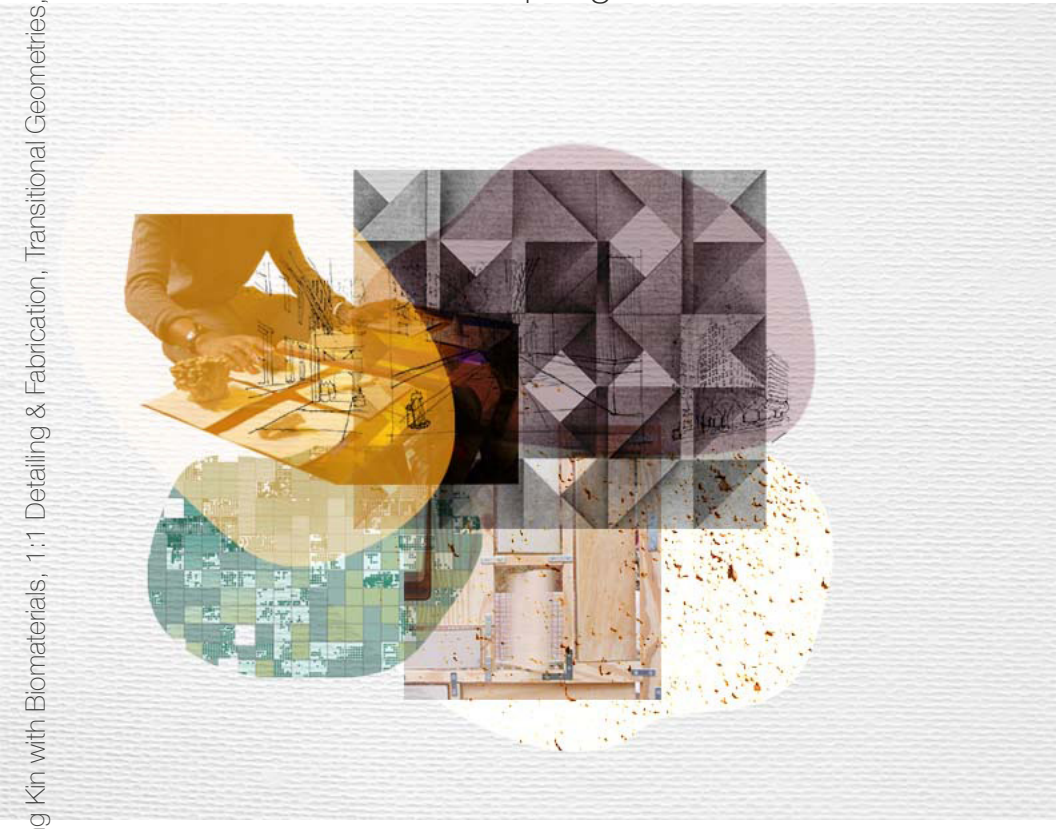
BUILDING TECH

TECHNOLOGY | ECOLOGY | CLIMATE | HEALTH

Course Catalogue
Fall 2022 / Spring 2023



Images from: Making Kin with Biomaterials, 1:1 Detailing & Fabrication, Transitional Geometries, TECH III

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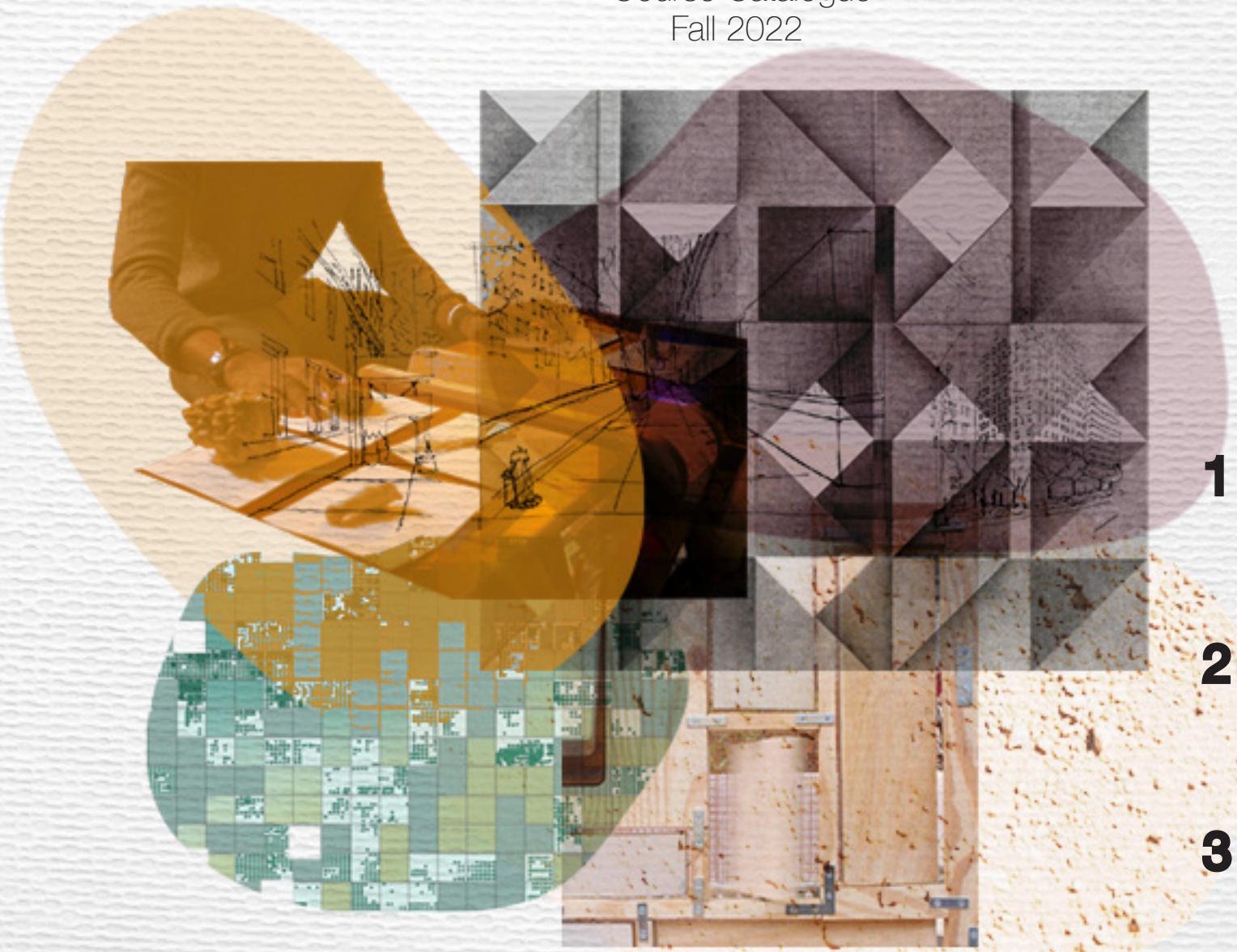
BUILDING TECH

TECHNOLOGY | ECOLOGY | CLIMATE | HEALTH

Course Catalogue
Fall 2022



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Images from: Making Kin with Biomaterials, 1:1 Detailing & Fabrication, Transitional Geometries, TECH III

Lola Ben-Alon

Assistant Professor
Director, 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 may condition design, and the lives of those who practice it and works behind the scenes for it. 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 global challenges of social and environmental equity that arise from resource scarcity and public health emergencies, the Building Tech sequence takes a strong position to forward novel approaches to making buildings more resource-aware, comfortable (dare we say, pleasurable?), and available for all.

At the heart of this sequence are the required TECH I - TECH IV courses that take a new stance in threading technology, ecology, climate, and health considerations in existing buildings, integrating environmental, structural, mechanical, enclosure, and circulation systems through intense drawing and fabrication processes.

Additionally, an array of elective courses are curated as part of the sequence mission to create novel and radical experimental forms of building technologies, while celebrating the tactile interaction between humans, more-than-human species, materials, structures, and the built and natural environments. The Building Tech electives cover a range of topics, from landscape technologies and 1:1 fabrication of details, to healthy materials and supply chains of low-carbon and readily available assemblies. This course selection not only provides software tools for performance analysis and making practices, but also cultivates radical interventions to crafting new ways of understanding and imagining resource justice, anti-racist vernacular, construction slowness, recovery, and wellbeing.

With best wishes at the start of the semester,

Lola Ben-Alon
Assistant Professor
Director, TECH Sequence

Farm to Building
The Natural Materials Lab
Instructors: Tommy Schaperkotter, Lola Ben-Alon, Sami Akkach, Lorenz Kastner
Students: Zina Berrada, Fukunda Mbaru, Wenjing Xue, Shuyang Huang, Xiyu Li
Volunteers: Grace Schleck, Penmai Chongtoua, Lynnette Widder

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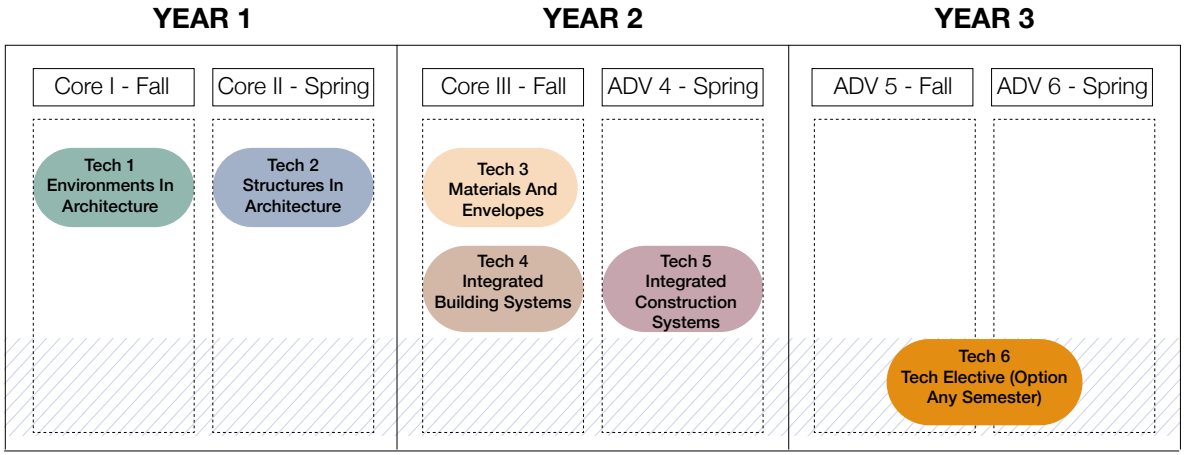
Core Tech Sequence Overview

NO WAIVERS

Core Tech Sequence - 18 Credit Hrs.
Required Classes:

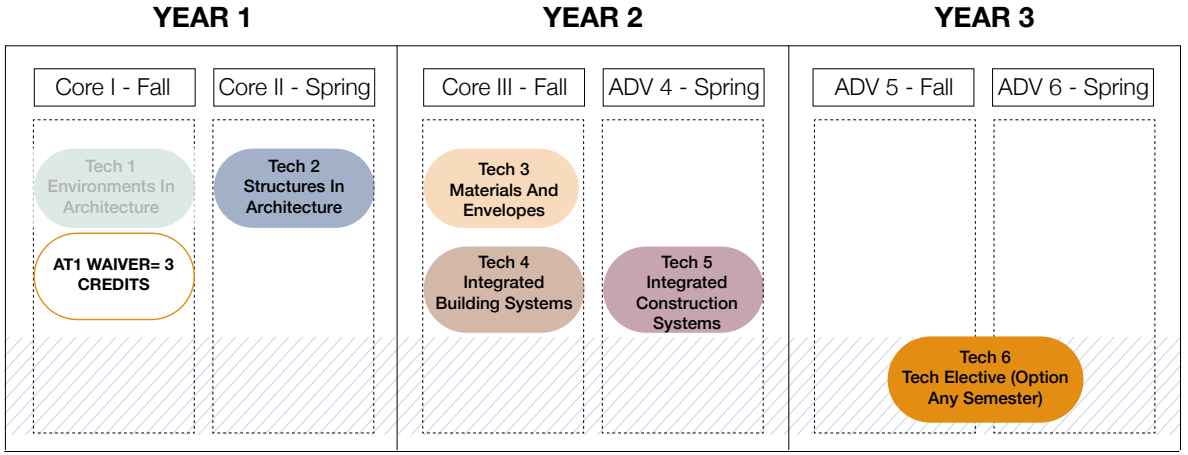
Tech 1-5 Required
Tech 6 Elective



TECH 1 ADVANCED STANDING

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

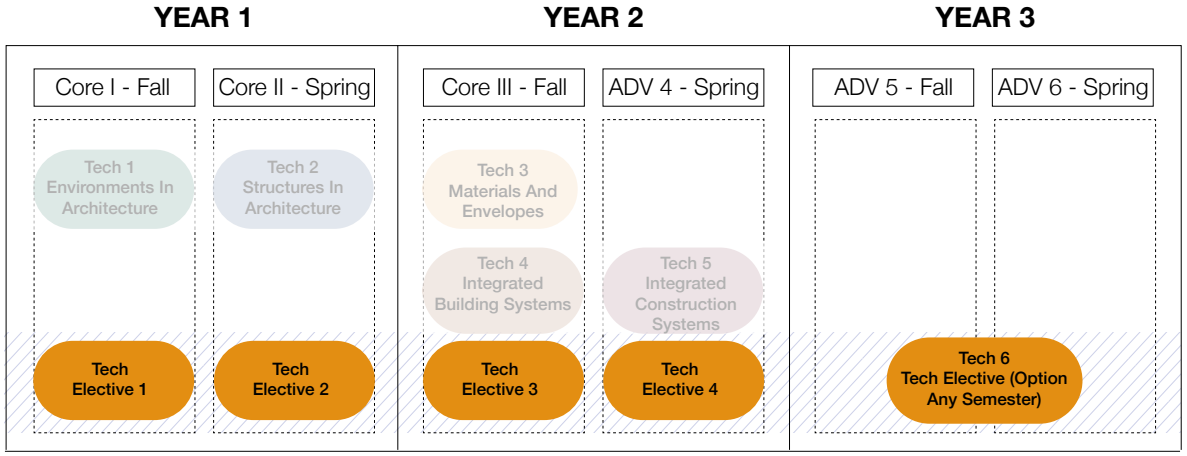
Tech 1 Advanced Standing gives you a 3 point credit.



TECH 2-5 WAIVED
OPTION TO WAIVE ANY TECH COURSE (TECH 2-5)

You can be granted with a Waiver if you provice evidence of two relevant courses.

For each Waiver granted, you need a subsitute Tech Elective.



