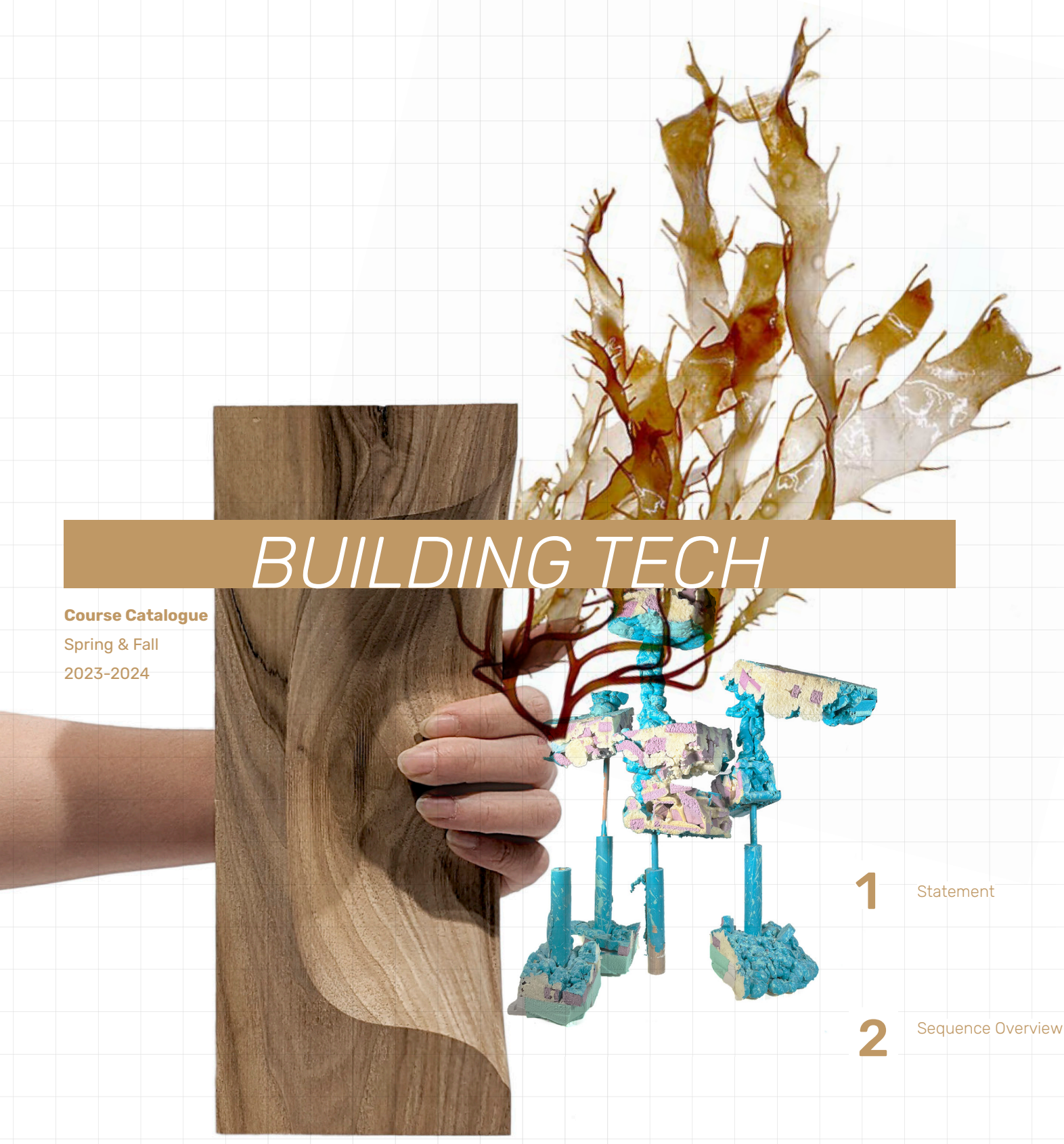


BUILDING TECH

Course Catalogue

Spring & Fall

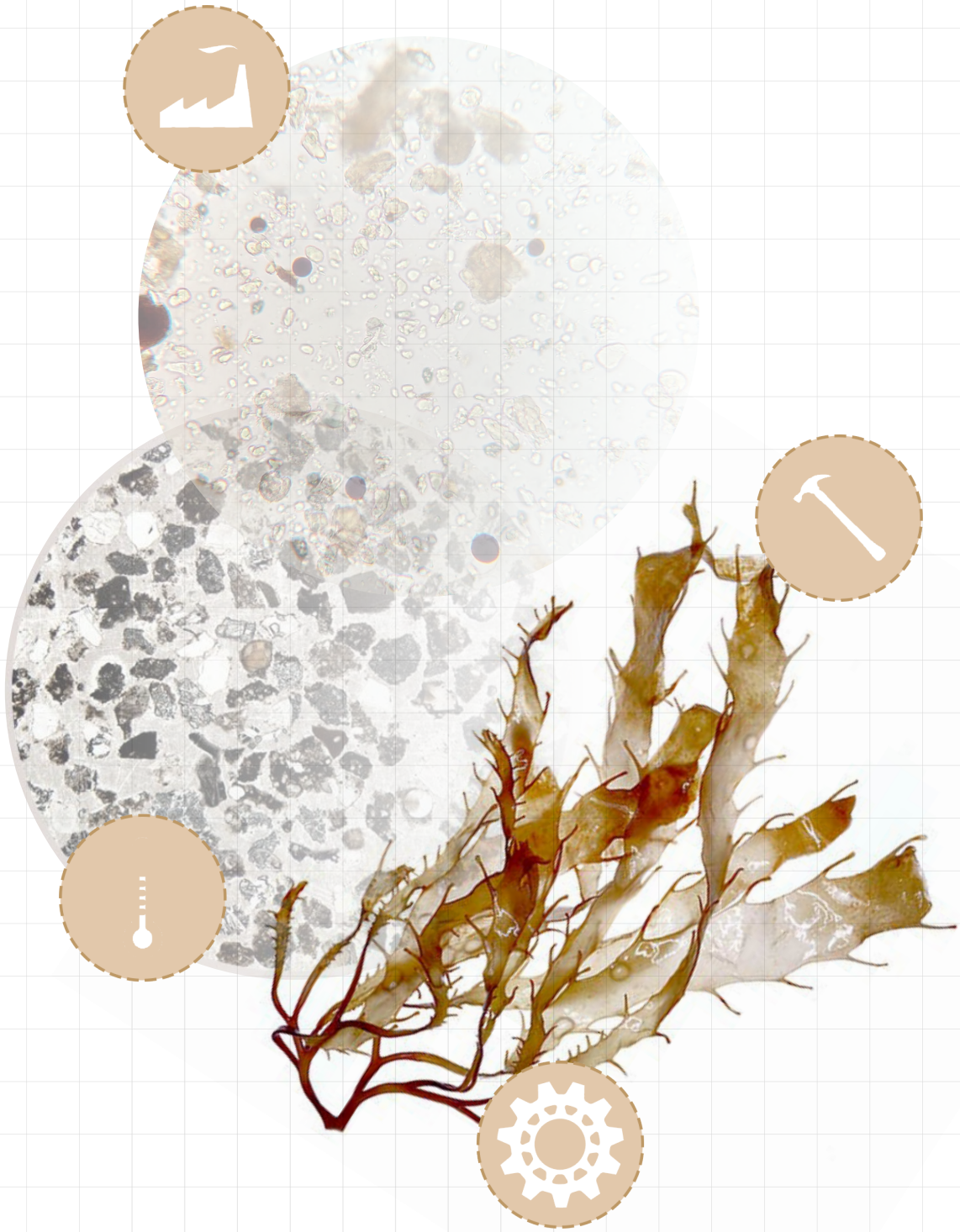
2023-2024

COLUMBIA GSAPP

Student Work: 1:1 Detailing Taught by Zachary Mulitauaopele | Daniel Chang, Julie Kim, Cecile Kim, Anne Freeman, Laura

EQUITY/HEALTH

DESIGN BUILD



CLIMATE/ENERGY

HIGH-TECH/LOW-TECH

Lola Ben-Alon

Assistant Professor
Coordinator, Building Tech

Building practices, even those supported by technology, are—like all human actions—necessarily contingent upon materials, social, and institutional arrangements, and are thus embodied, situated, and messy. Technologies themselves ultimately condition design, and the lives of those who are directly and indirectly involved in the making of the built environment. As David Benjamin writes in his editorial book "Embodied Energy and Design" (page 13), buildings are ideas made physical, and they carry with them "silent histories of the extractions, labor, and supply chains" that are then manifested into an operational structure with dynamically moving parts.

With emerging social, technocratic, bodily, and environmental crises, the Building Tech sequence takes a strong position to forward critical approaches to embrace uncertainties and the unfixed, non-binary nature of materials, tools, buildings, and their resulting construction systems.
At the heart of the Building Tech sequence are the required TECH I - TECH IV courses that take a strong stance in threading inquiries throughout notions of technology, ecology, climate, and health considerations in existing buildings, integrating environmental, structural, mechanical, enclosure, and circulation systems through intense drawing and fabrication processes. These courses act not as an instrument to design but rather as a pathway for questioning, redefining, and hacking technological tools and instruments.

Additionally, an array of elective courses is developed as part of the sequence with the mission to create novel and radical experimental forms of building science, structures, physics, chemistry, and biology while celebrating the tactile interaction between human hands and tools, worldly agencies and species, and the built and natural environments.
The Building Tech electives cover a range of topics, from acoustics ecology to landscape technologies and from 1:1 fabrication of details to healthy materials and the industrial notions of African urbanism. This selection of courses not only aims to highlight the intricate constant change—of what building technologies are and how they are perceived in architecture—but also to conceptualize the forthcoming changes needed of technologies to enable resiliency and greater access.

