheres, materials, spaces and inhabitants to host the interconnected diurnal and scalar reciprocities between organisms and ecosystems in their Center and Park. What constructive reciprocities can be materialized across small, in between, and large time frames and scales? At what scale and in what timeframe do we design?

Construction Ecologies, Construction Economies

J. Roc Jih

This section positions construction and its attendant transformations of carbon as mediator between ecologies and economies. If ecology can be understood as the study of organisms and their interactions with surrounding environments (including humans in our anthropocentric frameworks), and economy as an area of production, distribution, and trade, construction might be re-contextualized as a mediator between landscape and labor.

Our program will be a Center for Constructive and Environmental Praxis. Expanding upon German models of trade education as well as those seen in notable American schools such as the Haystack Mountain School of Crafts, Yestermorrow, and the North Bennett Street School, the Center will educate, exhibit, and innovate upon relations between built and natural environments.

Students will each select a relation between ecology and economy by defining a position on landscapes of production, remediation, restoration, and extraction, and setting the choreography of a building’s assembly as a transformative, relational instrument.

Constructive Seeding

Sam May

Striving to adapt inherited spatial conditions, architects are stifled by the same deterministic models that produced these environments. Deterministic logics derived from historical conditions fail to guide us into an unknowable future, producing wasteful, carbon-intensive results. To enable regeneration, architects must instead catalyze new possibilities through affordance for natural processes and cultivation of emergent lifeways. In the Miyawaki Method of reforestation, a selection of local species is planted in a small area such that they co-facilitate conditions of ecological growth. If successful, this flourishes into a community of plants and animals ranging well beyond those originally introduced. Whereas monocultural forestry is predetermined, resource intensive and susceptible to disease, the Miyawaki forest is regenerative and resilient. This method has parallels in many practices, from autocatalytic sets in biological systems to the resourcefulness of folk construction. Thinking indeterminately enables architects to earnestly re-engage unknown trajectories of our shared carbon future and work systematically toward widespread change.

Ever After

Adam Modesitt

The narrative of efficiency promises redemption, an “ever after” in which managerial metrics solve ecological crisis. Yet efficiency often reinforces the very systems it claims to critique. Materials are not neutral commodities, they are products of the regulatory, cultural, and economic value systems that govern how they are produced, circulated, and discarded.

Ever After will probe architecture’s role in these entanglements. Each group will select a single material and design a center dedicated to it, foregrounding its multiple identities as product, byproduct, artifact, and residue. While programmatically centered on one material, buildings needn’t be constructed solely from it, or from it at all. Rather, projects will operate as lenses for investigating how materials embody value systems, and how those systems might be reframed.

Tectonic experiments and tactile exploration will take precedence over statistical abstraction. Students will attend to irregularities, wastes, and overlooked consequences, imagining architectures that stage reciprocity among resources, labor, and culture. The ambition is not permanent solutions, but to articulate provisional afterlives and continuities—an “ever after” without end.

SCHEDULE

WK 1 Tu Sept 02 Studio Framework Presentation (Registration)

Th Sept 04 Studio Introduction | Studio Critic Presentations | Module 1 Introduction

Fr Sept 05 Student/TA Work Sessions| Open Desk Crits (Registration Deadline)

WK 2 Tu Sept 09 Open Desk Crits

Th Sept 11 Open Desk Crits | Studio Section Presentations

Fr Sept 12 Open Desk Crits | Student Team Selection + Studio Section Lottery

WK 3 Tu Sept 16 **Review-Module 1** | Module 2 Introduction (Teamwork moving forward)

Th Sept 18 **Site Visit** | Desk Crits

**Fr Sept 19** **Student Holiday**

Wk 4 Tu Sept 23 Desk Crits

Th Sept 25 Desk Crits

Fr Sept 26 Student/TA Work Sessions

WK 5 Tu Sept 30 **Review-Module 2**

Th Oct 02 Desk Crits

Fr Oct 03 Student/TA Work Sessions

WK 6 Tu Oct 07 Desk Crits

Th Oct 09 Desk Crits (NOMAS Conference 10/08-12)