Building Tech Course Listings - Fall 2022

Clim. Equ. Des. Lo/Hi VS UD HP

			Climate & Energy	Equity & Health	Design/ Build	Low-Tech/ High-Tech	Visual Studies	Urban Design	Historic Preservation
A4111	**Tech I, Environments In Arch.**	Lola Ben Alon	●	●		●			
A4113	**Tech III, Materials & Assemblies**	Gaby Brainard & Tom Reiner	●	●					
A4114	**Tech IV, Building Systems**	Berardo Matalucci	●	●	●	●			
A4856	**Transitional Geometries**	Josh Jordan			●	●			
A6892	**1:1 Detailing & Fabrication**	Zachary Mulitauaopele			●	●			
A6917	**Seed Bombs**	Emily Bauer	●			●		●	
A4776	**Man, Machine, and the Industrial Landscape**	Sean Gallagher	●	●					
A4625	**Tensile/Compression Surfaces in Architecture**	Robert Marino			●	●			
A4634	**Advanced Curtain Wall**	Daniel Vos	●						
A4635	**Architectural Daylighting**	Davidson Norris	●	●					
A6893	**Making Kin With Biomaterials**	Chris Woebken	●	●	●	●			
A6894	**Net Zero Housing**	Andreas Benzing	●						
A4715	**Re-Thinking Bim**	Joe Brennan				●	●		
A6768	**Architectural Metals**	Richard Pieper	●			●			●
A6784	**Brick, Terra Cotta, & Stone**	Norman R. Weiss & Daniel Allen	●			●			●

Building Tech Course Listings - Fall 2022

EQUITY/HEALTH

DESIGN/BUILD

CLIMATE/ENERGY

TECH 3, Materials And Assemblies
Gaby Brainard & Tom Reiner

Making Kin With Biomaterials
Chris Woebken

Transitional Geometries
Josh Jordan

Man, Machine, And The Industrial Landscape
Sean Gallagher

TECH 4, Building Systems
Berardo Matalucci

1:1 Detailing & Fabrication
Zachary Mulitauaopele

Seed Bombs
Emily Bauer

TECH 1, Environments In Architecture
Lola Ben Alon

Tensile/Compression Surfaces In Architecture
Robert Marino

Net Zero Housing
Andreas Benzing

Re-Thinking BIM
Joe Brennan

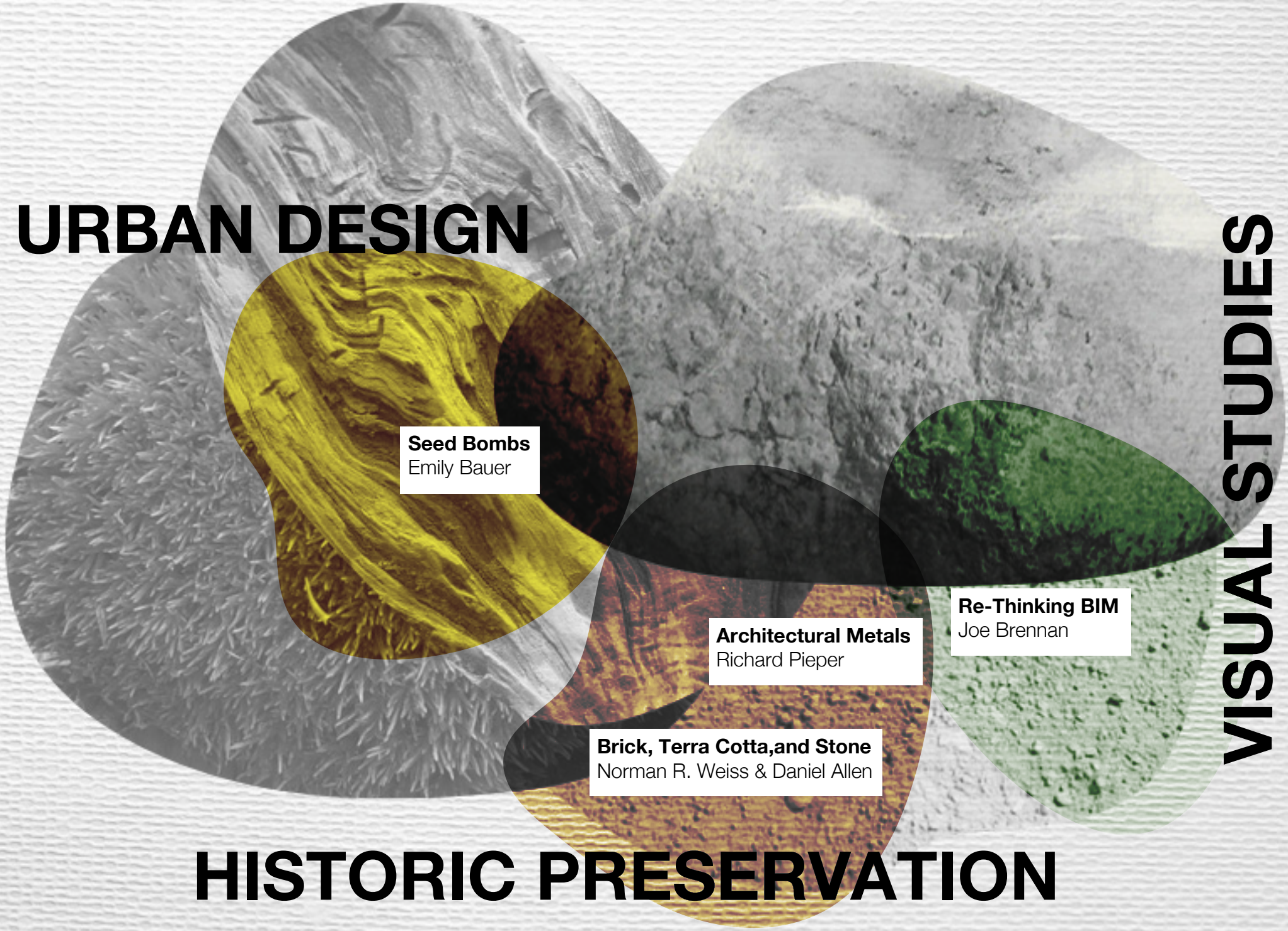
Architectural Daylighting
Davidson Norris

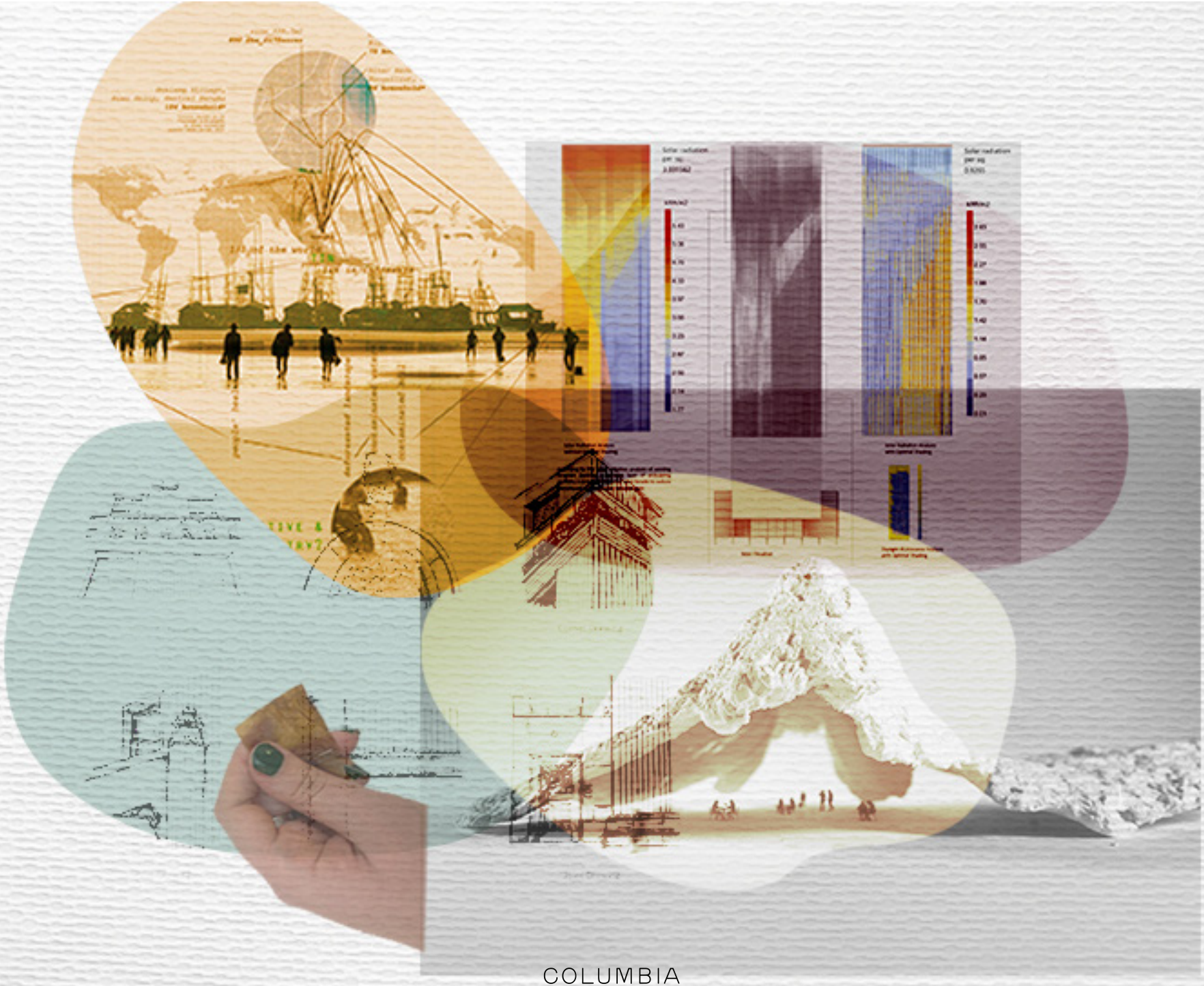
Architectural Metals
Richard Pieper

Advanced Curtain Wall
Daniel Vos

Brick, Terra Cotta,and Stone
Norman R. Weiss & Daniel Allen

HIGH-TECH/LOW-TECH


URBAN DESIGN
VISUAL STUDIES
Seed Bombs
Emily Bauer
Re-Thinking BIM
Joe Brennan
Architectural Metals
Richard Pieper
Brick, Terra Cotta,and Stone
Norman R. Weiss & Daniel Allen
HISTORIC PRESERVATION



Images from: Making Kin with Biomaterials, Tensile/Compression Surfaces, Net Zero Housing, Man, Machine, and the Industrial Landscape, Re-Thinking BIM

COLUMBIA
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Building Tech

Fall 2022 Courses

TECH 1: ENVIRONMENTS IN ARCHITECTURE

Lola Ben Alon

Clim. Equ. Lo/Hi

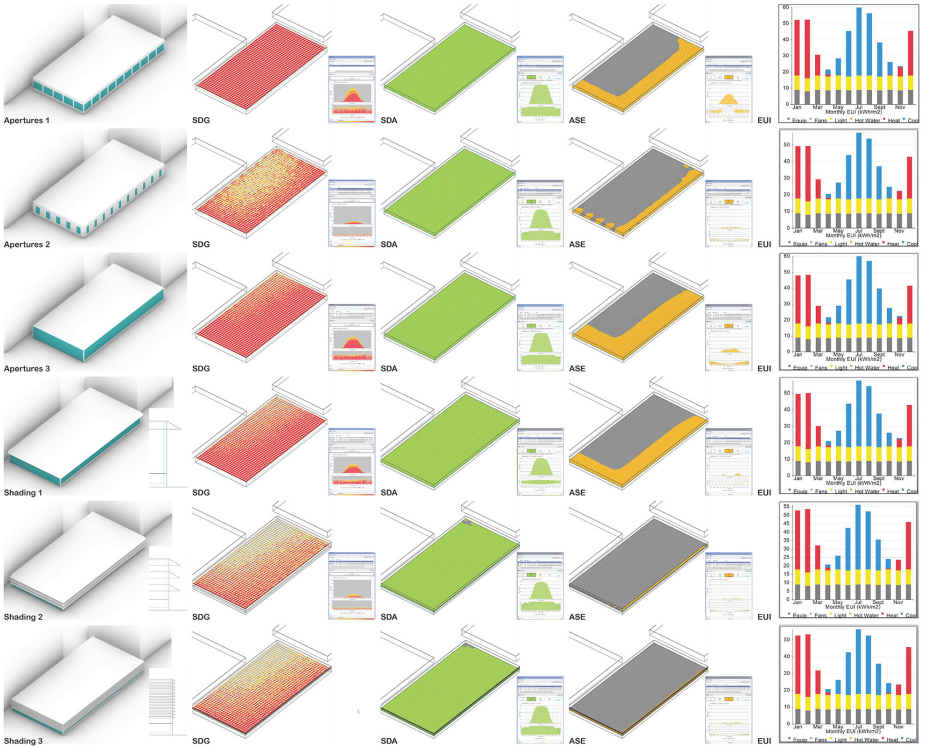
AT1 introduces building technology responses for energy conservation and natural conditioning, human comfort, and the site-specific dynamics of climate and environments. The state of the art in environmental design and passive heating and cooling technologies will be presented in lectures and supported by software tutorials, readings and assignments.

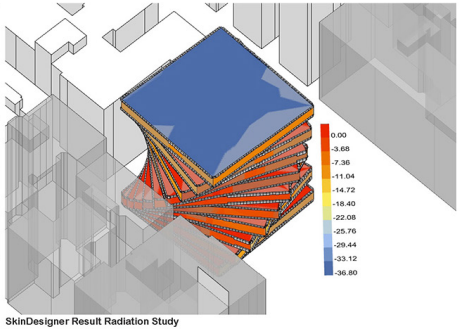
To illuminate the significance of architectural design decision-making on energy consumption and comfort, design specifications and modifications will be explored for a residential building. Students will be expected to integrate an understanding of the basic laws of comfort and heat flow with the variables 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 explorative 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.

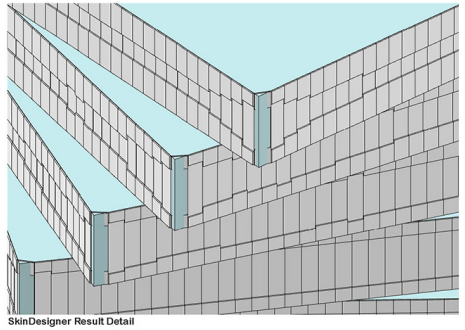
A4111 | Tech 1: Environments In Architecture
Location: Avery 114
Date & Time: Tuesday 9 AM -12 PM
Call No.: 12425

Student Work Samples
Gio Kim, Adam Fried, Ian Callender





SkinDesigner Result Radiation Study


SkinDesigner Result Detail

TECH 3: MATERIALS AND ASSEMBLIES

Gabrielle Brainard & Tom Reiner

Clim. Equ.

AT3: Materials and Assemblies 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.

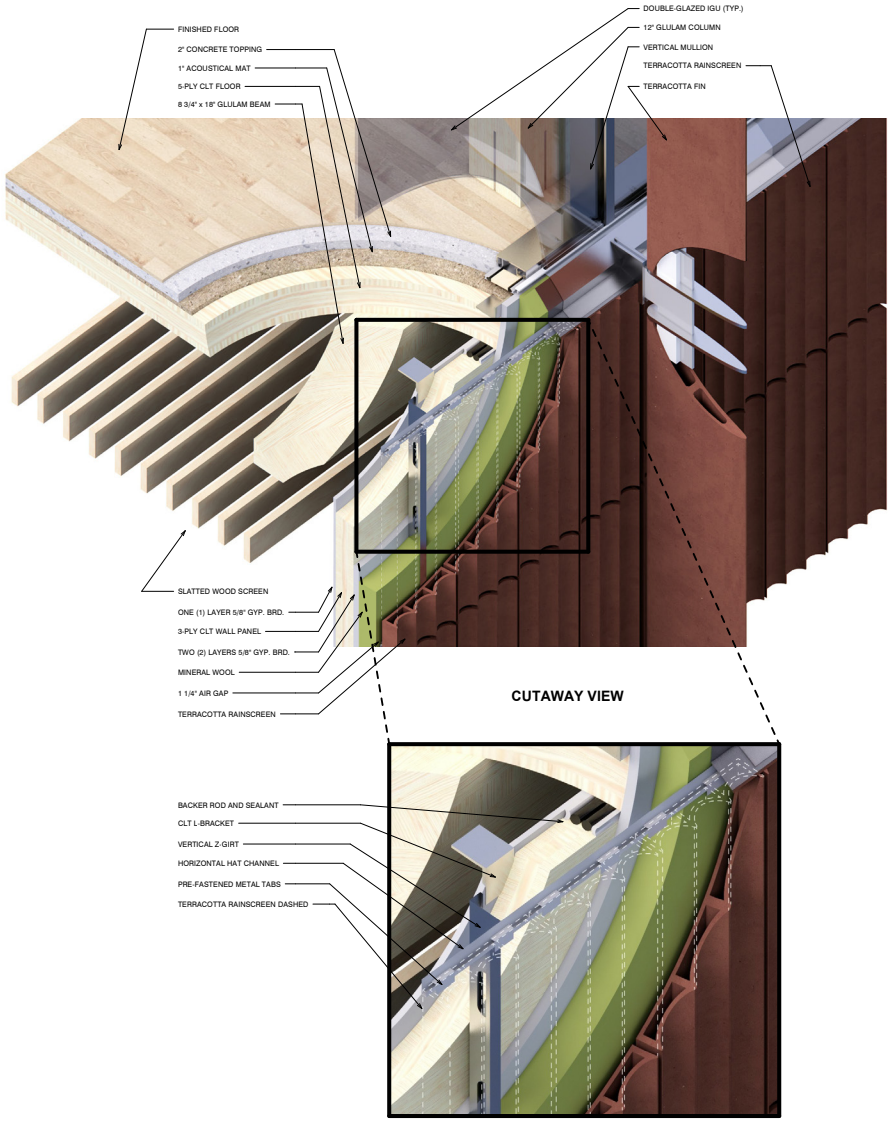
The first module focuses on structural systems and is taught by Thomas Reiner. The material is based on the structural concepts first introduced in AT2. This module covers structural design criteria, building structural design, and discusses common structural systems and materials. The students learn 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 group8-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 – Building Systems. Students are expected to apply the material covered in AT3 to the structural and envelope design of their AT4 projects.

A4113 | Tech 3: Materials & Assemblies
Location: Avery 114
Date & Time: Thursday 9 AM -12 PM
Call No.: 12420

Student Work Samples
Thiago Lee, Blake Kem, Khadija Tarver, Stephen Zimmerer, Aaron Smolar



TECH 4: BUILDING SYSTEMS INTEGRATION

Berardo Matalucci

Clim. Equ. Des. Lo/Hi

Building Systems Integration (Tech 4) brings together the technical domains of life safety, fire protection, environmental systems, structure, and enclosures in a way that promotes the integration of disciplines. It also exposes participants to the issue of validating their design ideas against code and technical constraints. The knowledge, concepts, and principles learned in previous Tech courses are applied in a design-based project.