With best wishes at the start of the semester,

Lola Ben-Alon

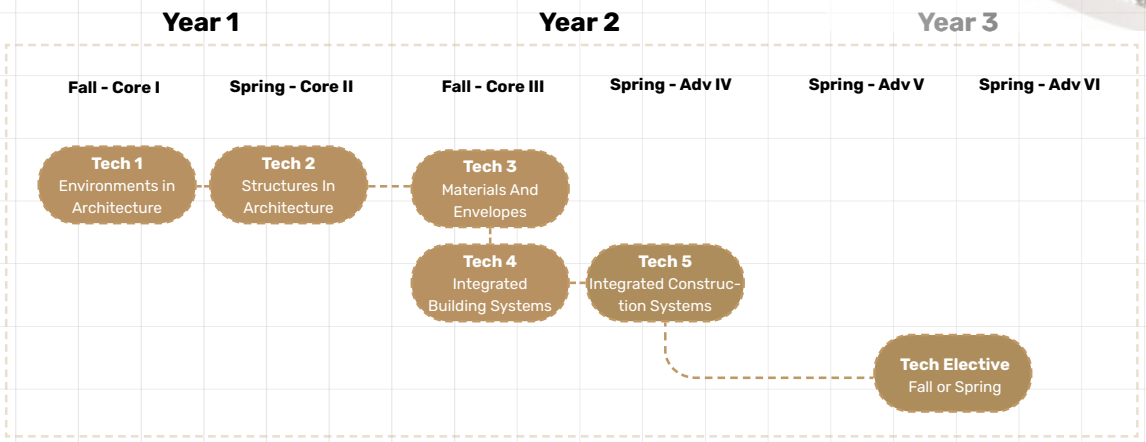
CORE TECH SEQUENCE

1

NO WAIVERS

Core Tech Sequence - 18 Credit Hrs.
Required Classes

Tech 1 - 5
Tech 6, Open Elective

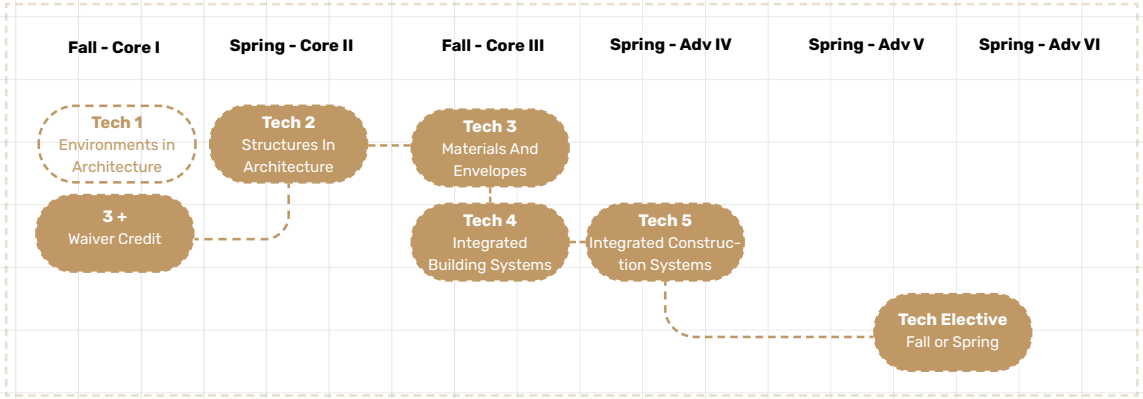


2

TECH 1 ADVANCED STANDING

You can be granted with Advanced Standing if you provide evidence of two relevant courses.

Tech 1 advanced standing gives you a 3 point credit.

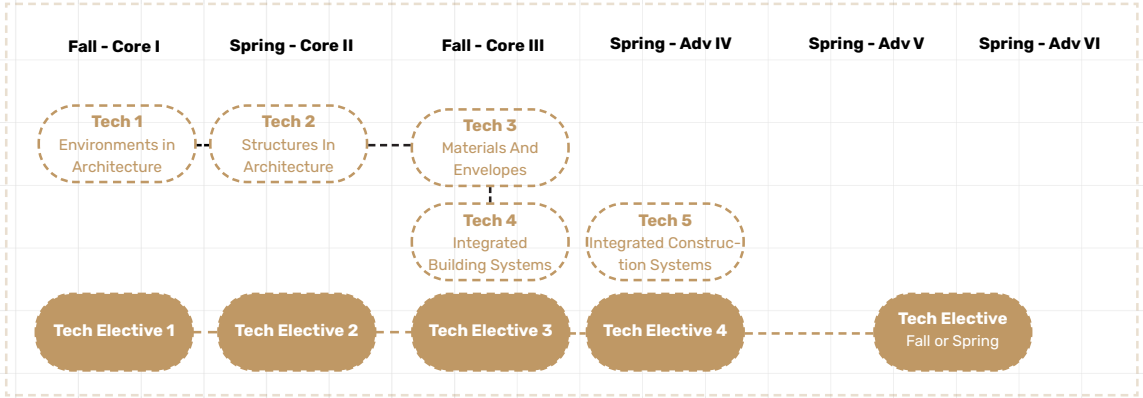


3

TECH 2 - 5 WAIVED

You can be granted with a Waiver if you provide evidence of two relevant classes.

For each waiver granted you need a substitute Tech Elective.



FALL 2023

Course Catalogue

Academic Year

2023-2024

EQUITY/HEALTH

Environmental Justice - Simulated
Anwino Helen Rose Anyango

Building the Engine: Industry & the African Urban Agenda
Fatou Dieye

Designing Spaces for Children
Anna Knoell

Home is Where the Toxics Are
Marta H. Wisniewska

TECH IV, Integrated Building Systems
Berardo Matalucci

Construction Ecologies in the Anthropocene
Tommy Schaperkotter

TECH IV, Integrated Building Systems
Berardo Matalucci

Tensile/Compression Surfaces in Architecture:
Bob Marino

TECH 1, Environments in Architecture
Rufei Wang, Jerrod Kennard

Acoustic Ecology
Ethan Bourdeau

Seed Bombs
Emily Bauer

TECH III, Materials and Assemblies
Gabrielle Brainard, Kat Chan

Daylight, Metabolism
Elliot Glassman

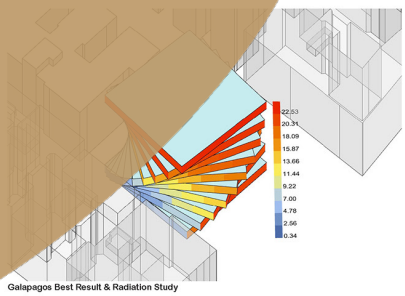
DESIGN BUILD

CLIMATE/ENERGY

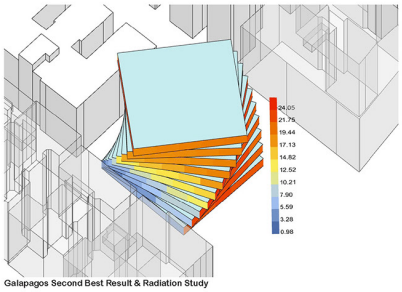
HIGH-TECH/LOW-TECH

TECH 1: *Environments in Architecture*

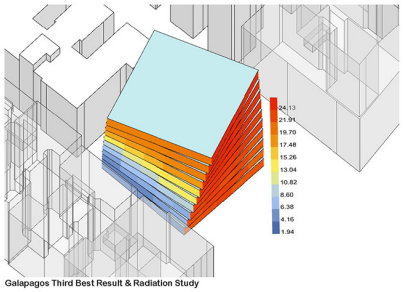
Rufei Wang



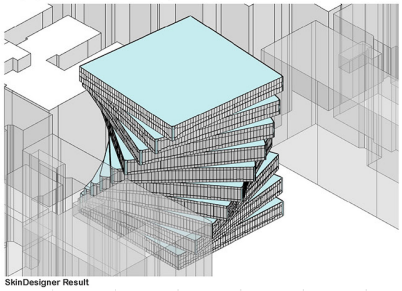
Galapagos Best Result & Radiation Study



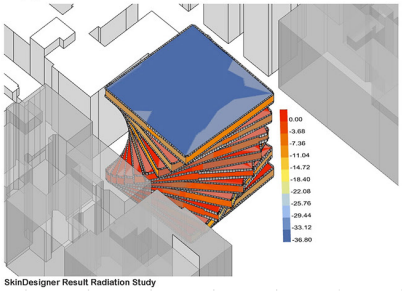
Galapagos Second Best Result & Radiation Study



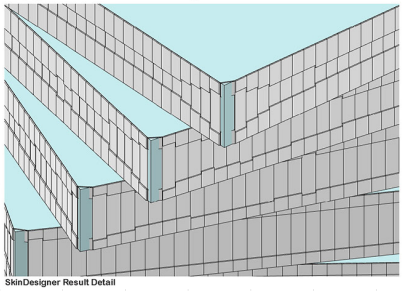
Galapagos Third Best Result & Radiation Study



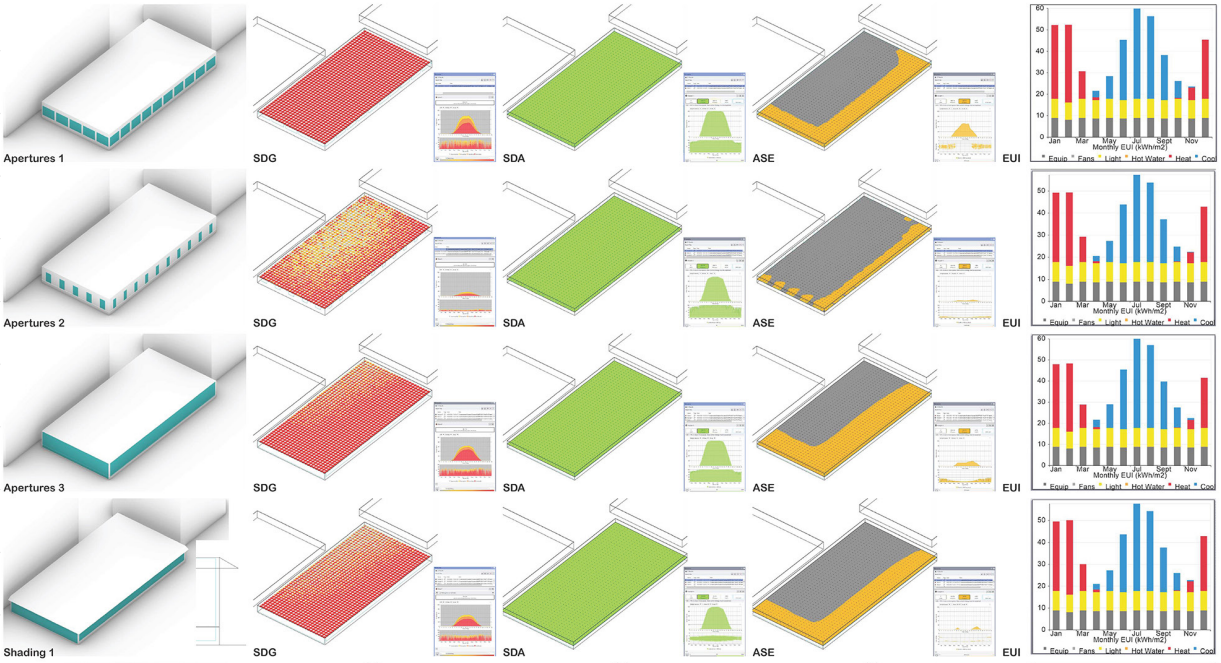
SkinDesigner Result



SkinDesigner Result Radiation Study



SkinDesigner Result Detail



AT1 introduces building technology responses for energy conservation and natural conditioning, human comfort, and the site-specific dynamics of climate and environments. The state of the art in environmental design and passive heating and cooling technologies will be presented in lectures and supported by software tutorials, readings and assignments. To illuminate the significance of architectural design decision-making on energy consumption and comfort, design specifications and modifications will be explored for a residential building.