Fr Oct 10 **Site Visit/Lecture** | Student/TA Work Sessions

WK 7 Tu Oct 14 Desk Crits

Th Oct 16 Desk Crits (YD Out)

Fr Oct 17 Student/TA Work Sessions

WK 8 Tu Oct 21 **Midterm Review-Module 3**

Th Oct 23 Section critics introduce Module 4 | Desk Crits

Fr Oct 24 Student/TA Work Sessions

WK 9 Tu Oct 28 Desk Crits

Th Oct 30 Desk Crits

Fr Oct 31 Student/TA Work Sessions

WK 10 Tu Nov 04 **Pin-Up/Review-Module 4**

Th Nov 06 Desk Crits

Fr Nov 07 **Site Visit/Lecture** | Student/TA Work Sessions

WK 11 Tu Nov 11 Veteran’s Day Holiday

Th Nov 13 Desk Crits

Fr Nov 14 Student/TA Work Sessions

WK 12 Tu Nov 18 **Penultimate Review-Module 4**

Th Nov 20 Desk Crits

Fr Nov 21 Student/TA Work Sessions (BT Exhibition Studio @10am; Critics attend)

WK 13 Tu Nov 25 **Pin-Up-Module 4 (**Final Review Mock-up)

**Th Nov 27**  **Thanksgiving Holiday**

**Fr Nov 28**  **Mit Holiday**

WK 14 Tu Dec 02 Desk Crits

Th Dec 04 Desk Crits

Fr Dec 05 Student/TA Work Sessions

WK 15 Tu Dec 09 **Final Review** (includes Modules 1+2+3+4)

(Date TBD) Semester’s Project Archived (TAs assist)

LEARNING OBJECTIVES

4.153 consists of a semester long building design that explores sustainable and regenerative constructive and thermal building systems. Students must show an ability to integrate structural, enclosure, climate, in architectural design strategies and understand the carbon impacts of material and construction system choices.

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. Design representation and communication conventions and experimentation will be explored through various modes of drawing and modeling. Students will need to demonstrate the application of analytical and design skills, an understanding of drawing and modeling conventions, and an ability to sustain an increasing level of research in the projects over the semester.

EVALUATION CRITERIA

Grades will be assessed according to the following criteria:

1. Clarity of design concepts through the stages of design development.
2. Design concept translation in response to the program, site, building and detail scales.
3. Synthesis of the concept with the representational means.
4. Precision and rigor across representational modes (drawings, models, and fabrications).
5. Capacity to reflect upon and self-critique the work produced regularly and effectively.
6. Ability to establish an iterative design process to explore and synthesize design options.
7. Clarity of physical and oral presentation (from desk-crits to class discussions and juries).
8. Active and constructive involvement in class discussions (both formally and informally).
9. Effectively respond to criticism from instructors, classmates, and outside jurors.
10. Attendance

EVALUATION METHODS

Quantitative Evaluations

Completion of the course deliverables which all studio groups share, in addition to the specific instructions of the studio critic, and the integration of building technology in the architectural design projects. The integration of building technology will be evaluated through a demonstrated understanding of section, construction assembly and construction detail drawings in the studio projects (and through their problem sets in BT).

Qualitative Evaluations

In addition to the completion of deliverables, the development of each student’s design process, design research skills and understanding of design integration across scales in architecture is evaluated through presentations, and discussions. The rigor in process and clarity in representation, and the overall qualitative progress of the semester (including participation and attendance) will be fundamental to completing the course.

In addition to conventional desk-crits, reviews and pin-ups, there will be presentations, workshops, tutorials, discussions, and field trips led by the faculty and teaching assistants. This mix allows for a range of discursive formats to engage students, faculty, and external guests in conversation on students ’design projects and will enable a range of voices and views to provide input and feedback toward the development of the proposed building designs.