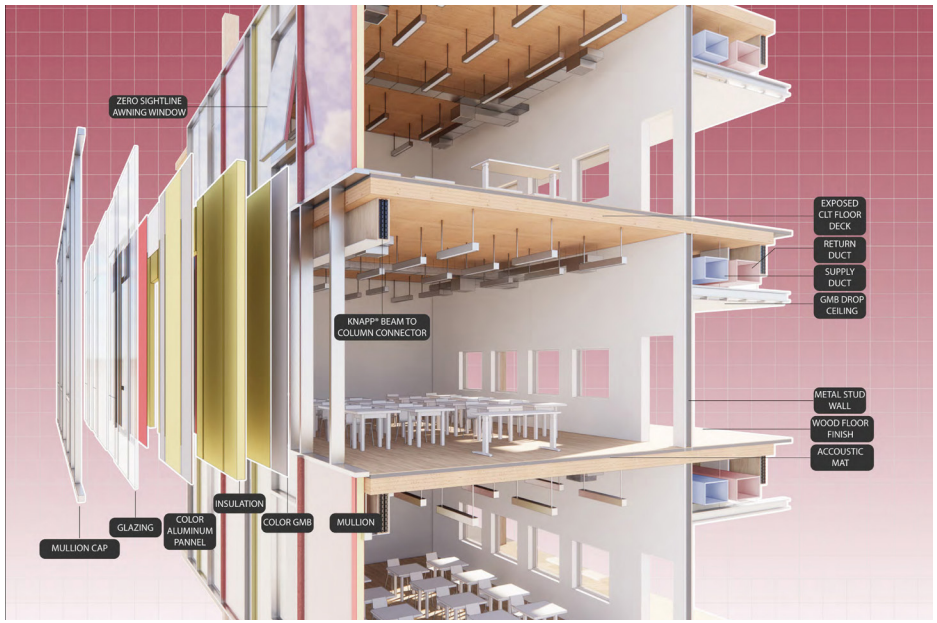
The construction of a building is essentially a part-to-whole problem, as it involves the integration of multiple building components, systems, and processes into a whole. In successful building projects, architects, engineers, fabricators, and erectors work together to develop each respective part. Within this process, architects hold a critical role in ensuring the successful synthesis of these multiple parts, all while keeping the design intention intact. Through a better understanding of the different building systems and the constraints associated with them, architects can 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 to the application of technical systems through design development. The course objectives are to establish an understanding of the technical aspects of architecture and how they participate in reinforcing and supporting the design intentions, such as beauty, sustainability, functionality, and integration with the surroundings. Structural form, environmental systems, materials, construction methods, and fire protection elements are developed systematically and integrated.

This course takes a fresh look at the primary systems within a building. What are their key drivers, requirements, and intentions around each system? What are techniques to rapidly iterate around design ideas and strategies? The course is structured in two modules: a series of lectures on technical topics and assignments to encourage real-case applications. The participants will work in teams, selecting a design concept previously developed during the previous studio. The design teams will work with mentors to bring the chosen design concept to a highly-detailed level of development by constantly confronting the design intent against the technical constraints discussed in class and nurturing a critical decision-making process.

A4114 | Tech 4: Building Systems Integration
Location: Avery 114
Date & Time: Tuesday 2PM - 5PM
Call No.: 12425

Student Work Samples
Hanyu Liu, Kaixi Tu, Dongxiao Yang, Ruisheng Yang, Zixiao Zhu



TRANSITIONAL GEOMETRIES

Josh Jordan

Des. Lo/Hi

This course investigates tiling and modular fabrications, from two simultaneous motivations:

1) To explore the organizational, experiential, and aesthetic performance of units and repetition in architectural composition. This trajectory of the course will consider the history and application of tiling effects and techniques in the making of architecture, as well as study the geometric principles that lead to existing and potentially new systems of connections of parts.

2) To develop the skill sets involved fabricating the units: through mold-making, casting substances, and other shop-based materials and methods. This trajectory of the course will look at moldmaking craft as an analog to construction logics writ large, efficiencies and economies of modular fabrication, and the development of fabrication systems that apply the lessons of the first trajectory in new and innovative ways.

This course will begin with exercises in tiling, tessellation, and pattern, developing incrementally into a 3D modular geometric system. These systems will be constructed physically along with digital development.

Note that the materials component of the course will have individual student costs in the range $200-250.

A4856| Transitional Geometries
Location: Ware Lounge
Date & Time: Wednesday 9AM -11AM
Call No.: 12445

1:1 DETAILING + FABRICATION

Zachary Mulitauaopele

Des. Lo/Hi

As digital fabrication processes continue to advance, our comprehension and command of these construction methodologies is critical in capturing the full potential they offer 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 fly 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.

A6892 | 1:1 Detailing + Fabrication
Location: Buell 200
Date & Time: Tuesday 7PM - 9PM
Call No.: 12452

SEED BOMBS: URBAN ECOLOGIES AND LANDSCAPE TECHNOLOGIES

Emily Bauer

Clim. Lo/Hi UD

Ecosystems have a larger role than ever to play in our buildings and cities and are a key to future adaptation. Seed Bombs: Urban Ecologies and Landscape Technologies will explore the realms of ecosystems in the urban environment and the technologies and systems that they depend on and support. In this course, constructed and emergent ecosystems are considered across scales, from architectural to urban scale and lessons are applied through a fabricated installation.

As a significant component of contemporary design, landscape's key concepts, diverse characteristics, metrics and modes of measurement, and cutting-edge practices will be explored through lectures, readings, and case studies. Students will be expected to articulate an understanding of these topics through assignments, discussions, case studies, and their final project.

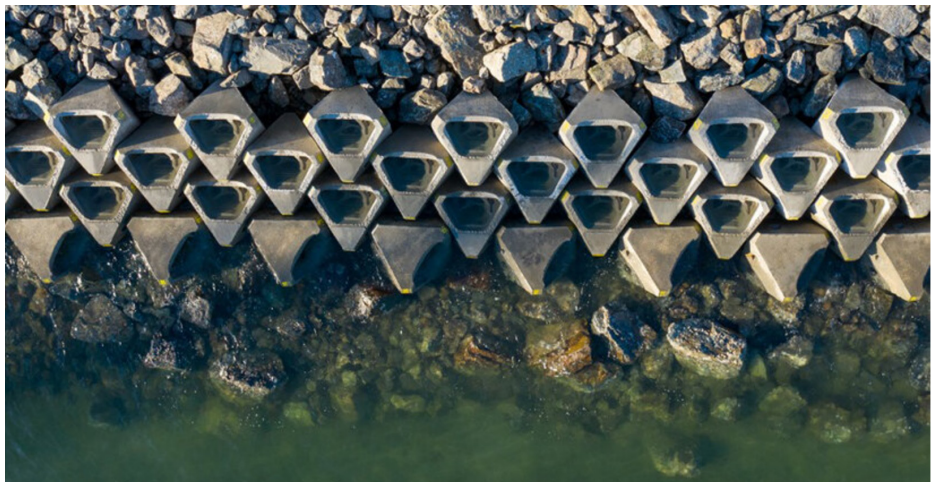
Floating landscape typologies have the potential to produce measurable impacts on water quality, native ecology, and community wellbeing, as well as serve as an important design reference in the city. Through the course, students will fabricate a cultivated/constructed intervention that functions as a floating marine landscape. The course will end with students constructed projects being installed on NYC's Red Hook waterfront. The intervention's ongoing ecological performance will be monitored in collaboration with the local RETI Center nonprofit.

Class time will be composed of presentations, guest lectures, discussions on key topics, peer-presentations of case study best practices, and design/fabrication reviews.

Our urban environments are adjusting the idea of nature to include technology-dependent and emergent ecosystems. The course will provide the tools to understand, assess, and build these hybridized ecological systems.

A6917 | Seed Bombs: Urban Ecologies And Landscape Technologies
Location: Avery 409
Date & Time: Wednesday 9AM - 1PM
Call No.: 13210
Cross Registered with Urban Design

Image Credits
eCOncreteTECH, Balmori Associates, Bouyant Ecologies Float Lab



MAN, MACHINE AND THE INDUSTRIAL LANDSCAPE

Sean Gallagher

Clim. Equ.

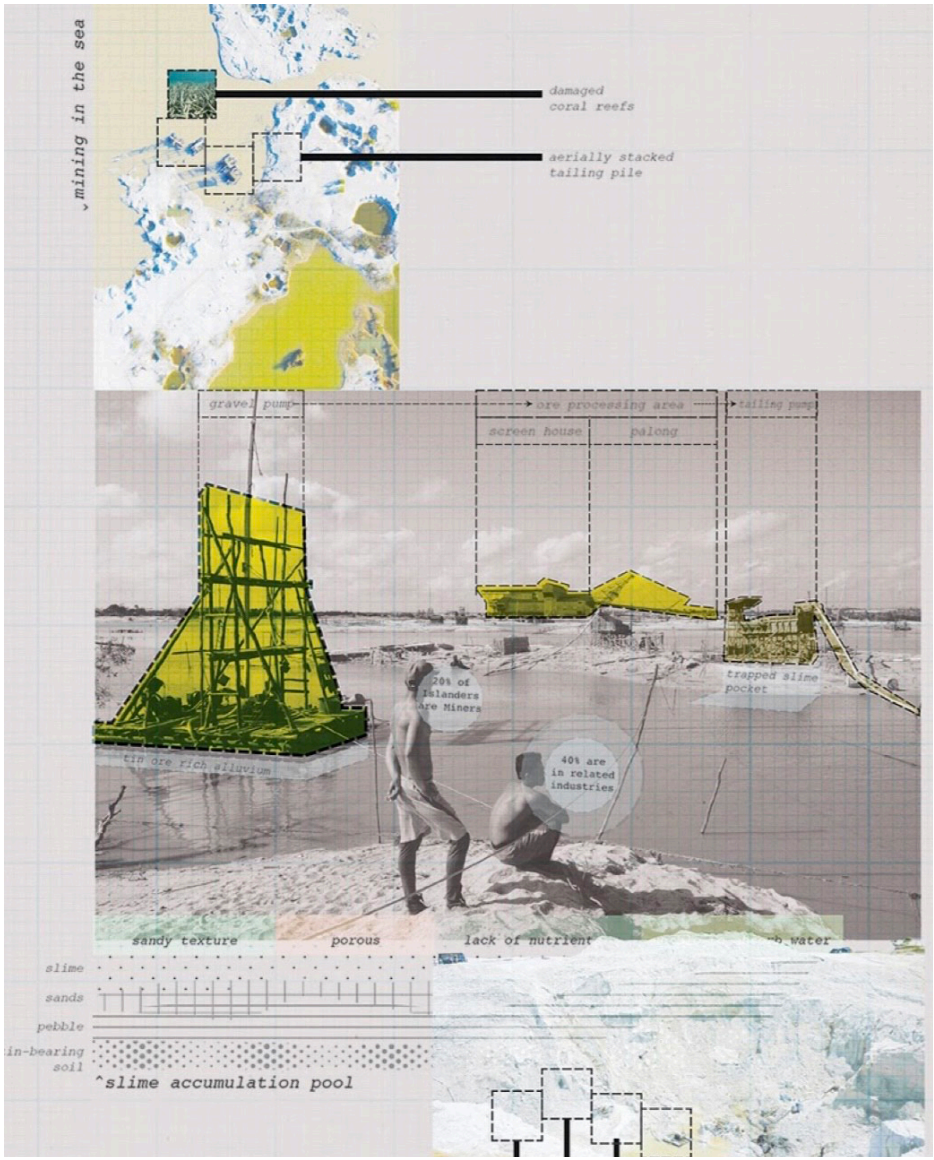
Industrialism changed human civilization and the surface of the Earth in unimaginable ways. While it has exponentially increased human awareness and prosperity, its has initiated the Earth's 6th Great Extinction Era. It's both promising and terrifying. So what is next? That is unclear. But one thing 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 industrial and infrastructural demands of human civilization. The goal is to expose students to emerging post-industrial 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 community structures and networks. The course is structured as a think-tank and students are encouraged to use their personal interests to identify unlikely post-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 planners and architects can influence the necessary change in how we structure global habitation.

A6892 | Man, Machine, and the Industrial Landscape: Re-Imaging the Relationship Between Industrial and Public Territories
Location: Avery 409
Date & Time: Monday 9AM - 11AM
Call No.: 12445



TENSILE/ COMPRESSION SURFACES IN ARCHITECTURE

Robert Marino

Des. Lo/Hi

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.

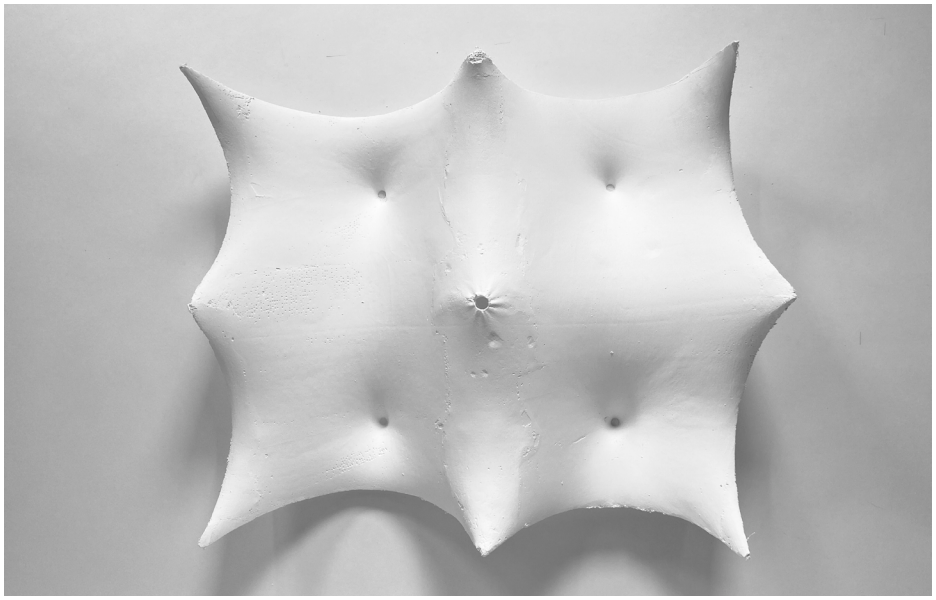
The semester project will be the construction of a shell, and the consideration of its theoretical form, the techniques of its fabrication, and the materials of its construction. These assumptions will be proposed by the student(s) and will become their responsibility. The use of the GSAPP Maker Space 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 will be 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.

A4625 | Tensile/Compression Surfaces in Architecture
Location: Avery 115
Date & Time: Thursday 7PM-9PM
Call No.: 12428

Student Work Samples
Nelson DeJesus



ADVANCED CURTAIN WALL

Daniel Vos

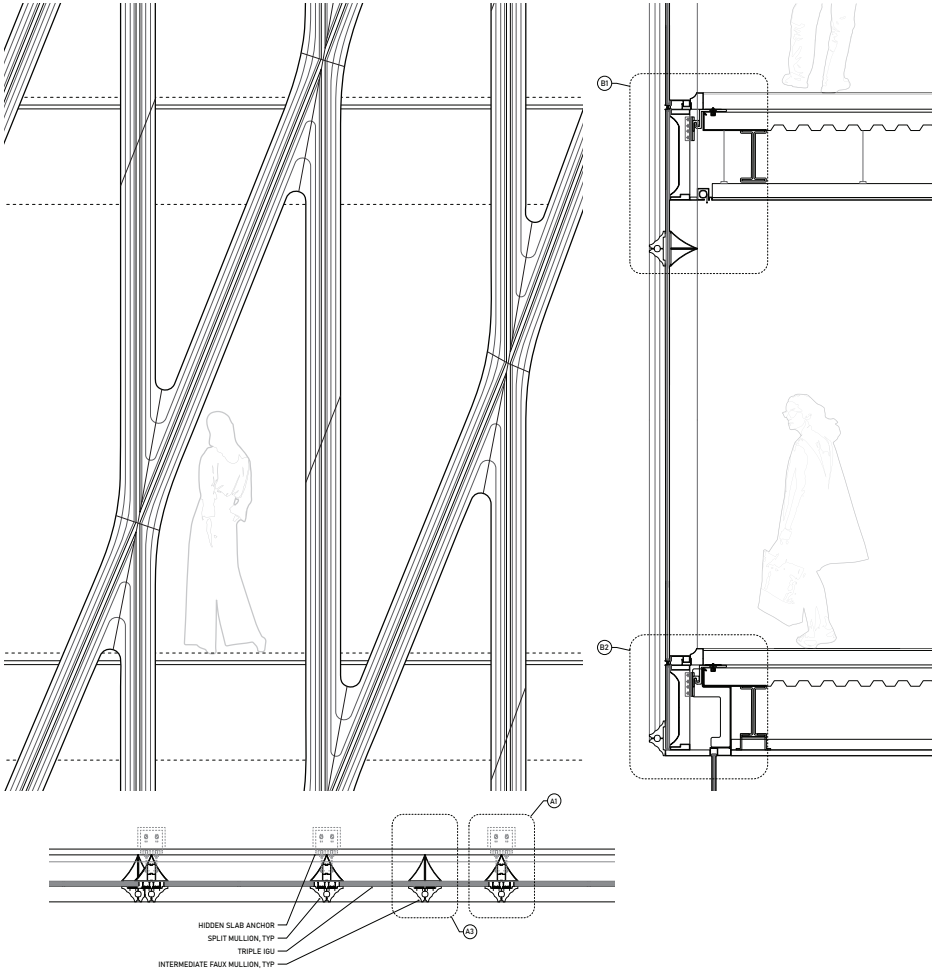
Clim.