Students will be expected to integrate an understanding of the basic laws of comfort and heat flow with the variables of the local environment to create design adaptations for their own work. Homework assignments will be scaffolded to compile a professional environmental communication video, analyzing energy measures from massing, orientation, organization, enclosure detailing, opening control, to passive system integration and management. An overview of world energy consumption in buildings and energy rating systems will be introduced by lectures on building energy and emerging responsibilities for a broader definition of sustainability.

The course will end with a critical and exploitative visual communications exercise of environmental considerations that integrate natural and passive systems as well as the potentially dynamic interface of mechanical systems. Class time will be divided into lectures, lab introductions of software tools, and guest lectures. Students are encouraged to apply lessons learned in this class to their studio explorations.

TECH 3: *Materials and Assemblies*

Gabrielle Brainard & Kat Chen

This course introduces students to the technical design of structural and building envelope systems. The course is divided into two modules, each taught by a specialist in that subject. The first module focuses on structural systems and is taught by Thomas Reiner.

The material is based on the structural concepts first introduced in AT2. This module covers structural design criteria, building structural design, and discusses common structural systems and materials. The students learn how to develop and detail preliminary designs of structural systems based on the strength and properties of different materials, as well as the geometry of their building designs. The second module focuses on building envelopes and is taught by Gabrielle Brainard. Beginning with envelope design principals and system typologies, and moving on to performance criteria, documentation strategies, and considerations of project execution (fabrication, installation, cost), this module covers the tools and methods of façade design and prepares students to design advanced enclosure systems.

The course is taught in lecture format. The lectures cover core concepts relevant to the design process of both structural and envelope systems. A series of group-based design and detailing exercises encourage students to immediately engage with the material presented during class and develop a hands-on understanding of the principles and systems discussed. AT3 is taught in parallel with AT4 – Integrated Systems.

TECH 4: *Integrated Building Systems*

Berardo Matalucci

Student Work: Christopher Armstrong Lauren Brown Omer Gorashi Kelsey Jackson Roman Karki

AT4 Integrated Systems – Building is the capstone course of the Master of Architecture technical sequence. The course brings together key areas of previous coursework in life safety, fire protection, environmental systems,structure and enclosures. Knowledge, concepts and principles on these subjects learned in previous Tech courses are applied in a design-based project. The construction of a building is essentially a part-to-whole problem. It involves the complex integration of multiple building components, systems and processes into a synthetic whole.

Architects, engineers, fabricators and erectors work together to develop each respective part. Also, architects hold the key role in ensuring the successful synthesis of these multiple parts into the whole. Through a better understanding of all systems, architects are able to integrate systems more completely with greater economy, elegance and efficiency. A well-integrated building is an efficient one, an elegant one, and most importantly, a well-integrated building gets built. The intent of the course is an intensive introduction into the application of technical systems through design, development and integration.

The course objectives are to establish an understanding and experience in the construction of the technical aspects of architecture. Structural form, environmental systems, materials, construction methods, and fire protection elements are developed systematically and integrated with one another. This is achieved through the development of analytic skills, basic principles and their applications. This course takes a fresh look at each system within a building. What are the key drivers, requirements and intentions around each system? What are techniques to rapidly iterate around design ideas and strategies? This course focuses on a developed and applied understanding of how the parts of constructed form get put together.

The course will start with key ideas around integration at the building scale. What drives the key decisions to be made on a project? Where do technical constraints appear in massing, egress, structure, mechanical systems? We will explore through lectures some fundamental ways of looking at the basic drivers for decision making and use of tools and support information to assist you in developing your future projects, including the project for this class.

AT4 forms the basis of a year-long exploration on integrating across multiple scales in the built environment. While we will begin with building scale in the fall semester, the spring semester will build on this knowledge at the urban and city scale. Facade systems will be explored simultaneously in AT3 Envelopes in Architecture and work in this class will support the project work we will be doing in AT5 Integrated Design: Urban Scale.

TENSILE/COMPRESSION SURFACES IN ARCHITECTURE: *Tactile Mediums for Architects*

Bob Marino

In the history of architecture there are few forms which engender thoughts of the Platonic Ideal. We think of the perfect architectural form: a combination of an efficient use of a material and labor at hand, an intelligent encapsulation of space for a particular use, and a structurally precise concept. In the past these goals have been met by architects, engineers, and designers of a particular ilk. Our current ability, (or inability), to deal with our physical environments could benefit from an appreciation of this type of design. There is no better summary of this way of working than in understanding shells.

The course is organized with a brief weekly visual presentation by the instructor, an invited architect, or when possible, a field visit, conducted by the instructor or a qualified specialist. The themes for these presentations are aligned with the production of architectural shells in both the history of architecture, and as pure, theoretical physical/structural constructions. The remainder of the allotted class time will be devoted to a discussion of each student's work on their chosen semester projects. The semester project will be the construction of a shell, and the consideration of its theoretical form, the techniques of its fabrication, and the materials of its construction.

These assumptions will be proposed by the student(s) and will become their responsibility. The use of the GSAPP maker pace or shop will be necessary and encouraged. It will be possible for students to work individually, or in teams. Presentations to the class, as well as the student's own work will be aligned with physical principles active in shell construction and theory. The principles can be described through an active glossary of terms, which will be emphasized throughout the semester. In addition to visual presentations, there are currently planned two visits to the Avery Archives, to examine the work of Santiago Calatrava and Rafael Guastavino. A field trip is being planned to see the plywood shell structures of architect George Nakashima in New Hope, Pennsylvania.

ACOUSTIC ECOLOGY

Ethan Bordeau

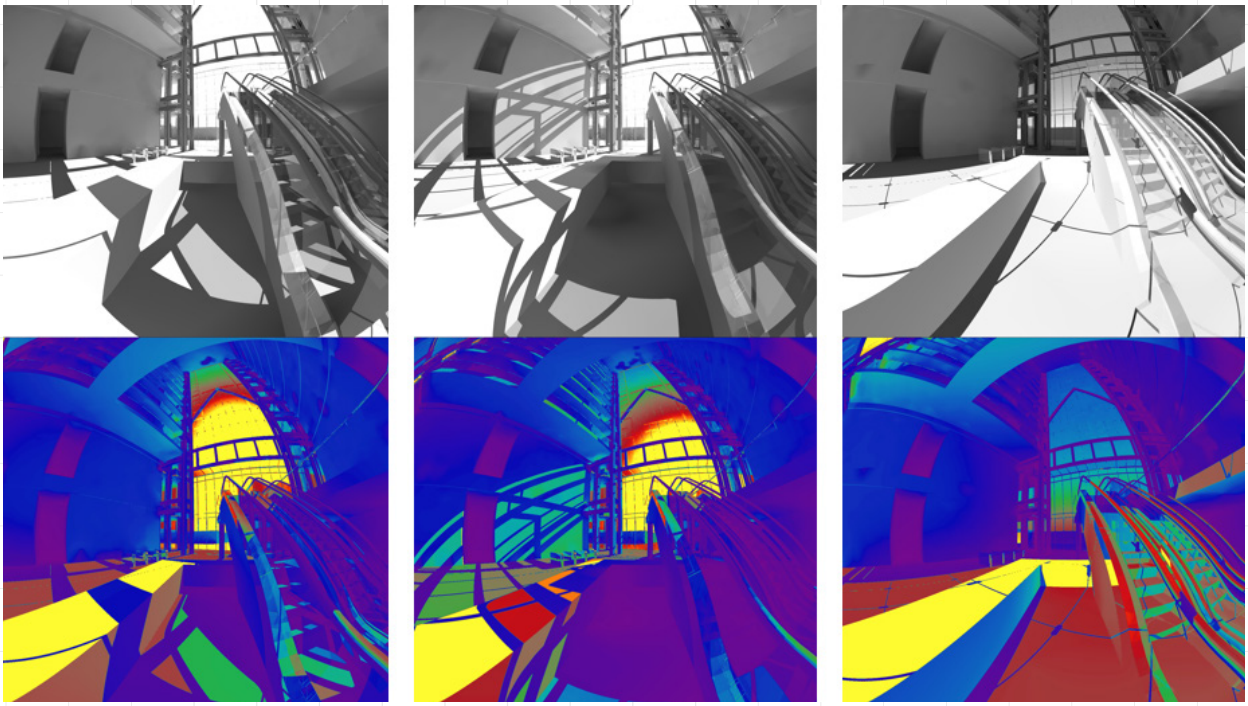
Our individual and collective understandings of the sonic environment inform several ubiquitous elements of urban habitation, including but not limited to wayfinding, respite, communication, understanding, transit, and cohabitation with the animal kingdom. For many living in city centers during and shortly after March 2020, an opportunity presented itself to hear our municipalities differently and begin what many would argue is a necessary dismantling of the human-made barriers, literal and figurative, imposed between our natural and built worlds. Increasing opportunities to listen are coinciding with larger themes of healthy indoor environmental quality as part of the design and renovation of buildings and communities, old and new.

By swapping the camera for a microphone, we will examine tried and true methods of acoustic ecology monitoring, develop an understanding of the fundamentals of acoustics, and study the materials used to control and influence our sonic landscapes. In doing so, we will hone a holistic, sensorial design tool kit which will help conceptualize and realize the lived experience in urban centers.

In this course, we will introduce concepts of acoustic ecology and design with a focus on active listening before, during, and after built concepts are realized. We will examine the nuances between sound and noise, the history of urban planning and sonic gentrification, and what implications both have on human health, well-being, and comfort. Using sound as a catalyst, we will also examine and debate a supposed dichotomy between natural and anthropogenic worlds to build a foundation for sonic design as a proactive, rather than reactive, practice. Finally, we will explore the use of natural elements and intentional landscaping to command the propagation of acoustic energy to support inviting communal spaces and peaceful interiors.