Self-Reflective and Peer Evaluation

The intermeshing of skills in design analysis, representation and documentation paired with material research/experimentation provide space for self-evaluation and transitions between scales in architectural design. To foster reflection on their design work, students are encouraged after each project discussion to formulate a key question and list steps that they will initiate in response.

Student Participation

Participation is a critical component of the design studio. This ranges from participation in the studio process and collaborative teamwork to attendance, assignments, class discussions, desk crits, workshops, and tutorials pin-ups, reviews, and field trips.

Attendance Policy

The studio is an exceptional learning environment that requires your physical and intellectual presence. Attendance for the full duration of each class is mandatory. It is understood that leaving the studio to use fabrication facilities may be necessary, but it must not conflict with scheduled events in the design studio. Review attendance is mandatory.

Three excused absences are allowed for the semester. An excused absence is one discussed with and approved by the professor at least 24 hours prior to the date of absence, or a family or medical emergency confirmed by your physician or a dean in Student Support Services. Unexcused absences will reduce the course grade by half a letter grade, at minimum. Late arrival or early departure from class will count as a partial absence. 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.

Studio Culture

Work in studio will build sequentially. Therefore, your commitment to continual development daily is of paramount importance. It is important that you take advantage of the studio environment. Magnification of your development as a designer is made possible by the collective nature of the class. 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 instructor and TAs if there are any problems you cannot resolve on your own.

Personal Conduct

Instructors, TAs, and students in this course are expected to act responsibly, ethically, and with respect for the dignity of all others, both within and outside the classroom. Issues relating to personal conduct, including discrimination and harassment, will be taken extremely seriously. Students should take the time to become familiar with MIT’s major policies on personal conduct, which can be found here: [MIT Policies: Conduct and Community Standards](https://policies.mit.edu/policy-topics/conduct-and-community-standards)

Academic Integrity/ Honesty

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 scholarship 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, which can be found here: [Academic Integrity at MIT: A Handbook for Students](https://integrity.mit.edu/handbook/academic-integrity-handbook)

GRADING RUBRIC

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.

STUDENT SUPPORT

Medical

If you are on a Medical Hold due to attesting to potential Covid symptoms, or have tested positive and must isolate, then please contact your instructors so we can make sure you have access to course materials, and we can discuss how we address the missed work. You can also contact Student Support Services for additional assistance.

Student Support Services (S3)

If something is getting in the way of attending class, completing work, or taking an exam, contact a dean in Student Support Services (S3). The deans will provide you with support and help you work with us to determine the next steps. We ask that you go to S3 so we know you have had a chance to talk through your situation with someone and to connect with any resources you might need. 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. For more information or to join the virtual help queue visit [studentlife.mit.edu/s3](http://studentlife.mit.edu/s3) or e-mail s3-support@mit.edu.

Disability Accommodation and Access Services

MIT is committed to the principle of equal access and an inclusionary environment. Students who need accommodation are encouraged to speak with the instructor as early as possible. Students who need disability accommodations are encouraged to speak with Disability and Access Services ([studentlife.mit.edu/das](http://studentlife.mit.edu/das)), prior to or early in the semester so that accommodation requests can be evaluated and addressed in a timely fashion.

If you have a disability and are not planning to request accommodation, it is still recommended that you meet with DAS staff to familiarize yourself with their services and resources. Contact Disability and Access Services with any questions at 617-253-1674 or via email das-student@mit.edu.

COURSE COMMUNICATIONS

Updates to the course schedule and content will be issued via Canvas announcements and to your MIT email address. Students are responsible for checking email regularly throughout the course. Students are also encouraged to email the instructor and/or TA with any questions, concerns, or requests that may arise during the course. Course information will be distributed via Canvas. The syllabus, schedule and submission deadlines, and the studio handbooks, will be distributed via Dropbox. Final coursework submissions are required via Dropbox. The Canvas course homepage can be found at: <https://canvas.mit.edu/courses/28121>