This course is intended for students wanting to focus and excel in the technical execution of custom curtain wall enclosures. It will provide students with a comprehensive understanding of the concepts, process, and skills necessary to design, detail, specify, and administer the construction of a custom curtain wall. The course will be structured with a dual seminar / studio format. Lectures for the seminar portion will inform the studio design project and vice versa.

The primary focus of the course is the intensive, semester-long Technical Studio Design Project. Students will design their own unique custom curtain wall, developing detail drawings and preparing outline specifications. The projects will be developed over the course of the semester through Mini-Pinups that encourage peer-to-peer feedback, weekly individual crits with Prof. Vos, a mid-term pinup review, and a final end-of-semester pinup review.

The Seminar Lectures will introduce key concepts to understand the first-principles of façade enclosure design and key performance features of unitized curtain wall systems. The lectures will further explore the many material and aesthetic possibilities of curtain walls, explain design documentation methods and strategies, and review the various phases of the process through which custom curtain walls are designed, engineered, and built. This will include discussions on contract documentation, forms of contract, the bid process, review of fabricator's submittals and shop drawings, full-scale performance prototype testing, and fabrication and installation processes. Case study examples will be used throughout the lectures to show real-world examples of the concepts presented.

A4634 | Advanced Curtain Wall
Location: Avery 115
Date & Time: Tuesday 11AM-1PM
Call No.: 12431



ARCHITECTURAL DAYLIGHTING

Davidson Norris

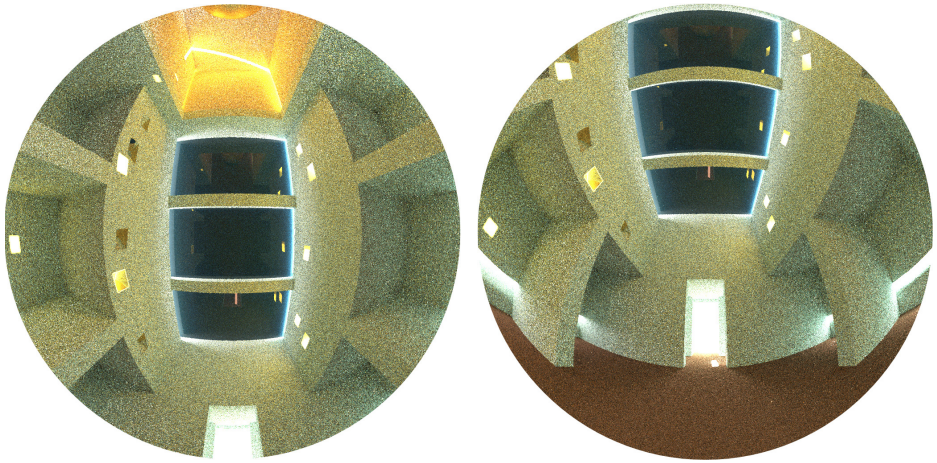
Clim. Lo/Hi

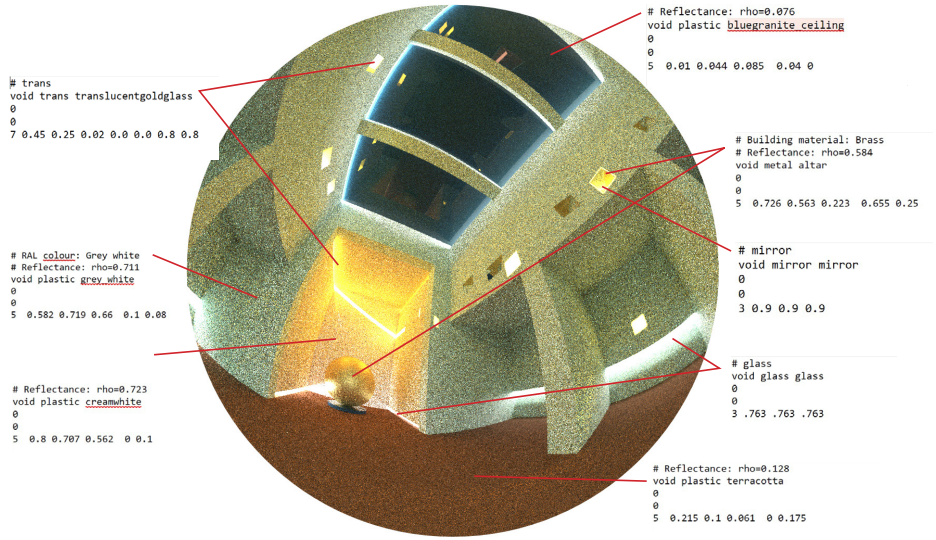
“Natural light is the only light that makes architecture Architecture...” - Louis Kahn

Daylight has played a key role in the perception, aesthetics and function of the built environment from its inception. The masterful play of light depends on the designer’s grasp of both the technical requirements and spatial opportunities of natural light. This course will provide instruction in both.

Topics covered include: daylight and health, energy and productivity; daylight and perception; daylight in the atmosphere; daylight and the site; daylight and the section; architectural shading; calculating the daylight factor graphically; calculating daylight luminance and illuminance digitally using Rhino/Diva. Over the course of the semester, related assignments will develop perceptual as well as technical daylighting acuities. At the end of the semester, students will build physical models and put them out in the sun to test and demonstrate an architectural daylighting phenomenon of their choosing located, preferably, in their studio project.

A4635 | Architectural Daylighting
Location: Avery 412
Date & Time: Thursday 11 AM - 1 PM
Call No.: 12439





MAKING KIN WITH BIOMATERIALS

Chris Woebken

Clim. Equ. Des. Lo/Hi

The realm of the tiny and invisible has actively been ignored within modern societies, despite or exactly because modern science found out more and more about our mutual relations and dependencies with microorganisms, fungi, and other non-human species. Only recently, this situation has started to change. New scientific, computational, philosophical, and evolutionary approaches emphasize the decisive role of the microbiome in the development and maintenance of complex life-forms. In the pyramid of organic life, microorganisms not only lay the foundation but by far represent the largest part, both in numbers and in volume or weight.

With the dawning of the carbon-based period of modernity and the realization of the environmental costs that are going along with it, biological agents and materials have received a major upgrade in public recognition. Being it for substitution of carbon-based building materials or fuels, being it as a means to clean up the petromodern mess, or being it as the basis for entirely new regimes of nutrition, transport, and living, nowadays' future scenarios are full of visions for newly envisioned uses of or, rather, collaborations with microorganisms.
This course aims to theoretically and practically investigate and reveal these mutual relationships and multispecies collaborations across all scales. Students will interrogate different approaches of industrial production, conceptualize and materialize objects that propose alternative approaches and situate these artifacts within the speculative frameworks and future developments. We will be designing prototypes for interfacing with biological systems in the form of grown materials, bioreactors, sampling instruments, or bio-receptive substrates. Students will have the chance to present work-in-progress prototypes and scenarios in a public forum at the project space 1014 within the framework of a series of workshops to embody and imagine life in a post-carbon society.

A6893 | Making Kin With Biomaterials
Location: Avery 408
Date & Time: Tuesday 4PM -6PM
Call No.: 12454

Student Work Samples
Yingjie Liu, Brianna Love, Gloria Mah, Tashania Akemah, Carmen Yu

NET ZERO HOUSING - A MACHINE WITH A POETIC BIAS

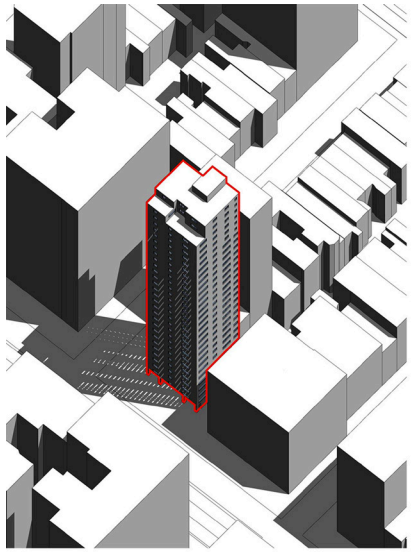
Andreas Benzing

Clim.

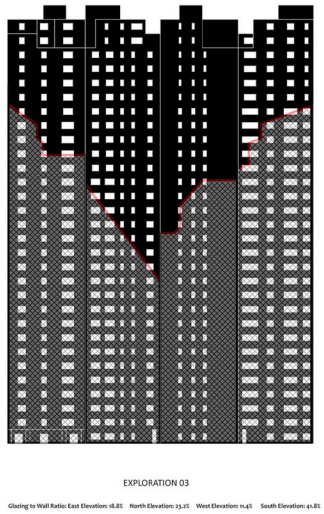
Net Zero Housing - A Machine with a Poetic Bias introduces building science principles to the tectonic treatment of massing an existing residential building in New York City. The course will explore the physical built environment: how the performance factor “energy balance” is influenced by climate conditions, spectral and thermal properties of materials, and the human body. The course will introduce tectonic principles as a possibility to express the thermal characteristics of the building skin and relate them back to the human body. This approach to building performance will explore form and geometry, mass and void, light and shadow, art form, and core form. The lectures and exercises are organized and paced to provoke questions to search for solutions in a methodical and morphological approach as they relate to the performance of a building.

A6894 | Net Zero Housing
Location: Avery 409
Date & Time: Tuesday 5PM -7PM
Call No.: 12457

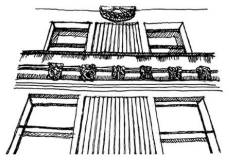
Student Work Samples
Hao Ma



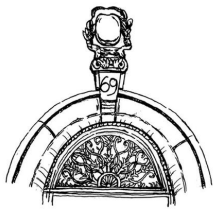
AXONOMETRIC DRAWING



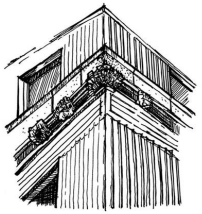
EXPLORATION 03



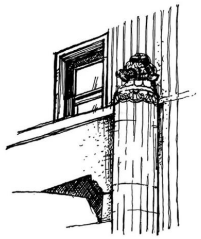
Cornice Drawing



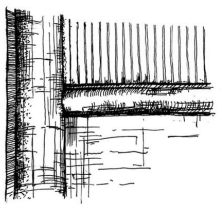
Cornice Drawing



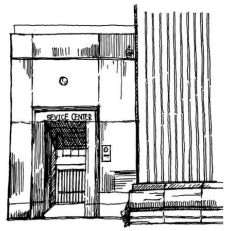
Corner Drawing



Joint Drawing



Joint Drawing



Joint Drawing

RE-THINKING BIM

Student Work Samples
Gejin Zhu and Bingyu Xia

Joe Brennan

Lo/Hi VS

Different assumptions exist for BIM, which stands for Building Information Modeling. Most people will tell you it means Revit. Others equate it more closely with parametric design.

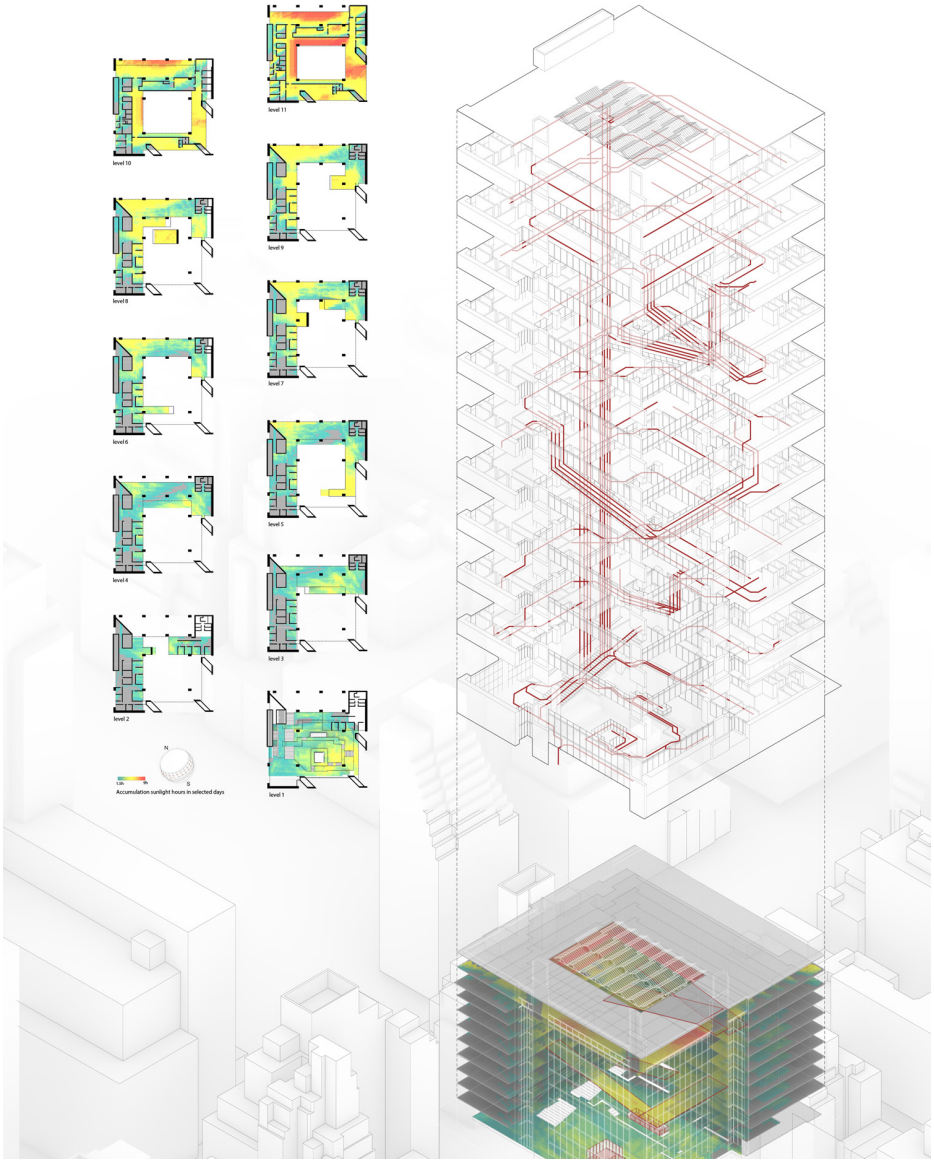
Rethinking BIM will challenge its participants to explore different methods of leveraging BIM to enhance all processes within our industry.

One of the critical drivers of success within architecture is our ability to collaborate with other members of the development, architecture, engineering, and construction (DAEC) industry. We will therefore examine how these related disciplines function. Concurrently, we will develop processes by which we can understand and communicate with them better, more efficiently, and seamlessly. We will also take inspiration from outside of the DAEC industry in areas like tech and manufacturing. Finally, we will leverage drawing and diagramming to visualize and explain these collaborative processes.

Throughout the semester, your project and thinking must function at two scales - macro (urban scale or building scale) and micro (program scale or detail scale). The goal of the class is to leverage new BIM processes to drive better-informed design, so all projects must develop a process that leads to a concrete design idea. You will be required to present both process and design ideas through various assignments throughout the semester. Students will work in groups.

The class will consist of lectures, discussions, pin-ups, office hours, and workshops. Lectures will consist of presentations and case studies. The lectures will consist also consist of software demonstrations. Class time together will focus on “big ideas” and concepts critical to successful project execution.

A4715 | Re-Thinking BIM
Location: Ware Lounge
Date & Time: Thursday 7PM -9PM
Call No.: 12387
Cross Registered with Visual Studies



ARCHITECTURAL METALS

Richard Pieper

Clim. Lo/Hi HP

New York is a city of masonry and metals. Its architecture reflects the changes in metal use and manufacture of the past three centuries, and provides an extraordinary laboratory for their study. What is the difference between wrought iron, cast iron, and steel? When were they introduced, how do they deteriorate, how can you visually differentiate them, and how can they be restored? Is that statue lead or zinc? What are the treatment needs of each? How can that copper cornice be replicated or restored? Is that ornament stamped, cast, or brake-formed, and what are the options for restoration? When were nickel silver and monel introduced, and how do they weather? What did that 1930's aluminum look like when it was first installed? How can that appearance be replicated?