Daylight Metabolism

Elliot Glassman



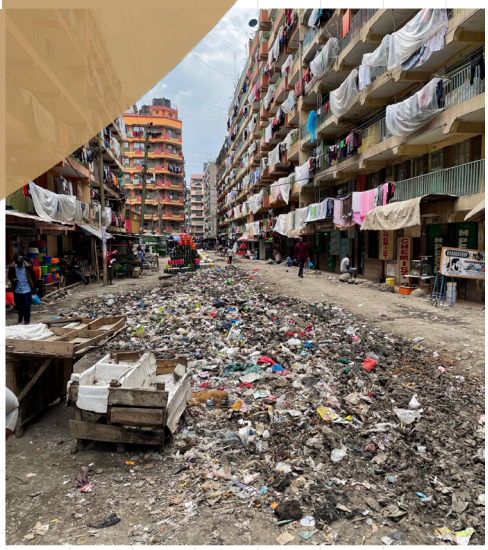
Access to natural light is so essential to human health and wellbeing, regulating our circadian rhythm and stimulating physiological responses that improve our mental and physical states. As a design element, daylight is an architectural form-giver and a way of ordering spaces, it provides visual interest and the appropriate atmosphere for the interior environment. This course will review the benefits of daylight in buildings in various typological contexts and provide students with the tools for designing with daylight.

Daylight design strategies will be explored for providing the appropriate amount of illumination of various space types while preventing visual discomfort and blocking unwanted direct sun. Various metrics for measuring daylight levels will be explored and put into context of building performance rating system frameworks. Students will learn how daylight analysis software can be utilized in conjunction with parametric analysis integrated to shape the architectural response.

Case studies of integrated daylight design processes from professional practice will be shown; project examples will come from various climates and project typologies. Students will be able to choose a standalone daylight project or complement their studio design work with daylight analysis to inform design choices.

BUILDING THE ENGINE:
Industry + The African Urban Agenda

Fatou Dieye



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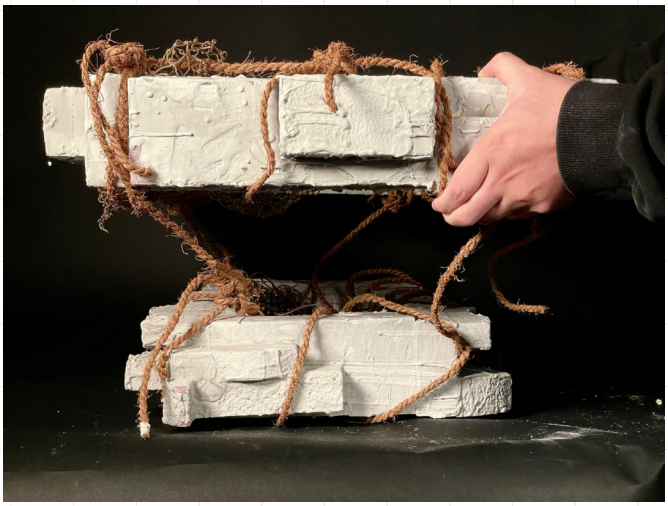
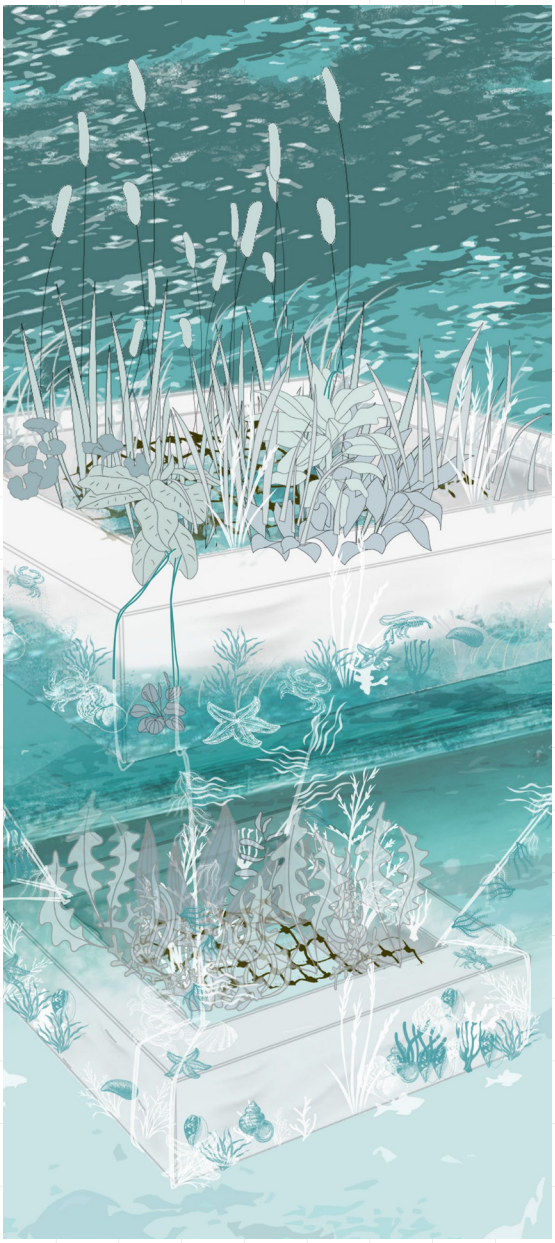
SEED BOMBS: *Technologies in Landscape Design*

Emily Bauer





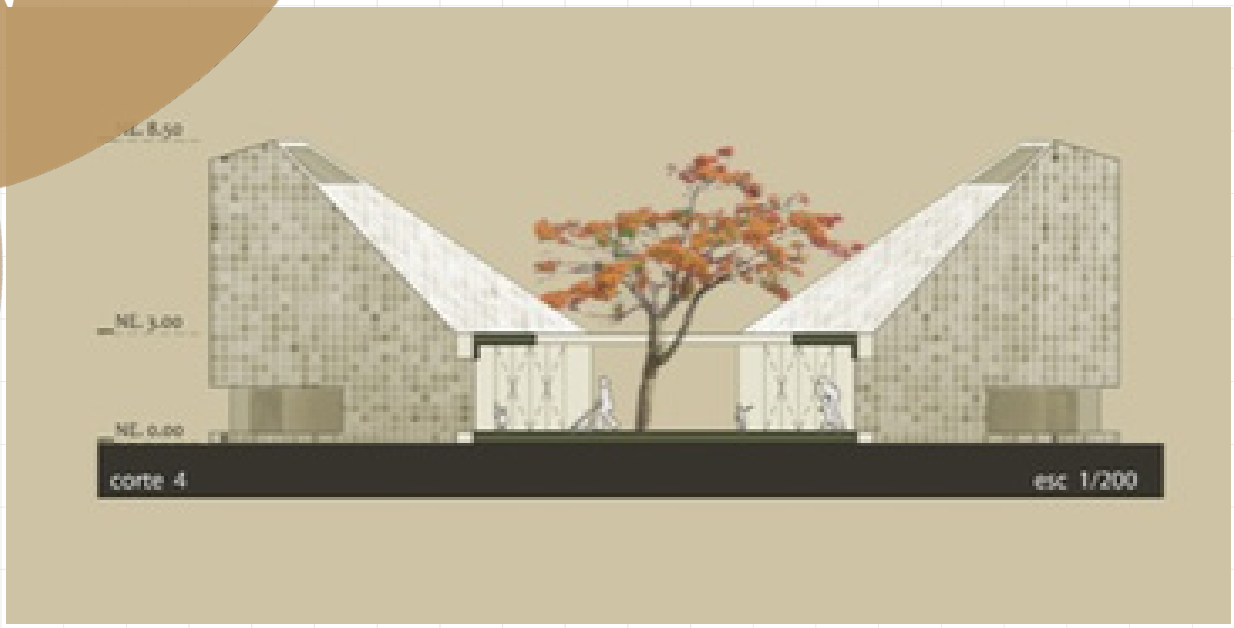
Ecosystems are central to the design and functionality of our built structures and communities. This course will immerse students in the symbiotic relationship between built environments and ecosystems, delving into their technological underpinnings and the systems they uphold. Spanning from intricate design details to overarching urban systems, our exploration will culminate with participants hands-on fabricated installations being tested in the NYC harbor.
Ecological design's foundational concepts, multifaceted characteristics, contemporary metrics, and cutting-edge practices will be brought to the forefront through class-based and hands-on learning.

As we progress through dimensions of ecological design, students will be introduced to the transformative potential of floating landscape typologies. These typologies are not just design elements but are active performers, enhancing water quality, rejuvenating native ecologies, and elevating community well-being. To anchor theoretical knowledge, students will conceptualize and actualize a floating marine landscape, testing and installing it at NYC's Red Hook waterfront.

This tactile experience will be enriched by continuous collaboration with the RETI Center, a local nonprofit, to assess the ecological impact of the interventions.
The course seeks to cultivate a deeper understanding of how urban environments are harmonizing nature with technological and structural innovations, producing a new era of hybrid ecological systems. Through this journey, students will be equipped with the tools and insights to navigate, assess, and shape these emerging urban landscapes.

DESIGNING SPACES FOR CHILDREN

Anna Knoell



This course will examine material selection and assemblies in the design of spaces specifically dedicated to the growth and development of children. Through discussion, case studies, and group research and fabrication, the objective of the course is to develop an understanding about the way material decisions affect the interior and exterior environments where children learn and grow--ranging from childcare facilities and classrooms to playgrounds to more specialized spaces such as libraries and child-centered exhibitions.

How can building materials, particularly healthier and more sustainable materials, affect a child's experience of a space and their cognitive and physical development? How can these materials be assembled to engage with children's sense of curiosity and tactile exploration while balancing issues of health, safety and care? How can they intersect with and enhance the various philosophies of early childhood education?

We will engage in investigation and critique of a range of materials from the conventional (and often petrochemical-based) to earth-based materials, and composites in between.

HOME IS WHERE THE TOXICS ARE

Marta H. Wisniewska

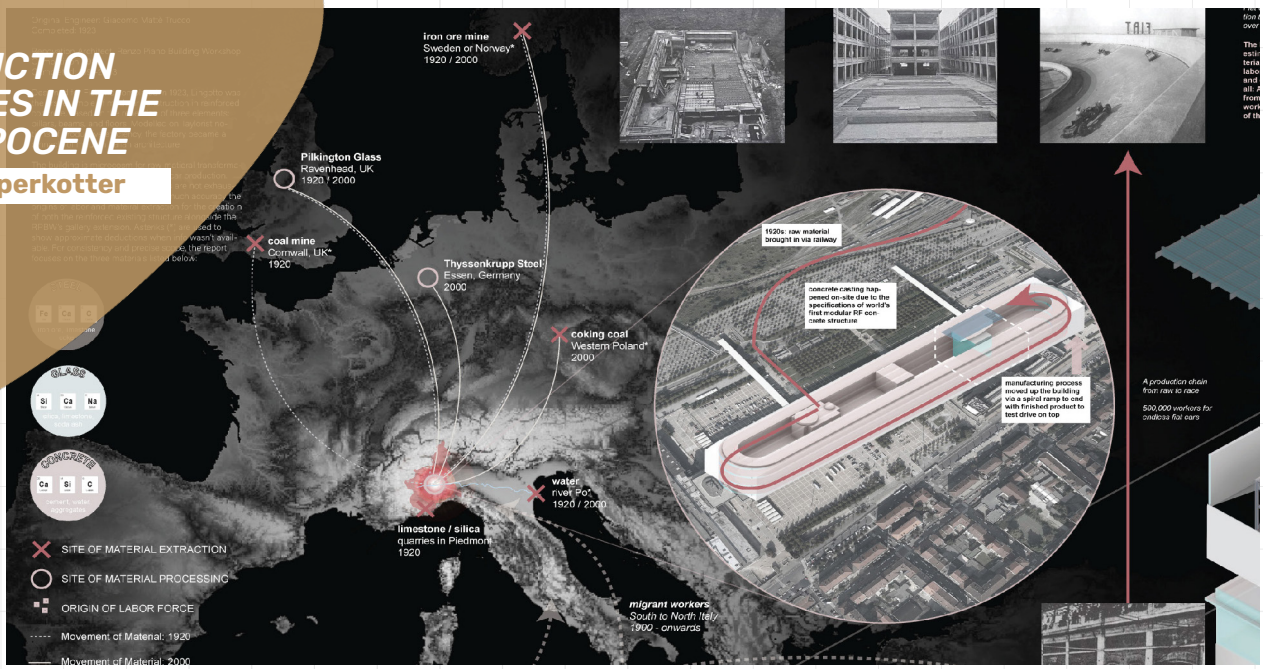
Environmental degradation, dwindling resources, housing shortages: the planet is facing enormous challenges. Driven by a growing global understanding for the necessity of alternative material and solutions, thousands of material industry startups launch every year offering potentially novel ideas for architects, designers, and engineers to redefine the way we design, build and live. This seminar is engaging with this fantastic world of materials.

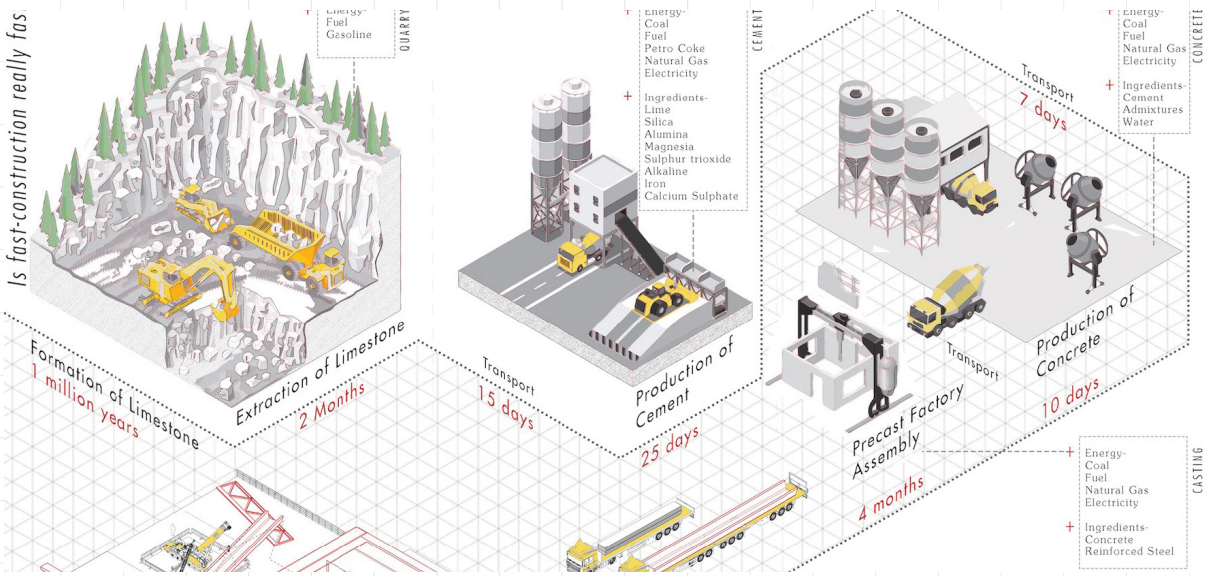
We will kick off the semester by investigating a global or local environmental and societal issues associated with a specific material's application or production. The goal of the investigation is to formulate a clear design problem connected to the overconsumption of mineral or fossil fuel-based resources in the current linear economy. Informed by research, group discussions, readings and input lectures, students will develop a thorough understanding of materials' composition, production and local application, as well as their associated global issues. Inspired by the wide range of smart, carbon-free, regenerative, healthy, circular, durable and/or affordable alternatives, the seminar will address the stated design problem through material research and product design. Students will investigate and trial questions such as how to produce materials and determine their specifications, how to evaluative their ongoing development within the bigger context, and how to integrate the findings into design projects. The majority of the semester will be dedicated to hands-on experimentations, connecting to (local) resources and designing a low-tech production processes. One of the seminar's outcome will be a collective database of material samples and datasets. Moreover, each student will develop an individual response to the initial challenge through the design of an (architectural) product utilizing and celebrating the developed material.

This elective calls for very motivated participants, manually and digitally well-versed, with strong interest in novel materials and sustainable circular architecture.

CONSTRUCTION ECOLOGIES IN THE ANTHROPOCENE

Tommy Schaperkotter





How should designers understand both their complicities and their capabilities in the complex and contested present? Is it possible to reconsider our disciplinary roles and remake our processes within a climatically relevant time frame? How might we envision a world worthy of the matter and energy borrowed from it? This course navigates histories, theories, technics, and ecologies of design and construction while seeking myriad opportunities for revitalized architectural enchantment commensurate with the existential narratives of the Anthropocene.

Contemporary architectural documentation of built environments amidst anthropogenic climate change is entangled by rifts between human determination and technological determinism stemming from the scale and severity of the environmental harm caused by design professions, and concurrent appeals for sustainable transformation requested of them. This entanglement of practices and pedagogies is engendered by a prevailing perception of buildings as autonomous objects whose a priori form-making obscures their terrestrial substrates of matter, energy, and labor that acts of design and construction presuppose but seldom engage.

To challenge the illusion of architectural autonomy this course provokes acts of storytelling and image-making that unearth hidden narratives of historical and contemporary case studies through thematic inquiries of energy, emergy, matter, materials, carbon, capital, care, repair, labor, production, value, velocity, space, and time. Such narratives, inspired by the idea of geostory from Bruno Latour, elucidate the spatial and temporal boundaries of architectural practice and enable designers to question and perceive anew buildings and building as inherently open, socio-ecological processes. Ultimately, this course asks students to pose questions about how and why built environments appear and disappear from the world, which people and places touch and are touched by their construction practices, and how the lives of those people and the crust of the earth are changed in the process.

SPRING 2024

Course Catalogue

Academic Year

2023-2024

EQUITY/HEALTH

DESIGN BUILD

CLIMATE/ENERGY

HIGH-TECH/LOW-TECH

TECH III Structures
Zak Kostura

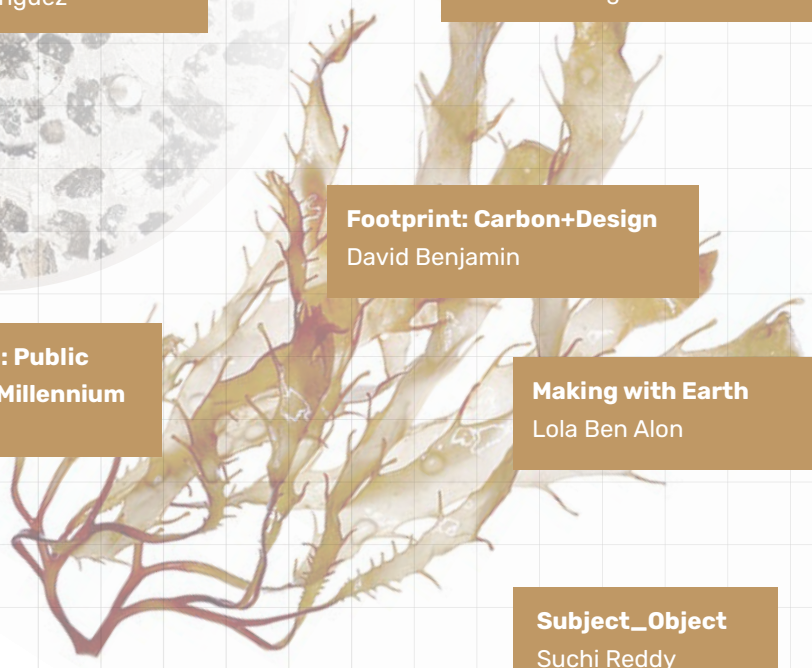
The Outside In Project
Galia Solomonoff

TECH V Construction + Life Cycles
Lola Ben Alon

1:1 Crafting and Fabrication of Details
Zachary Mulitauaopele

Low Tech Parametrics Disaster Responses: Prototyping Resilience
Danniely Staback Rodriguez

Other Natures: Human/ Non-human Relations
Michael Wang



Footprint: Carbon+Design
David Benjamin

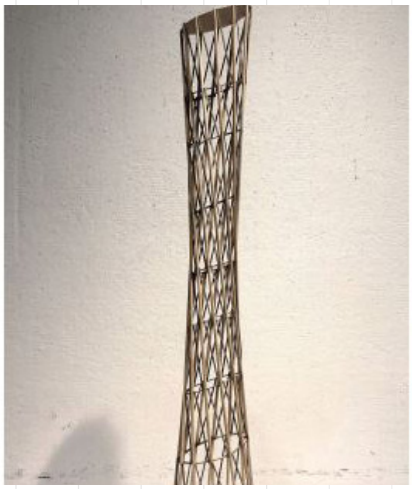
Emerging Optimism: Public Space in the Urban Millennium
Sean Gallagher

Making with Earth
Lola Ben Alon

Subject_Object
Suchi Reddy

TECH II: STRUCTURES

Zak Kostura



Some of the most prolific architectural works of the post-renaissance era have resulted from great architects and engineers working closely at every stage of the design process. These fruitful relationships demonstrate that the division of responsibilities once held solely by the majester operis into a wide array of technical disciplines – often led by the modern architect – has not hindered the viability of delivering a holistic end product. In fact, it has offered an opportunity to preserve harmony between innumerable aspects of design, planning and construction, while emboldening us with the capacity to embrace rapidly emerging technologies that promise to enhance our design process and built environment.