With lectures and field trips this seminar reviews the structural and decorative uses of metals in buildings and monuments from the eighteenth to the twentieth centuries. The metals to be reviewed include wrought iron, cast iron, and steel; copper and copper alloys including bronze and brass; lead; tin; zinc; aluminum; and nickel and chromium alloys. Assuming that Columbia will once again allow us to bus together to Perth Amboy, NJ, we will pay a visit to V&S Hot Dip Galvanizing (pictured above) to watch steel being dipped into 600,000 pound vats of molten zinc. With visits to some of the City's most remarkable structures, the course will examine the history of metal manufacture and use; mechanisms of deterioration and corrosion; and cleaning, repair, and conservation.

A6768 | Architectural Metals
Location: 655 Schermerhorn Extension
Date & Time: Wednesday 2PM-5PM,
Sep. 7 - Oct 12
Call No.: 12499
Cross Registered with Historic Preservation

BRICK, TERRA COTTA & STONE

Norman R. Weiss & Daniel Allen

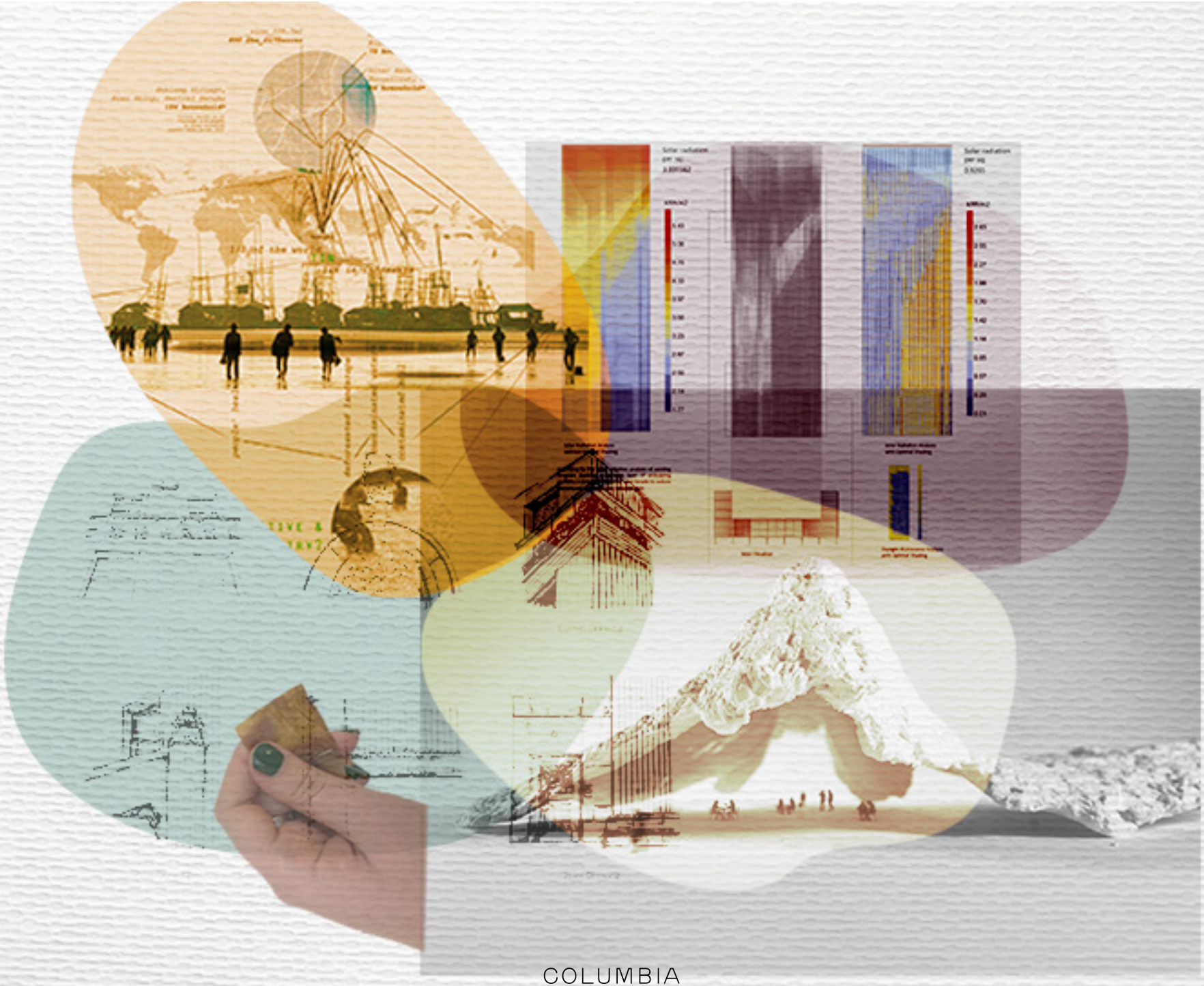
Clim. Lo/Hi HP

This course explores a complex group of traditional masonry materials--brick, terra cotta and stone. Our format includes lectures, demonstrations and laboratory exercises, and a field trip. The goals of the course are to provide:

1) An historical overview of the manufacturing and sourcing of these architectural materials with a focus on the 18th century to the present;

2) An understanding of some fundamental material properties in relation to their use and deterioration in a range of masonry construction systems; and 3) an exploration of state-of-the-art means and methods of their repair, maintenance, and conservation.

A6784 | Brick, Terra Cotta, & Stone
Location: 655 Schermerhorn Extension
Date & Time: Wednesday 1PM-5PM, Starting Oct 19th
Call No.: 12500
Cross Registered with Historic Preservation



Images from: Making Kin with Biomaterials, Tensile/Compression Surfaces, Net Zero Housing, Man, Machine, and the Industrial Landscape, Re-Thinking BIM

COLUMBIA
GSAPP

Building Tech

Spring 2023 Courses

Building Tech Course Listings - Spring 2023

Clim. Equ. Des. Lo/Hi VS HT HP

			Climate & Energy	Equity & Health	Design/ Build	Low-Tech/ High-Tech	Visual Studies	History/Theory	Historic Preservation
A4112	**Tech II**	Zak Kostura	●	●		●			
A4115	**Tech V**	Lola Ben Alon, Anna Knoell + Aaron Campbell	●	●	●	●			
A6682	**Subject_Object**	Suchi Reddy			●	●			
A6684	**Other Natures**	Michael Wang	●	●	●	●			
A6688	**United Atmospheres**	Andreas Theodoridis	●	●					
A6892	**1:1 Detailing & Fabrication**	Zachary Mulitauaopele			●	●			
A6678	**The Long History of Arch Tech**	Lucia Alais	●	●		●		●	
A6913	**Making With Earth**	Lola Ben Alon	●	●	●	●			
A4861	**Footprint: Carbon and Design**	David Benjamin	●	●					
A4859	**The Outside In Project**	Laurie Hawkinson + Galia Solomonoff	●	●	●	●			
A4849	**Healthy Building Materials**	Catherine Murphy	●	●					
A4874	**Construction Ecologies In The Anthropocene**	Tommy Schaperkotter	●	●		●			
A4854	**If Buildings Could Talk**	Sharon Yavo Ayalon			●	●			
A4845	**Generative Design**	Danil Nagy	●			●	●		

Clim. Equ. Des. Lo/Hi VS HT HP

			Climate & Energy	Equity & Health	Design/ Build	Low-Tech/ High-Tech	Visual Studies	History/Theory	Historic Preservation
A6857	**Measuring the Great Indoors**	Violet Whitney				●	●		
A4715	**Re-Thinking BIM**	Joe Brennan				●	●		
A4815	**X Information Modeling**	Snoweria Zhang				●	●		
A6788	**Conservation of Concrete, Cast Stone, & Mortar**	Norman Weiss + Heather Hartshorm	●			●			●
A6714	**Experimental Preservation**	Jorge Otero-Pailos	●			●			●

Building Tech Course Listings - Spring 2023

EQUITY/HEALTH

DESIGN/BUILD

CLIMATE/ENERGY

Healthy Building Materials
Catherine Murphy

Construction Ecologies In The Anthropocene
Tommy Schaperkotter

The Long History of Arch Technology
Lucia Alais

The Outside In Project
Laurie Hawkinson & Galia Solomonoff

1:1 Detailing & Fabrication
Zachary Mulitauaopele

Footprint: Carbon & Design
David Benjamin

Other Natures
Michael Wang

Making With Earth
Lola Ben Alon

If Buildings Could Talk
Sharon Yavo Ayalon

Subject_Object
Suchi Reddy

TECH V
Lola Ben Alon, Anna Knoell, and Aaron Campbell

TECH II
Zak Kostura

United Atmospheres
Andreas Theodoridis

Re-Thinking BIM
Joe Brennan

Experiemental Preservation
Jorge Otero-Pailos

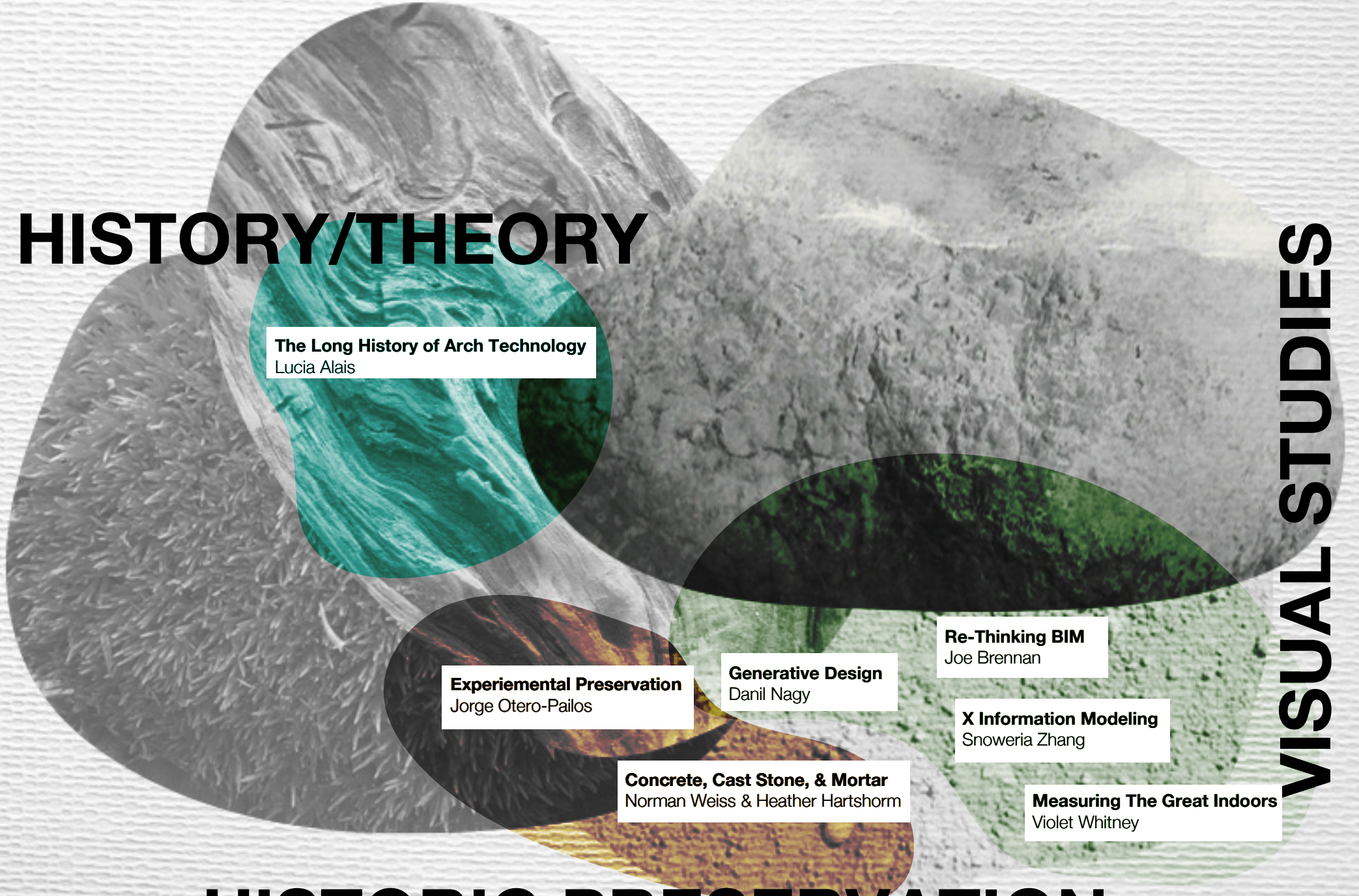
Generative Design
Danil Nagy

X Information Modeling
Snoweria Zhang

Concrete, Cast Stone, & Mortar
Norman Weiss & Heather Hartshorm

Measuring The Great Indoors
Violet Whitney

HIGH-TECH/LOW-TECH



HISTORY/THEORY

The Long History of Arch Technology
Lucia Alais

Experiemental Preservation
Jorge Otero-Pailos

Generative Design
Danil Nagy

Re-Thinking BIM
Joe Brennan

X Information Modeling
Snoweria Zhang

Concrete, Cast Stone, & Mortar
Norman Weiss & Heather Hartshorm

Measuring The Great Indoors
Violet Whitney

VISUAL STUDIES

HISTORIC PRESERVATION

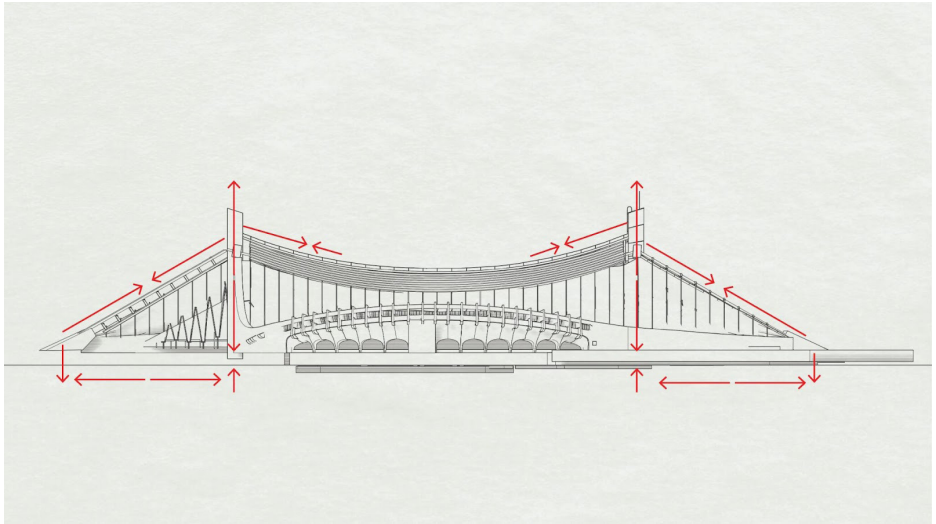
TECH 2: STRUCTURES

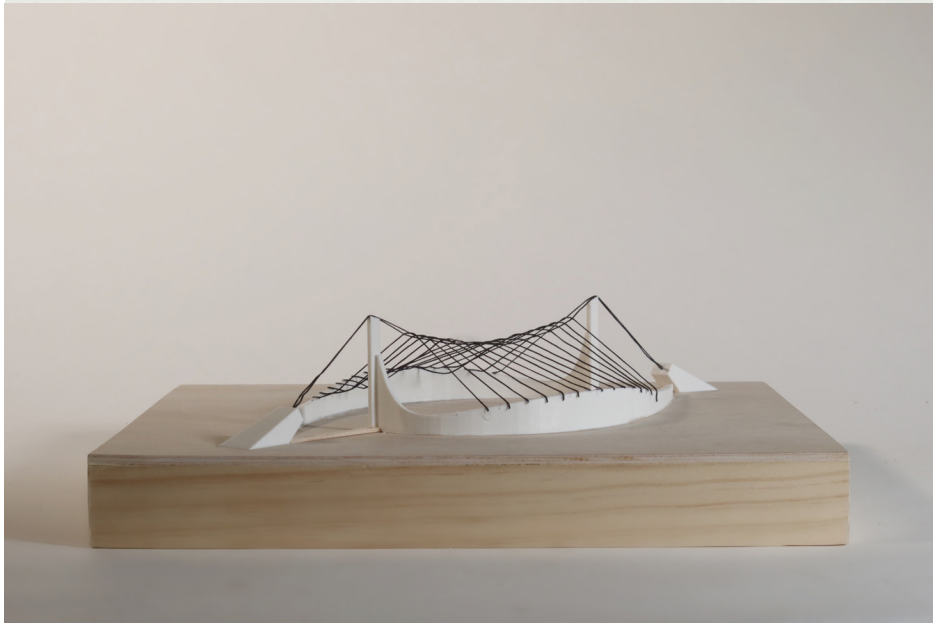
Student Work Samples
Adam Fried, Gio Kim, Ian Callender,
Hanna Wiegers, and Anna Kim

Zak Kostura

Clim. Equ. Lo/Hi

ATII Structures in Architecture provides students with an understanding of what structural design means and how it's carried out. Students gain familiarity with basic elemental forms, structural assemblies and systems, and new and emerging materials. Through project-based and hands-on work, students gain an understanding of structure, empowering them to integrate their newfound technical knowledge including load-resisting systems into architectural concepts.