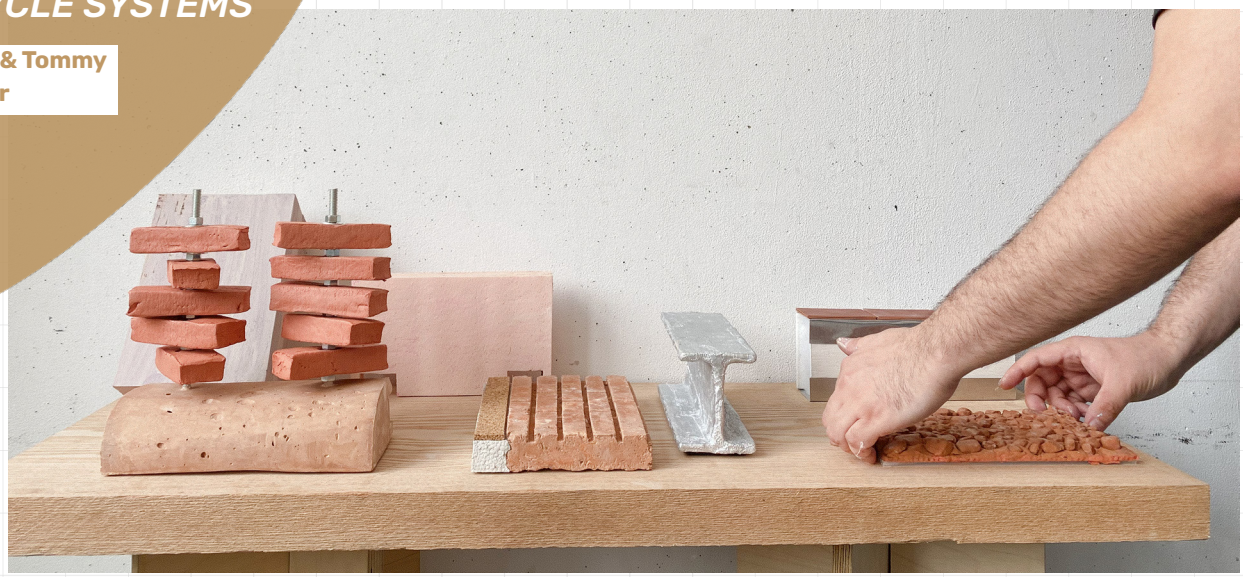
This class will provide students with an understanding of what "structural design" means, and how it is carried out. Students will gain familiarity with basic elemental forms, structural assemblies and systems, and new and emerging materials. Through project-based and hands-on work, we will work together to gain an intuitive understanding of structure, empowering students to integrate into architectural concepts a level of structural coherence and technical inspiration that allows load resisting systems to both perform and intensify the spatial experience.

The design of structure requires intimate knowledge of the principles and precedents of the assembly, as well as unique construction considerations and the analytical techniques used to validate its performance. An analysis of these aspects will confirm that these assemblies exist not only because of their compelling form, but likewise as a result of the ability of early designers to prove that they can be built using conventional construction techniques at reasonable cost, and perform adequately throughout their useful lifetimes despite their unique and unusual configuration.

Students will gain a holistic understanding of these essential characteristics through group-based research and design projects. Groups will select an existing assembly, which they will explore through four class modules: principles and precedents, analysis, construction, and innovation. Each group will prepare and deliver a presentation for the class at the end of each module.

TECH V: CONSTRUCTION & LIFE CYCLE SYSTEMS

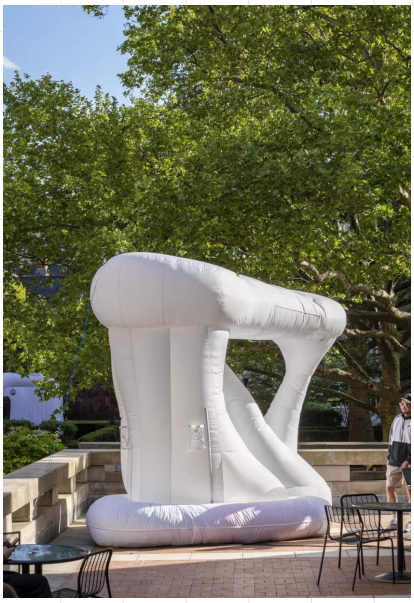
Lola Ben Alon & Tommy Schaperkotter



This class will follow an analytical approach of dissection to gain an in depth understanding of select building conditions. Through dissection of building conditions students will gain a comprehensive understanding of material geographies, the environmental and social life cycles, cost analysis, interrelationships, construction sequencing, and project management. Students will use their studio project as developed within Revit in Tech 3+4 to produce a supply chain and life cycle assessment, followed by construction shop drawings. As a final deliverable, students produce a physical mock of a selected detail, while making sensitive choices on the materials, and fabrication for assembly/disassembly. The course will be divided into three modules. During the first module, students working in assigned groups will develop a triple bottom line analysis of their model with Lola Ben-Alon During the second module, students will create a chunk model drawing and a physical three-dimensional printed model that will document the components and sequencing of one of the predefined building conditions, with Anna Knoell. During the third module, students will include aspect of project management, informed by a construction site visit and a project management workshop with Aaron Campbell. Group assignments and predefined building condition will be assigned directly following class 1 and would ideally continue the team work assigned in Tech 3 and Tech 4. The final review will consist of presentation of physical three-dimensional digitally/manually fabricated models and further developed analysis and chunk model drawing of the assigned condition and evolution.

THE OUTSIDE IN PROJECT

Galia Solmonoff



The Outside in Project Seminar is an initiative by the Graduate School of Architecture Planning and Preservation (GSAPP) to research, test for design, and build a sustainable temporary pavilion to be erected by the students in the Spring semester of 2024. This year aims to expand the focus of the next iteration to the use of innovative and sustainable technologies and bio-based/upcycled construction materials. The elective Seminar's focus will be to research bio-based and upcycled materials for the upcoming iteration of this class. Students will investigate, document, design, engineer, and build mock-ups of a temporary pavilion that could be used as a charging station. This seminar includes design, hands-on building, budgeting, and calculations for the engineering components such as structure and wind load safety, solar power, and environmental impact. Just like in practice, we will be consulting with structural, electrical, and solar engineers throughout the semester to ensure the design's compliance with the New York Building Code and Columbia University regulations.

The seminar instructors, Laurie Hawkinson and Galia Solomonoff will be supported with consulting engineers, including Hubert Chang from Silman Structural Engineers. The seminar will begin by researching bio-based and upcycled materials, fabrication processes and precedents for temporary pavilions, then progress into the design, feasibility study, structural review, project management, budget management, and construction of mock-ups.

CRAFTING AND FABRICATION OF DETAILS

Zachary Mulitauaopele

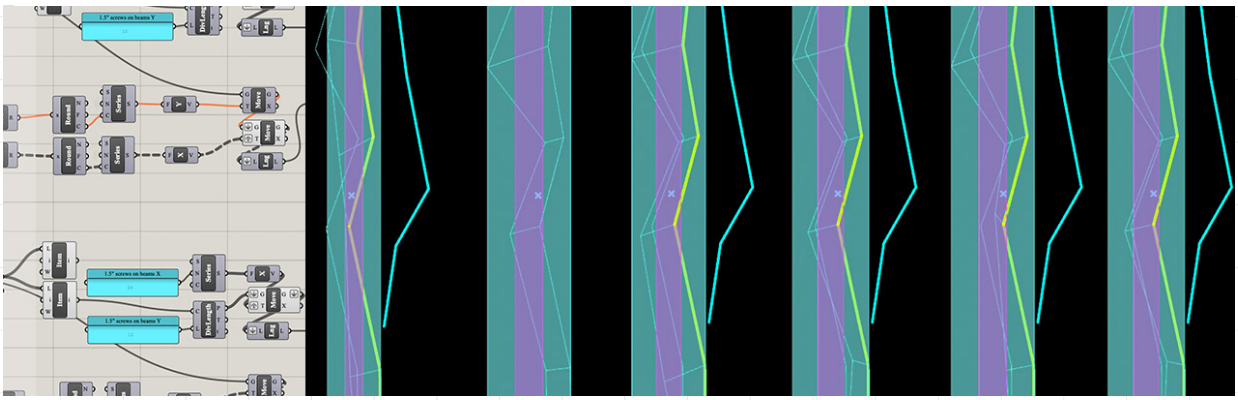
Daniel Chang Julie Kim Cecile Kim, Maria Ramire z& Dhruva Lakshminarayana

As digital fabrication processes continue to advance, our comprehension and command of these construction methodologies is critical in capturing the full potential they off er to the built environment and how we design. 1:1 will focus on advanced detailing, fabrication, and assembly techniques. We will challenge the conventional illustrative mode of architectural detailing by using 1:1 material exploration to facilitate design ideation and spatial speculation. The course encourages curious fabrication, rogue detailing and imaginative research into new potentials for building assemblies.

Participants will iteratively build a totem, a remixed and on the fl y response to the default wall mock-up. Shifting through scales of a building, we will track the spatial and technical trajectory of detailing custom hardware, new wall typologies, structural abnormalities and fully customized building skins. The course will oscillate between detailing and fabricating these spatial constructs, always building off of the previous week's iteration to facilitate new and unimagined component adjacencies. The totem, which should be thought of as a living prototype, should fill a 2'x2'x5' volume and will incorporate lateral connection requirements provided by the instructor. The final totem assemblies will be connected to form an 8'x8' mini pavilion and even further the unforeseen spatial relationships.

LOW TECH PARAMETRIC DISASTER RESPONSES: *PROTOTYPING RESILIENCE*

Danielly Staback Rodriguez



The CAD revolutions of the 80's and 90's made it cheaper and faster for architects to conceive of and realize complex architectural forms. Digital design then turned its attention to mass customization and, through the domestication of parts, cheaper materials, ever-more-powerful PCs, and CNC fabrication, it promised clients unique and smooth objects, and it promised architects complete control, from design to execution. Though not without cutting/simplifying design jobs, material costs, and assembly labor.

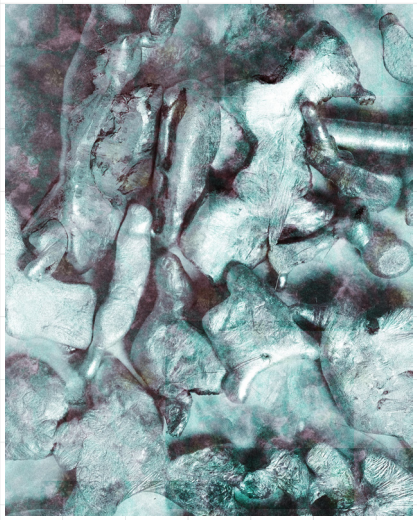
In addition to the obvious shortcomings of each era, computational design has become synonymous with a particular aesthetic and a particular kind of project, alienating the technology itself, along with architects, from the rest of the world– wasting its potential to contribute to society's biggest challenges, and to invert our culture of making from one of few to one of many. This course invites students to channel the potentials of computational tools by shifting our attention: from the outcome, to the process; from final form, to the interactions of agents; from the precision, to the tolerance; from the constraints, to the variables; from authorship, to shared meaning– and to welcome that uncertainty as an asset.

The term Generative (1) for this course refers to the open-ended, undetermined nature of the design that students should embrace from day one, challenging the normative top-down design ethos that has dominated architecture at large, and digital fabrication as a sub-culture of architecture. The term Distributed (2) means spread out, divided among the several or the many.

Through four fast-paced exercises, the course will prompt students to investigate and respond to exterior wall types, and to understand them as proto-architectures or archetypes, not explicitly concerned with program, volume, enclosure, users, etc. These will help establish a focused dialogue of transformation and parametrization, using Rhino and Grasshopper as our main tools for the development of processes, and employing physical prototyping to gain process feedback. Students will then embed their own design "values" and metrics of evaluation and performance, spanning between the practical and ideological. This computational process will slowly evolve to admit external variables, loops, and uncertainties that will be simulated, prototyped, and documented in parallel.

OTHER NATURES: HUMAN/NON-HUMAN RELATIONS

Michael Wang



A distinction between animate and inanimate matter pervades so-called Western thought since at least Aristostle's De Anima. In this course, we will question this persistent dividing line and uncover new linkages between the quick and the dead, using metabolic processes as both metaphor and mechanism for the transformation of matter. Our methods will borrow from and work through scientific discourses, industry-specific expertise, animal studies, indigenous knowledges, queer theory and critical race theory. Artistic practice, understood broadly, will offer case studies for making new material perspectives visible or sensible.

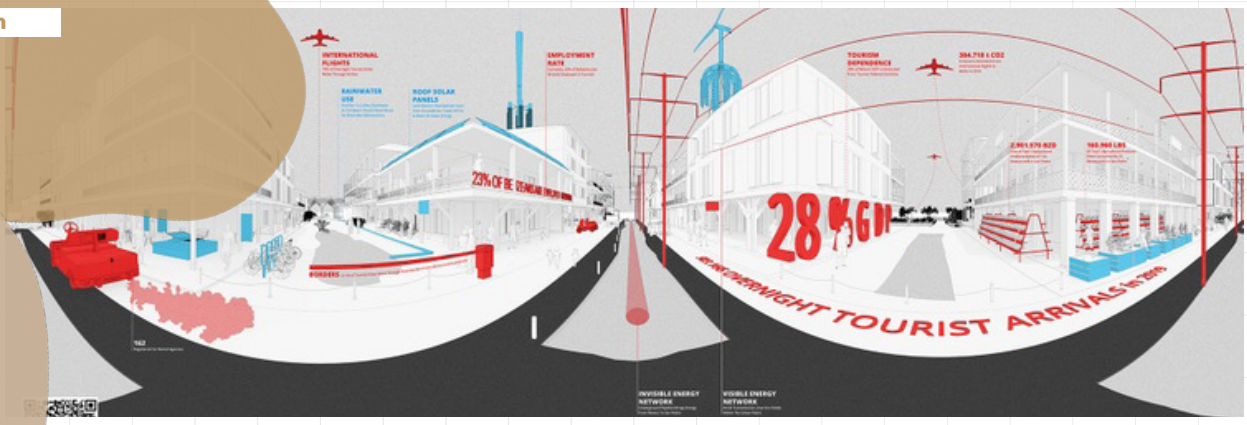
Crucially, we will understand material transformations as organized across ecological, economic, and political matrices. Students will explore the meaning of materials and their transformations: their origins, sourcing and extraction, networks of exchange, and the impacts of these networks on human and non-human lifeworlds. Together, we will examine how artistic or architectural uses of materials can mask or reveal these processes.

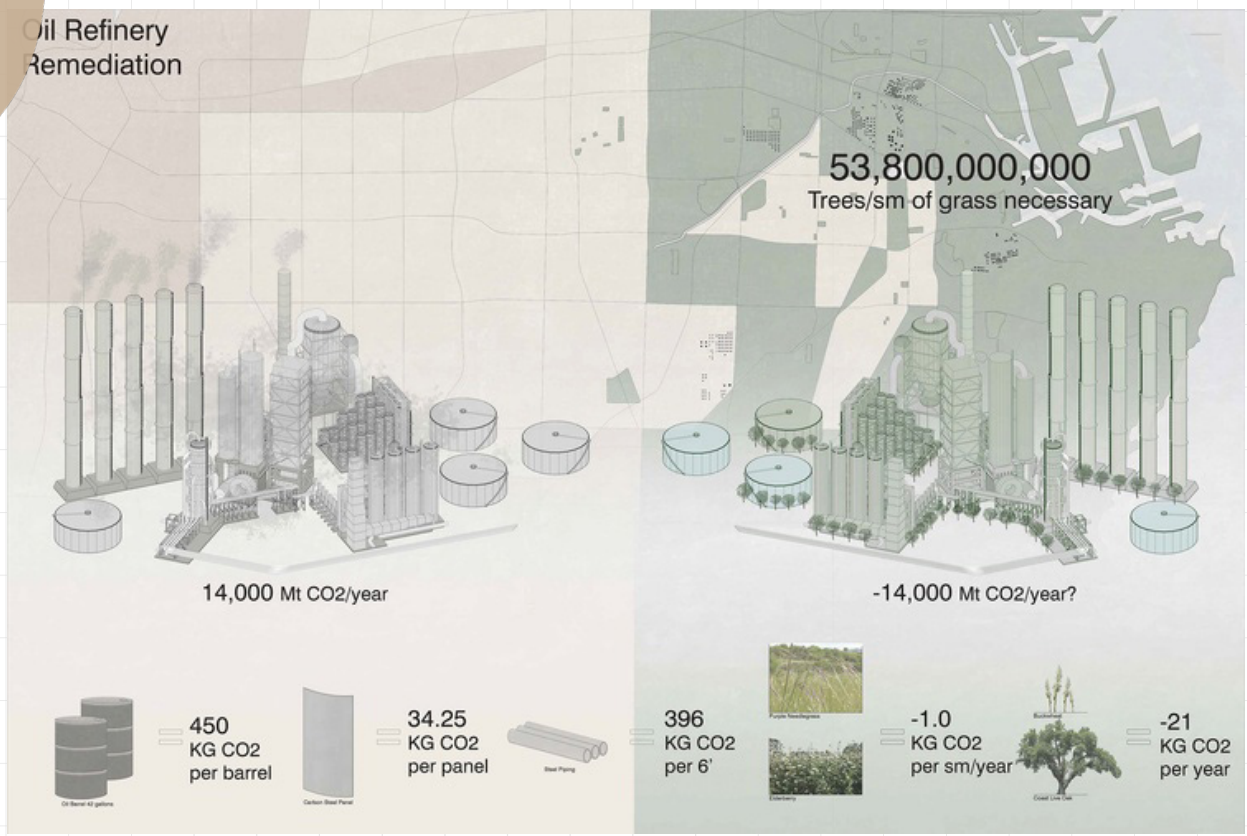
Working singly or in pairs, students will pick a single material to explore over the course of the semester. Through a series of analyses, students will question the apparent singularity of their chosen material and explore its possible links to both animate and inanimate matter. They will look to the conditions of its formation and processing, and, importantly, its potential role in energy systems and flows. These analyses will span the global (even extra-planetary) and the microscopic, geologic time (the relationship between iron ore deposits and Precambrian photosynthesis, for example) and fleeting, daily rhythms (the role of blood iron in cellular respiration, to continue this material example).

This background research will lay the groundwork for determining possible avenues for modifying or intervening in the industrially-normative production and use of their chosen material. Each project will culminate in a critical object or gesture that calls attention to unseen processes of transformation, linkages between apparently inanimate and animate matter. Students will be encouraged to work at a one-to-one scale, and to find methods for foregrounding the material itself (or those human or nonhuman actors it impacts) as a key element in their final work. The works will seek to reveal materials as ambiguous actors, intermediaries that move between the organic and the inorganic.