A4112 | Tech II
Location: 114 Avery
Date & Time: Thursday 9AM - 12 PM
Call No.: 11435

TECH 5: CONSTRUCTION AND LIFE CYCLE SYSTEMS

Lola Ben-Alon, Anna Knoell, & Aaron Campbell

Clim. Equ. Des. Lo/Hi

A study of the triple bottom line and sequencing of how architecture is built; from material geographies to construction administration.

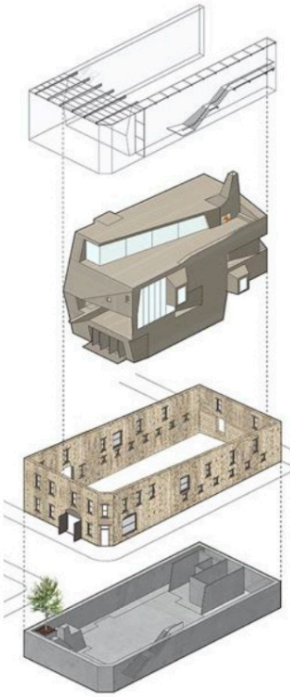
This class will follow an analytical approach of dissection to gain an in depth understanding of select building conditions. Through dissection of building conditions students will gain a comprehensive understanding of material geographies, the environmental and social life cycles, cost analysis, interrelationships, 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.



A4115 | Tech V
Location: 113 Avery
Date & Time: Tuesday 1:30 - 4:00
Call No.: 11442

SUBJECT_OBJECT

Image Credits
Edoardo Delille and Heather Hazzan

Suchi Reddy

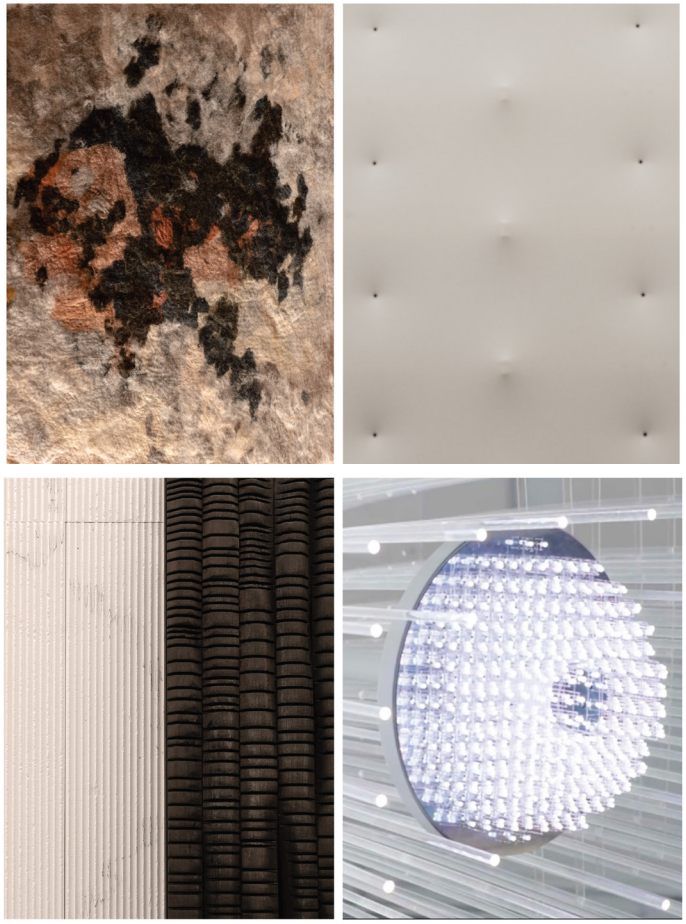
Des. Lo/Hi

Human-centric design today requires a recalibration of design methodologies towards connection, empathy, and agency. Subject_Object will explore the tectonic and poetic potential of materials to express and connect disparate agents/ environments through fabrication methodologies that are site specific and sustainable. The latent sensory and emotional potential of materials, and their combined Neuroaesthetic effects, will be a focus of the exploration of the course.

Participants will be asked to identify three disparate or different spaces/ places they would like to connect. They will isolate three found objects, one from each space or place, and work with a fourth connective, sustainable material to connect the three objects. Connective fabrication typologies will be explored to express unexploited adjacencies and create a new unified form, based on the materials identified by each participant. Exploring the logic of difference and unity through material connection, the resulting works will be assembled in a unified installation created by the class.

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.

A6682 | Subject_Object
Location: 323M Fayerweather
Date & Time: Thursday 11AM - 1PM
Call No.: 14564



OTHER NATURES:
REPRESENTING HUMAN/NON-HUMAN RELATIONS

Michael Wang

Clim. Equ. Des. Lo/Hi

Modern artworks and architectures are typically defined in opposition to nature: they are products of culture. And yet, nature has always been present: as muse, as model, and, importantly, as material. This course will focus on material as the natural foundation of artistic and architectural practices—and, indeed, of a larger set of technological techniques. Materials are embedded in ecological, economic, and political matrices. The artistic or architectural uses of materials can mask or reveal these networks. In this class, students will explore the meaning of materials: their origins, sourcing and extraction, networks of exchange, and the impacts of these networks on human and non-human lifeworlds.

Working singly or in pairs, students will pick a single material to explore over the course of the semester: ideally a material or resource they interact with or use–directly or indirectly–on a daily basis. Concrete, natural gas, brick, glass, steel, petrochemical plastic, wood, and lithium, are all examples. Each student or pair will examine this material from several points of view, to understand its natural origins, industrial or technological processing, role as a commodity, and disposal. The students will then interrogate the effects of its extraction, use, and trade on local and global communities and examine its environmental impacts at each stage of the material's life cycle.

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 a moment or moment in this unseen lifecycle, or proposes an alternative material pathway. 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 human and non-human worlds.

We will look to contemporary art and research-driven architectural practices that engage with the materiality of commodities to inform the semester of material exploration, with a focus on natural and technological perspectives.

A6684 | Other Natures
Location: 505 Avery
Date & Time: Monday 11AM - 1PM
Call No.: 14574

Top: 2022 Formfantasma installation
Bottom: Lucy Raven

UNITED ATMOSPHERES

Image Credits
Andreas Theodoridis

Andreas Theodoridis

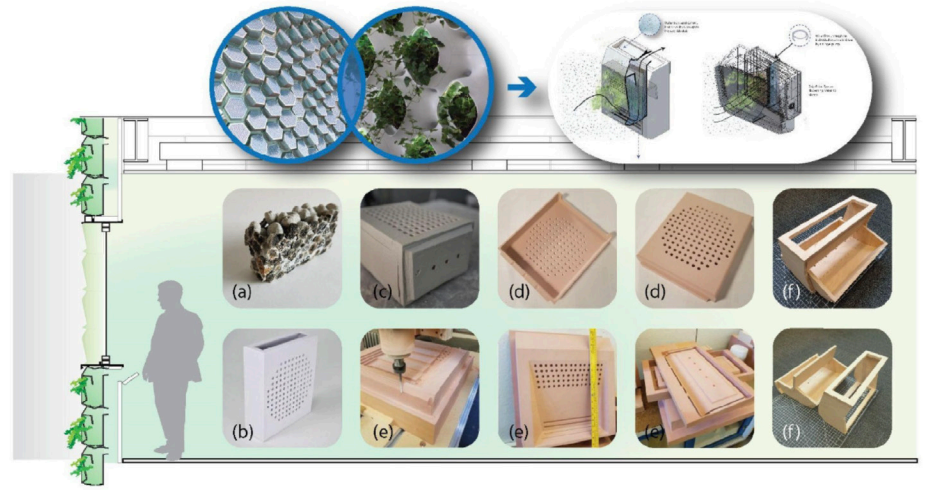
Clim. Equ.

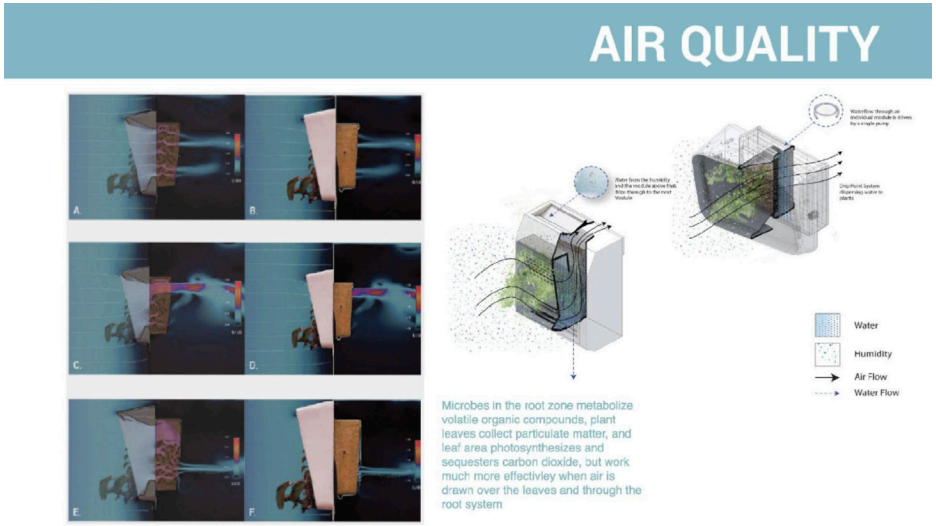
A course about the architectural and scientific atmospheres and their understanding and representation. With a hands-on approach and a summer exhibition in Greece consisted of student projects.

In this course, students will investigate architectural atmospheres through various topics ranging from the physical aspects of air quality to spatial nuances as experienced by subjects. We will discuss how we measure air pollution (AP), the sources of AP, and what safety thresholds exist in the industry concerning human health standards created by different international governmental agencies and private organizations. We will also discuss socioeconomic variables associated with air quality, as well as negative environmental externalities, and investigate building system approaches and solutions to some of these problems. Overall, this course aims to illustrate the fundamental science behind air quality in the built environment and to analyze/associate different air quality parameters entangled in the production of built environments.

The learning intent behind “United Atmospheres” will be to understand principal concepts around natural and mechanical ventilation systems related to air quality requirements; to associate global socioeconomic factors that influence architectural production and design strategies; and finally, to analyze contemporary environments based on characteristics and variables of energy consumption, passive and active systems, embodied energy, natural and mechanical ventilation, life cycle analysis, and other aspects of the design decision-making process. State-of-the-art in environmental design and passive and active heating, ventilation, and air conditioning (HVAC) technologies will be introduced in lectures and further analyzed in presentations, discussions, readings, and mini assignments.

A6686 | United Atmospheres
Location: 505 Avery
Date & Time: Monday 11AM - 1PM
Call No.: 14574





1:1 DETAILING + FABRICATION

Zachary Mulitauaopele

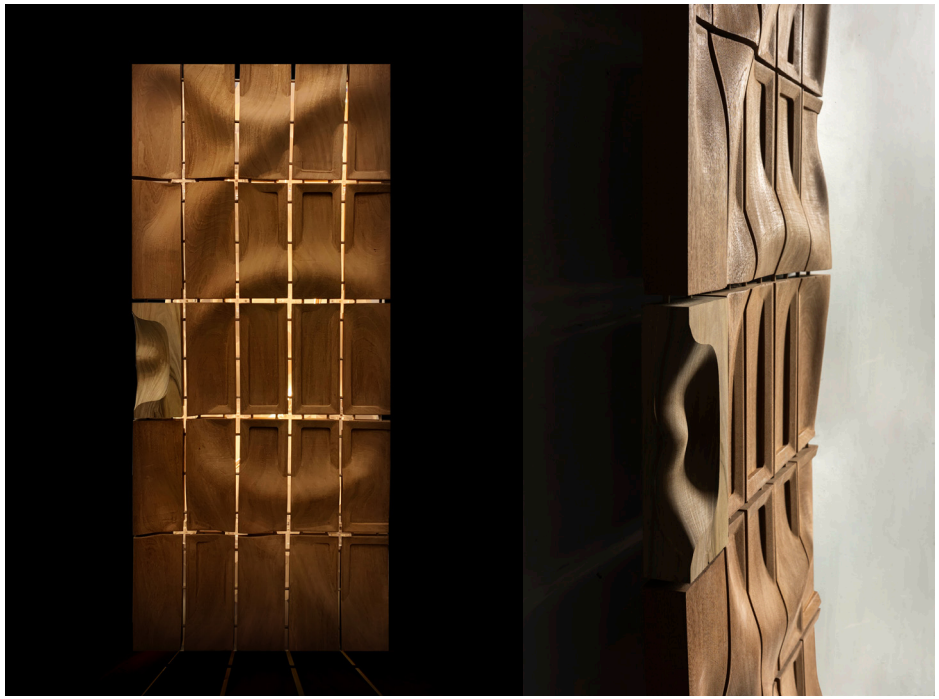
Des. Lo/Hi

As digital fabrication processes continue to advance, our comprehension and command of these construction methodologies is critical in capturing the full potential they offer 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 fly 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.

A6892 | 1:1 Detailing + Fabrication
Location: Buell 200
Date & Time: Tuesday 7PM - 9PM
Call No.: 11502

Student Work Samples
Daniel Chang, Cecile Kim and Julie Kim



THE LONG HISTORY OF ARCH TECHNOLOGY

Lucia Allais

Clim. Equ. Lo/Hi HT

Technology is often used to periodize human history (i.e., “the iron age,” the “neolithic,” the “industrial revolution.”) This leaves architectural designers and historians with a conundrum. On the one hand, it is tempting to use technology to tell architectural history, since buildings are ubiquitous records of all technical aspects of life. On the other hand, construction technologies themselves have seldom been the direct products of those techno-scientific inventions that are seen to drive humanity’s “progress” or “development.”

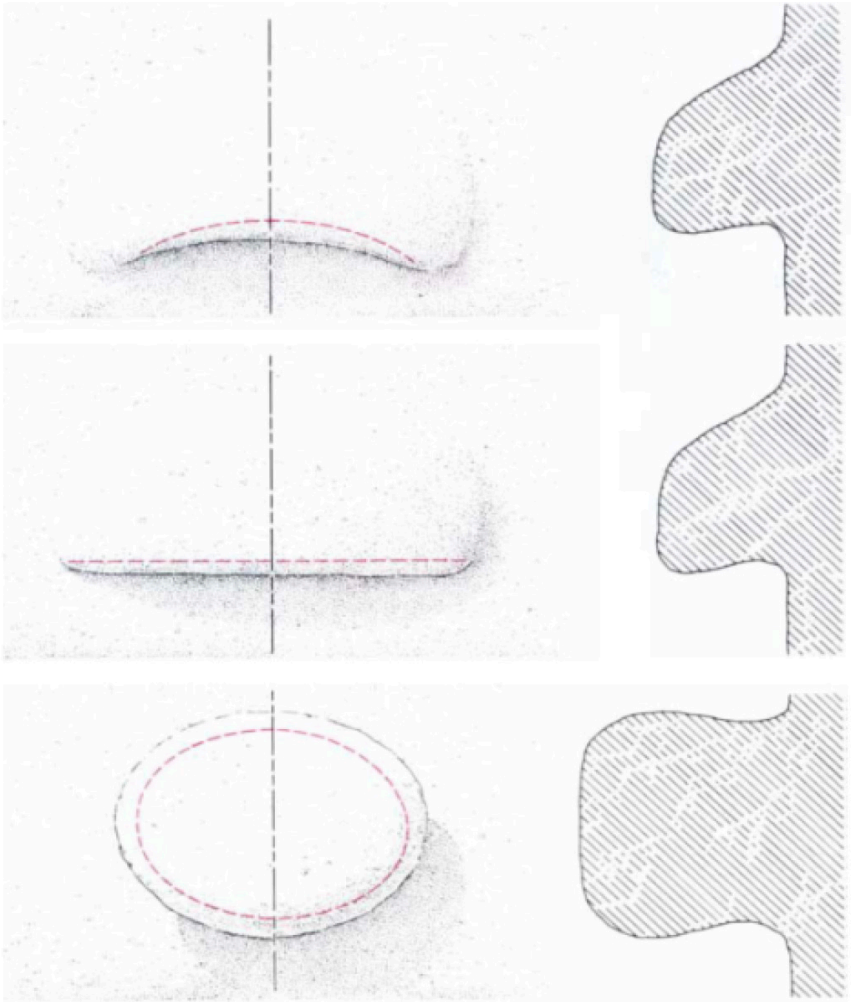
This course addressed this conundrum, by visiting monuments in the long history of architectural design (from the earliest known shelters to digital fabrication), and considering the manifold ways that technological change permeates built environments and building cultures.