FOOTPRINT: CARBON & DESIGN

David Benjamin

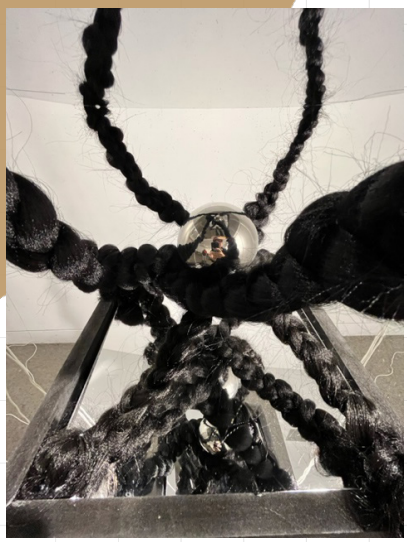


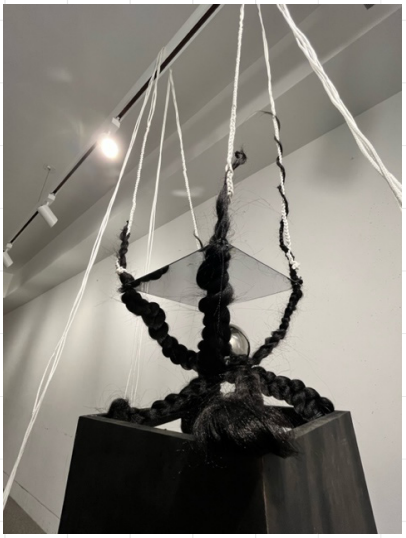


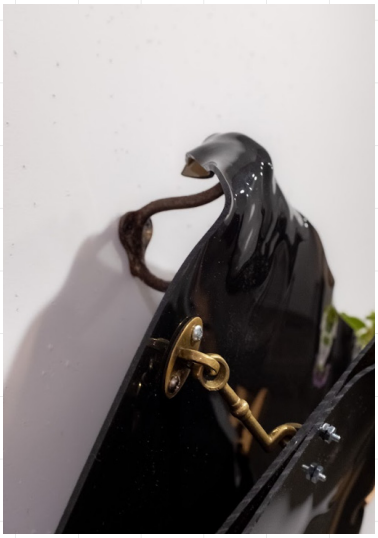
In the context of the climate crisis, there has never been a more important moment to think clearly and critically about the footprint of architecture. Carbon footprint is the most famous—and most urgent—impact of buildings, but it is interconnected with other footprints such as energy, water, labor, fairness, and biodiversity. Each footprint links individual design decisions to global consequences. This seminar and workshop will conduct research into carbon accounting, examine the history and relationships between various systems of environmental measurement, invent new forms of visualizing the footprint of architecture, and develop strategies for designing low-carbon buildings and cities. This course will explore carbon and design through the dual formats of seminar and workshop. The seminar format will involve a close study of the history of environmental measurement, and it will include guest presentations by leading figures on the topic of carbon footprint in architecture. Students will review case studies and engage in critical analysis of concepts and applications. They will gain experience measuring the carbon footprint of architecture, and at the same time they will explore the complexities of designing with this kind of metric. They will engage related issues such as labor, social equity, environmental justice, biodiversity, and species extinction. And they will develop a position about designing the footprint of architecture, rather than merely measuring it. Each student will select an individual topic, make a presentation to the class, and lead a group discussion. The workshop format will involve hands-on design. Students will develop a project that involves designing in the context of architectural footprints. (Using a project from your design studio is encouraged.) Low-carbon strategies to be investigated may include material selection, lifecycle analysis, building codes and government regulation, alternative business models, renovation and adaptive reuse, and design for disassembly.

SUBJECT OBJECT

Suchi Reddy





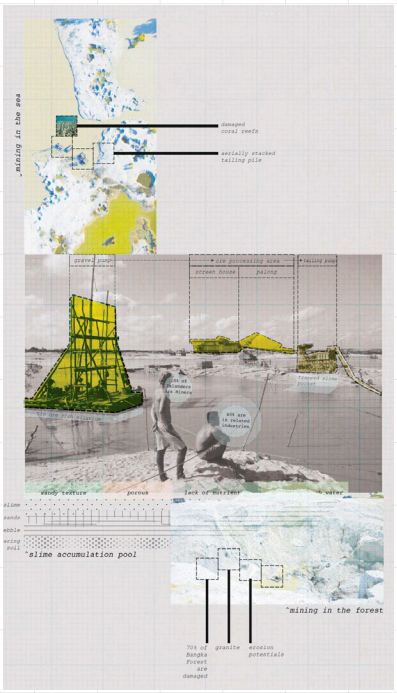


SUBJECT_OBJECT will explore the tectonic and poetic potential of materials to express the histories and futures of disparate found objects/ agents/environments by creating a new object through fabrication methodologies that are new, site specific and sustainable Amplifying the latent sensory and emotional power of materiality will be a focus of the course. The course will encourage research into sculptural fabrication techniques and will progress from documentation and ideation through design and detailing to fabrication of the newly found object. Connective fabrication typologies will be explored to express unexploited adjacencies and create a new unified form, based on the materials identified by each participant.

The neurasthenic effects of material assemblies will underpin all discussions. The course will be designed as a combination of lectures , guest lectures and site visits that explore artistic and sculptural practices that highlight fabrication as a poetic and intellectual process. Each week we will review a fabrication technique through a sculptural installation, its associated materials, and their properties. We will visit 3 fabrication studios around the city to learn about multi modal fabrication possibilities including digital fabrication techniques. Students will be asked to present documentation of sites and objects chosen through writing, drawing , and detail studies, followed by a presentation of connective strategies considered along with examples of precedents Design of the connective tissue creating the newly-found object, will be explored and discussed in drawings , including 2d and 3d detail drawings , models and prototypes. The fabrication process will be documented either as video or as a text. Exploring the logic of difference and unity through material connection, the resulting works will be assembled for exhibition.

EMERGING OPTIMISM: *PUBLIC SPACE IN THE URBAN MILLENNIUM*

Sean Gallagher



Industrialism changed human civilization and the surface of the Earth in unimaginable ways. While it has exponentially increased human awareness and prosperity, its has initiated the Earth's 6th Great Extinction Era. It's both promising and terrifying. So what is next? That is unclear. But one thing is for certain, a transformed industrial ecosystem will need to be at the center of any solution where human civilization as we understand it today survives this mass extinction event.

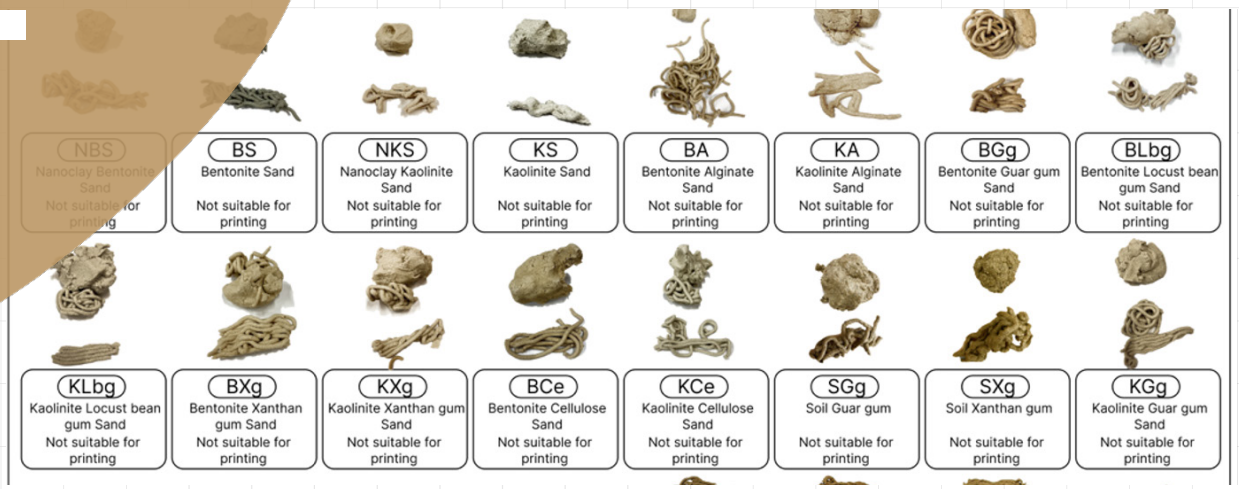
In light of this reality, this course examines past, present and future strategies of meeting the growing resources and infrastructural demands of human civilization. The goal is to expose students to the Fourth Industrial Revolution and emerging relationships between people, industry, and ecology that have the potential to define how human civilization can thrive globally within the planet's biospheric constraints.

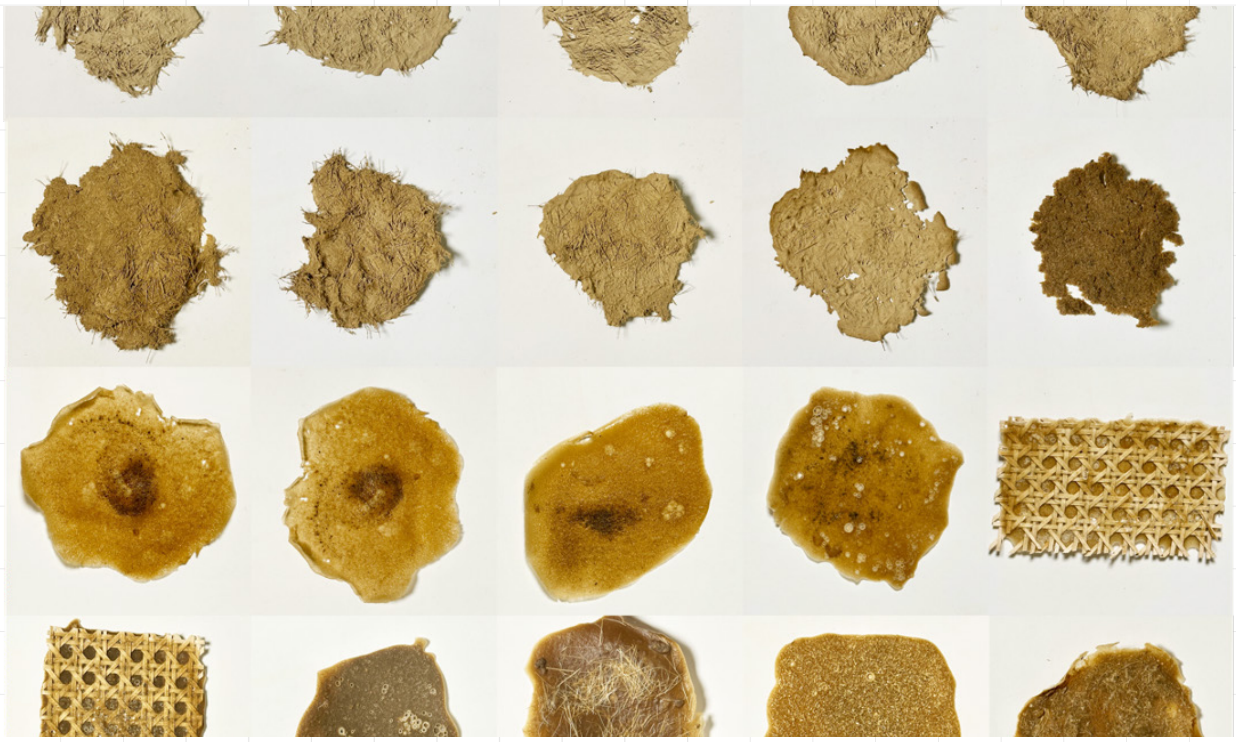
Through lectures, field explorations, and self-directed research, each student will gain a broad understanding of the means and methods that industrialized communities use to support societal needs. During the semester, the class will visit both industrial and post industrial sites of material extraction, refinement, production, distribution, and sequestration. Students produce writings and drawings analyzing and re-imagining the potential futures of global industrialized structures and networks.

The course is structured as a think-tank and students are encouraged to use their personal interests to identify unlikely industrial relationships between community, environment, and industry. On a broader level, this course is designed to be a means for each student to develop a personal manifesto for how urban designers and architects can influence the necessary change in how we structure global habitation.

MAKING WITH EARTH

Lola Ben Alon





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