The class is a hybrid of a history seminar (in which historical case-studies are critically studied and narrated) and the technology elective 9in which principles of building science and engineering are studied and applied.) As a history class, the class studies cases of architectural design in order to ask issues of human agency and scientific epistemology, familiarizing students with critical approaches to technology from STS and the environmental humanities. As a technology elective, the course consults research in engineering, building science, and archaeology, especially of the kind that puts calculation, technological experiments, and on-site reconstructions to work to arrive at sophisticated descriptions of the history of building cultures.

The aim is to undermine the longstanding split between two modes of inquiry in architecture: historical understanding vs. Technical knowledge. The ultimate goal is to develop a critically-informed working knowledge of architecture as a technical field, pushing against linear narratives that constrain both the designer’s hand and the historian’s pen.

A6678 | The Long History of Arch Technology
Location: 412 Avery
Date & Time: Tuesday 11AM -1PM
Call No.: 14562
Cross Registered with History/Theory

Image Credits
Protuberances on Inca Stone Blocks, Nair and Protzen, 1997



MAKING WITH EARTH:
DIGITAL AND MANUAL CRAFT OF NATURAL MATERIALS IN BUILDINGS

Lola Ben Alon

Clim. Equ. Des. Lo/Hi

Earthen building materials offer a minimally processed, locally available, non-toxic,and community self-sufficient alternative to conventional building materials. Constructing with these materials maximizes the potentials of freely available resources.

In this course, students will gain both theoretical knowledge and hands-on experiences related to a range of earth-based materials and their fabrication mechanisms, including digital 3D printing, mechanical pressing, and manual craft. You will draw inspiration from traditional techniques such as adobe rammed earth, cob, clay plasters, and straw bale construction to speculate the futures of earth materialities. You will study the performance and environmental benefits of earthen projects in a wide of range of climates. Guest lectures and workshops will provide insights towards creating your own inventive earth-based mixture for fabrication of the final project.

As a final deliverable, you will design and build a small-scale earth-based artifact that will be presented at the 1014, a cultural space for art and design in Upper East Manhattan. Your installation will be carefully designed and fabricated while making a sensitive choice of materials, technical details, and fabrication processes. The project will be intended to examine local material geographies, create know-how to improve living conditions in the local context, and support bottom-up form of capacity development of making with earth.

A6913 | Making With Earth
Location: 408 Avery
Date & Time: Monday 11AM -1PM
Call No.: 14565

Top: Eat me Build Me, Lola Ben Alon and Sharon Yavo Ayalon, 2022 Talinn Architecture Biennale
Bottom: 3D printed artifacts, The Natural Materials Lab, GSAPP

FOOTPRINT: CARBON AND DESIGN

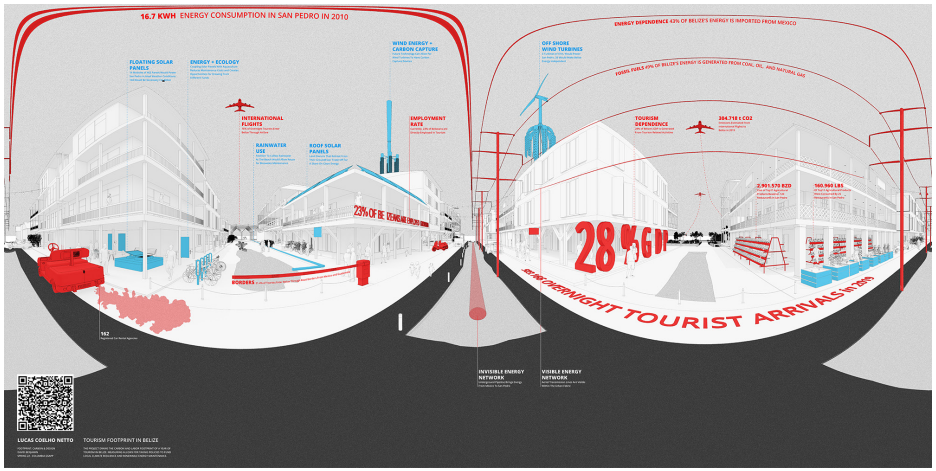
Student Work Samples
Lucas Coelho Netto

David Benjamin

Clim. Equ.

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.



A4861 | Footprint: Carbon and Design
Location: 409 Avery
Date & Time: Thursday 11AM - 1PM
Call No.: 11468

THE OUTSIDE IN PROJECT

Laurie Hawkinson and Galia Solomonoff

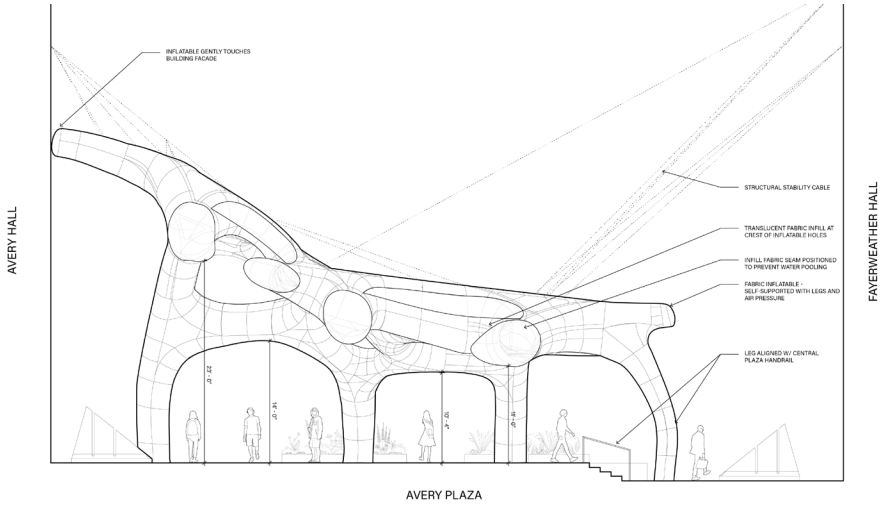
Clim. Equ. Des. Lo/Hi

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.

A4859 | The Outside In Project
Location: Ware Lounge
Date & Time: Thursday 11AM - 1PM
Call No.: 12136



HEALTHY BUILDING MATERIALS

Catherine Murphy

Clim. Equ.

Healthy Building Materials introduces students to issues of toxicity in common building products and their impact on human and environmental health. Central to this exploration is identifying the populations who are most at risk, what those vulnerabilities are, and at what stage in the life cycle of a material or product is risk most prevalent. The course will be divided into four modules which will include the chemistry of building products, designing with healthier materials, and strategies to ensure the installation of healthier materials.

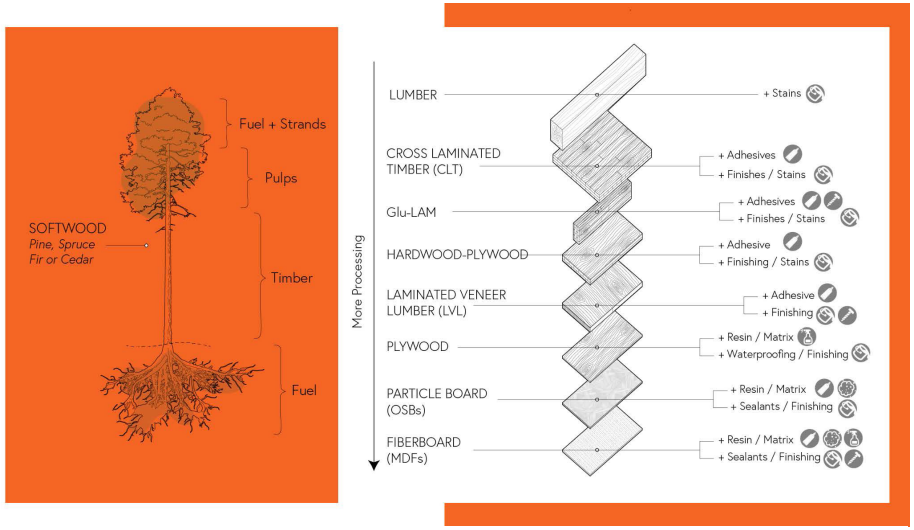
Over the course of the semester the students will develop a methodology to evaluate materials for human and environmental health. This methodology of material analysis and assessment can be carried into their studio projects and future practice. The goal of this course is to empower designers to transform architectural practice with the knowledge that healthier buildings lead to healthier lives.

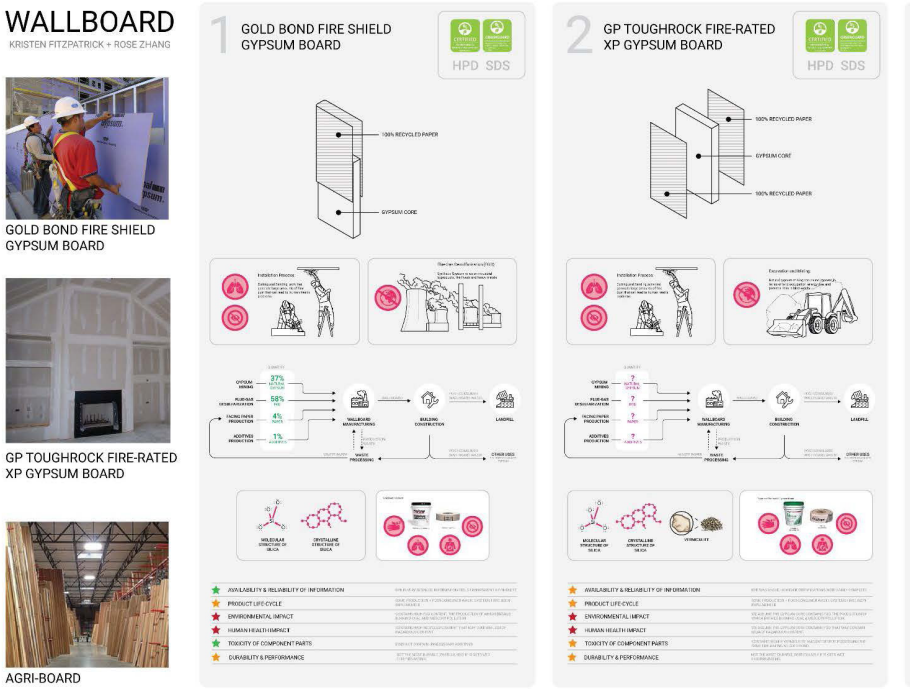
Students will explore the relationships between building materials, chemical toxicity, carbon impact, and environmental exposures that directly impact human health and the communities which are most adversely affected. We will establish healthier material literacy and explore materials and products that are used in buildings. We will understand why chemicals in common building products can be harmful to human health and explore healthier alternatives. We will investigate current practice to see how leading firms are executing healthier buildings which will inform and develop methodologies that can be applied in current studio projects. In addition to lectures there will be video presentations from leaders in the fields of material health, architecture, public health, sustainability, and science.

This course is taught through research and discussion in a seminar style format. Each week, students will read, watch video content, and conduct research in a specific material product category. All students are expected to participate in class discourse. The research will culminate in a review. Class time will be divided into lectures, workshopping of ideas, class presentations,guest lectures. Students are strongly encouraged to apply what they learn in this class and their material analysis explorations to their studio projects

A4849 | Healthy Building Materials
Location: 203 Fayerweather
Date & Time: Wednesday 11AM -1PM
Call No.: 11446

Student Work Samples
Top: Hallie Chuba, Cemre Tokat, & Andrew Magnus
Bottom: Kristen Fitzpatrick & Rose Zhang





CONSTRUCTION ECOLOGIES IN THE ANTHROPOCENE

Tommy Schaperkotter

Clim. Equ. Lo/Hi

How should designers understand their complicities and capabilities in the complex and contested present of the Anthropocene? Is it possible to reconsider our disciplinary roles and 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, technologies, ecologies, and processes of construction while seeking myriad opportunities for revitalized architectural enchantment commensurate with the existential narratives of the Anthropocene.

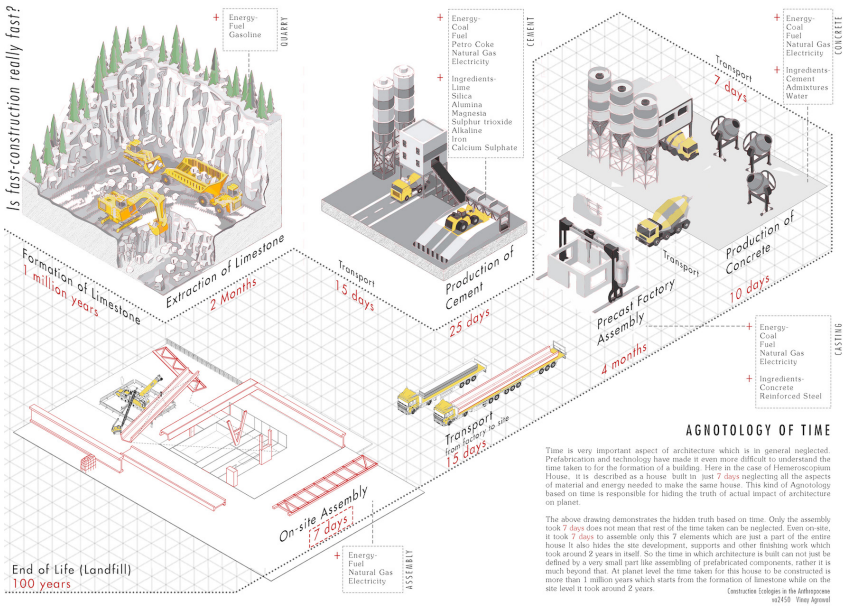
Architectural impressions of the Anthropocene and climate change are today entangled by rifts between human determination and technological determinism stemming from the scale and severity of the environmental harm caused by design professions, and concurrent appeals for sustainable transformation requested of them. This contemporary 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.

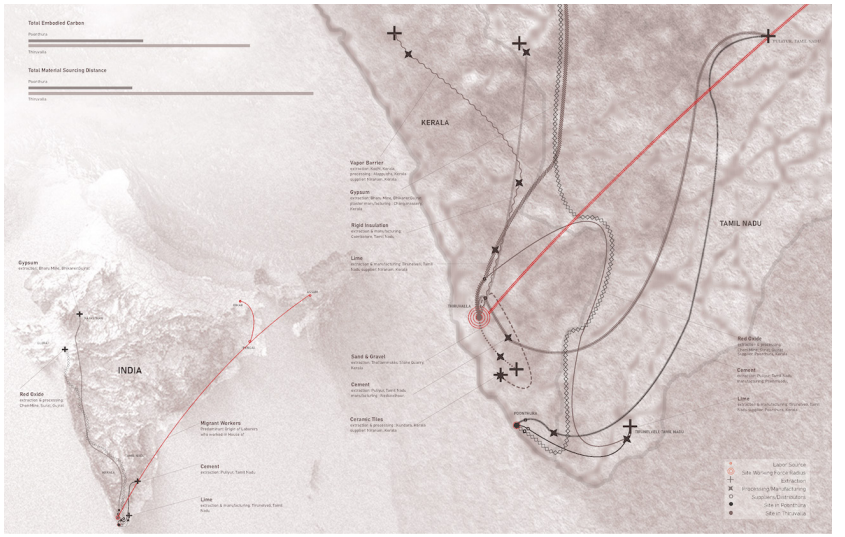
This obfuscation will be tested through thermodynamics of the energy hierarchy, movements of matter and labor, and historical as well as contemporary case studies. The course offers students a chance to explore quantitative and qualitative inquiries of energy, emergy, carbon, capital, care, repair, labor, time, value, and equity. 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.

The course is structured as a seminar in which students will be asked to complete weekly readings. Workshops will explore diverse forms of research, documentation, and illustration. Students, working individually or in pairs, will complete a final project of their own choice.

A4874| Construction Ecologies in the Anthopocene
Location: 412 Avery
Date & Time: Friday 9AM -11PM
Call No.: 11424

Student Work Samples
Vinay Agrawal, Mariam Jacob





IF BUILDINGS COULD TALK:
ART AND BUILDING TECHNOLOGY FOR INTERCONNECTED ENVIRONMENTS

Sharon Yavo Ayalon

Des. Lo/Hi

The histories of art and cities are intertwined in multiple ways, showing that art poses the power to either duplicate and reproduce existing power relations or to subvert them, to enhance distinctions and boundaries, or undermine them. Similarly, technology has always been part of the progress of cities, and it poses resembling powers. The combination of both can become a powerful tool to elicit social change in innovative ways.

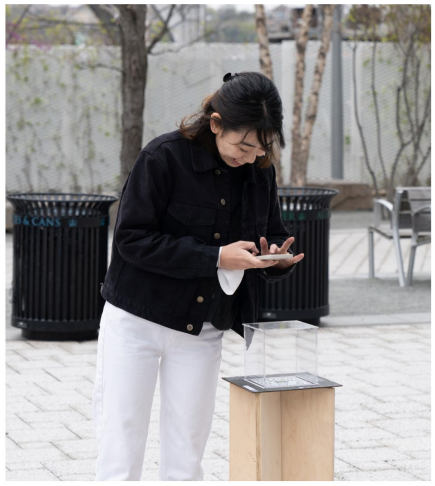
This course targets the question of distinctions and boundaries through how a building interacts with its immediate physical and social surroundings. Using the combination of art, data, and technology, students will engage with the societal and political challenges of the urban arena. Students will acquire analytical and theoretical knowledge and the opportunity to intervene and affect the building they learn in – the GSAPP Avery Building and the urban environment surrounding it - Harlem Neighborhood.

The course is based on a dual format of a seminar and a workshop. The seminar format, lectures, readings, and site visits introduce the theoretical and critical aspects of technology-driven artistic interventions. Students will examine past and present precedents of collaborative and participatory art projects that use advanced technology and big data to engage communities in shaping their environments. Through the workshop format, students will develop a suggestion for an artistic intervention to analyze, criticize, understand, and create better connections between GSAPP and the city.

In the mid-term presentation, each team will propose a technology-driven artistic intervention, and through a peer-review process, we will select one of the proposals to be built on-site. Then, throughout the second half of the semester, we will collaboratively work on the final assignment: developing, building, and installing the selected proposal: a prototype version on a 1:1 scale, on-site.

A4854 | If Buildings Could Talk
Location: 300 Buell North
Date & Time: Monday 11AM -1PM
Call No.: 11464

Student Work Samples
Yunha Choi, Lula Chou, Cesar Delgado, Ben Diller-Schatz, Max Goldner, Changbin Kim, Erisa Nakamura



GENERATIVE DESIGN

Student Work Samples
Qingning Cao, Jiafeng Gu, Wanqi Jiang,
Ruisheng Yang, Yifei Yuan

Danil Nagy

Clim. Lo/Hi VS

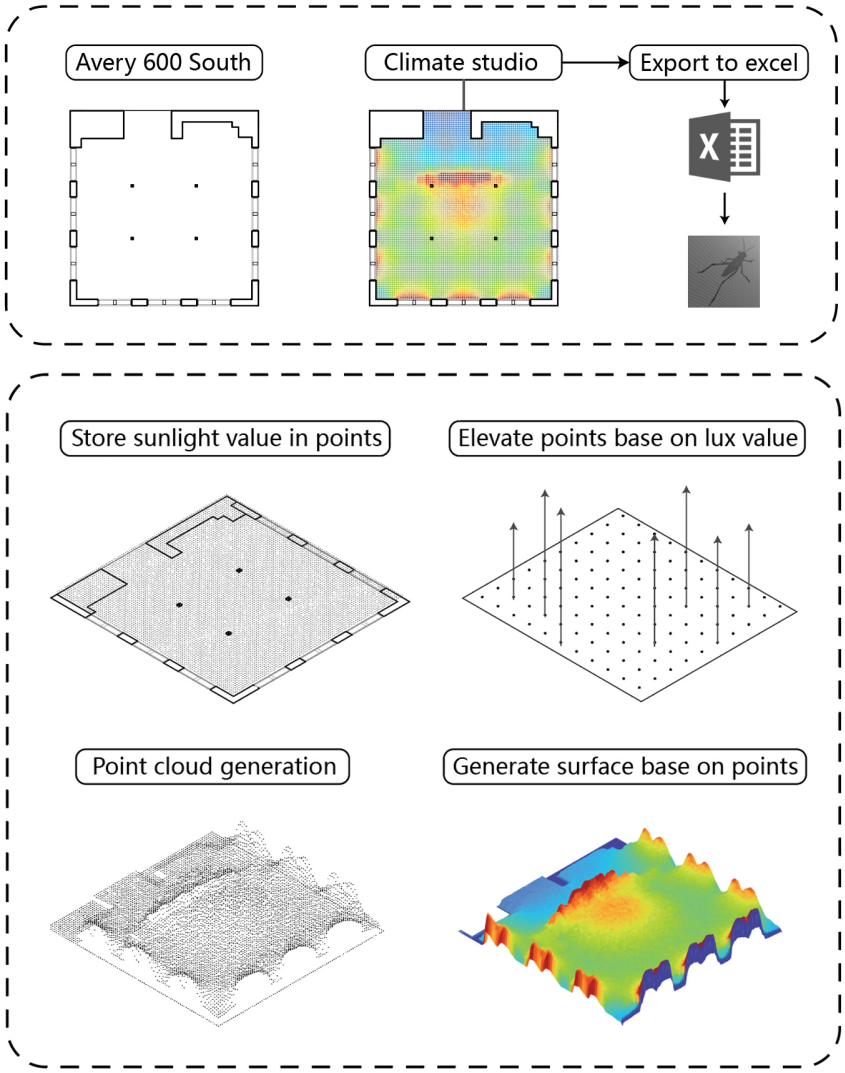
In the past decade, our interaction with the world has been deeply affected by artificial intelligence. Many industries including finance, science, and manufacturing have been revolutionized by developments in Machine Learning, optimization, and other artificial intelligence technologies, which have allowed them to leverage the power of computing to solve complex problems in new and innovative ways.

Meanwhile, architectural design practice has been barely impacted by these developments. Although almost all designers use computers in their practice, the tools they rely on have not leveraged these emerging technologies. As a result, the design profession has not substantially evolved since computers were first introduced to the design world nearly four decades ago.

Perhaps the greatest opportunity for artificial intelligence in design practice today is its ability to leverage another, much older form of intelligence - natural intelligence. Designers have always been inspired by the forms of nature, and their abilities to solve difficult problems in novel and beautiful ways. However, up to this point our inspiration from nature has been limited to 'bio-mimicry', or the reproduction of nature's physical forms in new designs. Can we go a step further and actually design like nature?

To do this we have to first understand how nature designs. The basic element of nature's design is the species, a kind of model which encodes all of the unique properties and abilities of its individual members. The basic tool of nature's design is evolution, which is an iterative process by which species are able to adapt and improve based on interaction with other species and their environment.

A4845 | Generative Design
Location: 114 Avery
Date & Time: Tuesday 9AM -11AM
Call No.: 11422
Cross Registered with Visual Studies



MEASURING THE GREAT INDOORS

Violet Whitney

Lo/Hi VS

An embodied computing course about the future of human computer interactions

In “Measuring the Great Indoors”, students investigate the spatial and tangible potential of web connectivity through the emerging field of embodied computing. We can heighten our connection to the physical world, and each other by designing digital interactions beyond the screen using social experiences over user experiences and spatial interfaces over user interfaces. By bringing technology beyond the screen, our interactions can engage the five senses in all three dimensions.

This course will interrogate methods from embodied computing and user experience; use hardware (sensors, microprocessors, computer vision cameras, smart home products), software (IFTTT and Processing).

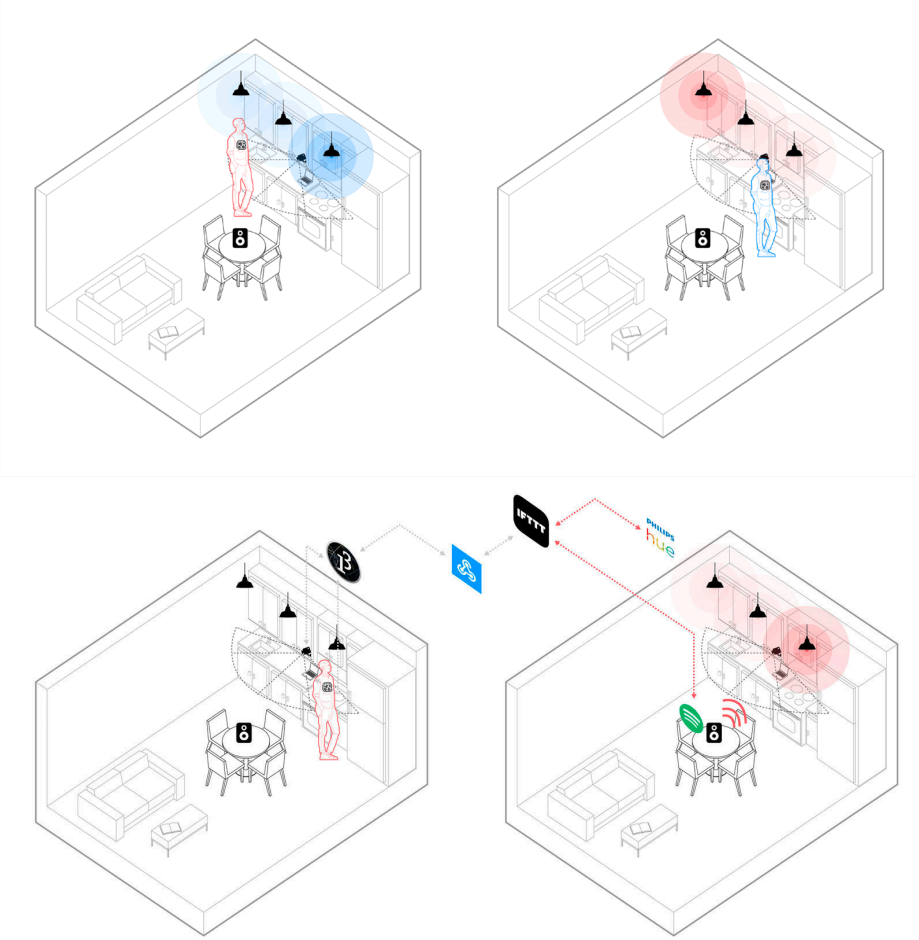
Students will develop 3 projects investigating:
Habit - how should daily rituals be influenced or not by embodied computing: for example how might smart home products actually subvert capitalist intentions of optimizing daily routines?
Privacy - what should privacy look in a future world of embodied computing?
What elements are most important to keep private?
Social - computers, phones, and mixed reality glasses preference the individual. How might projection mapping, and other methods of embodied computing have the potential to preference group experiences?

For each project you will create a vision video that demonstrates the future of embodied computing through a design. The video will encompass: elements of your technical prototype, critical and conceptual backing of the idea and the implications of your design on society.

Example vision videos: Apple’s 87 Knowledge Navigator, Accessories for the Paranoid, A Day In the Near Future

A6857 | Measuring the Great Indoors
Location: 115 Avery
Date & Time: Tuesday 4PM -6PM
Call No.: 11425
Cross Registered with Visual Studies

Student Work Samples
Takashi Honzawa, Jacob Kackley, Karan Matta, and Kylie Walker



RE-THINKING BIM

Student Work Samples
Gejin Zhu and Bingyu Xia

Joe Brennan

Lo/Hi VS

Different assumptions exist for BIM, which stands for Building Information Modeling. Most people will tell you it means Revit. Others equate it more closely with parametric design.

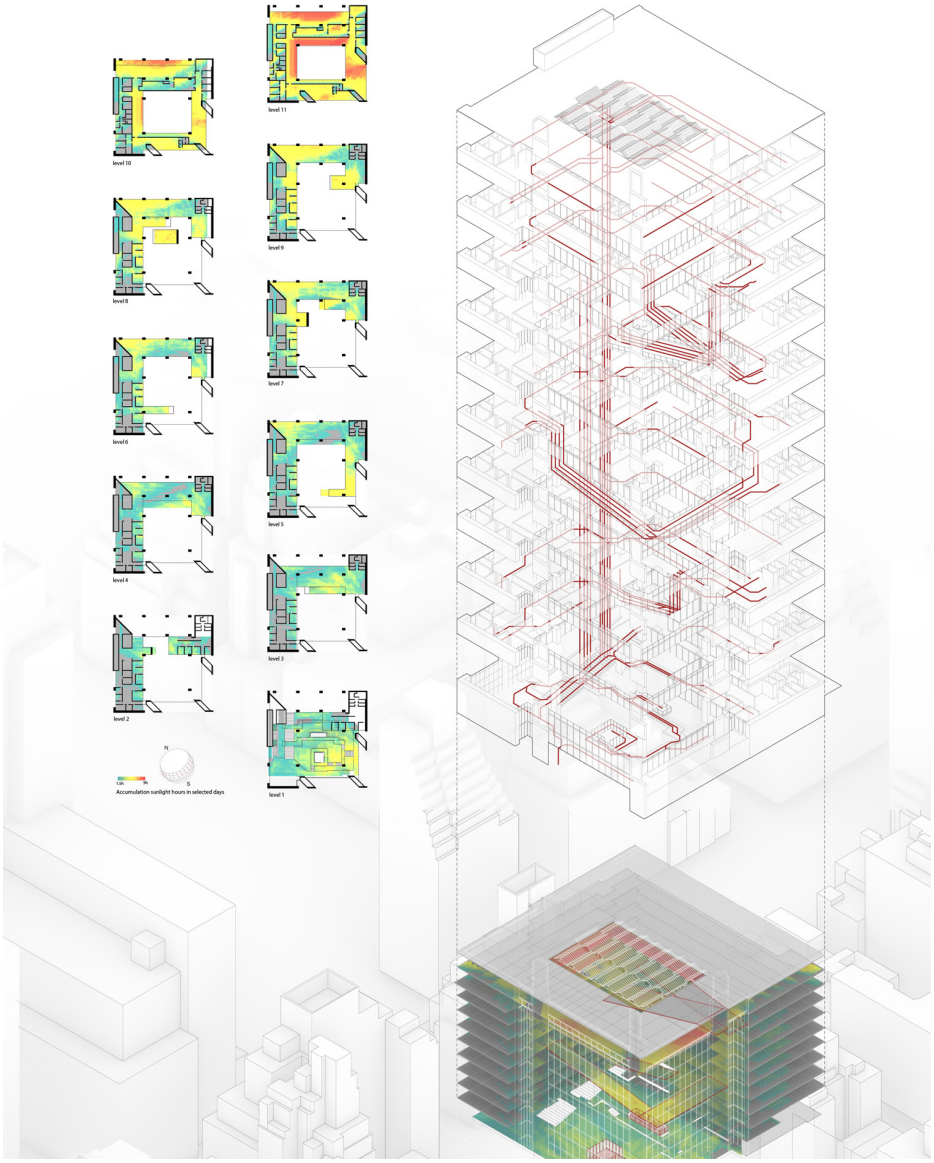
Rethinking BIM will challenge its participants to explore different methods of leveraging BIM to enhance all processes within our industry.

One of the critical drivers of success within architecture is our ability to collaborate with other members of the development, architecture, engineering, and construction (DAEC) industry. We will therefore examine how these related disciplines function. Concurrently, we will develop processes by which we can understand and communicate with them better, more efficiently, and seamlessly. We will also take inspiration from outside of the DAEC industry in areas like tech and manufacturing. Finally, we will leverage drawing and diagramming to visualize and explain these collaborative processes.

Throughout the semester, your project and thinking must function at two scales - macro (urban scale or building scale) and micro (program scale or detail scale). The goal of the class is to leverage new BIM processes to drive better-informed design, so all projects must develop a process that leads to a concrete design idea. You will be required to present both process and design ideas through various assignments throughout the semester. Students will work in groups.

The class will consist of lectures, discussions, pin-ups, office hours, and workshops. Lectures will consist of presentations and case studies. The lectures will consist also consist of software demonstrations. Class time together will focus on “big ideas” and concepts critical to successful project execution.

A4715 | Re-Thinking BIM
Location: 115 Avery
Date & Time: Thursday 7PM -9PM
Call No.: 11420
Cross Registered with Visual Studies



X INFORMATION MODELING

Student Work Samples
Top: Xiangru Zhao and Xumin Chen
Bottom: David Musa, Yuan Li, and Shuang Bi

Snoweria Zhang

Lo/Hi VS

Data is the language of cities. This data is inherently spatial, and as designers and planners we are uniquely suited to leverage it for informed decision making. Accordingly, this course introduces students to computational design through a unique data-driven workflow using Rhino, Grasshopper, and platforms for visual exploration of design and data.

Building Information Modeling has become pervasive throughout the design industry. This class expands the imagination and scope of the model to include geo-spatial data at multiple scales -- cities, neighborhoods, and buildings -- to capture the nuances of urban dwelling. Through a combination of technical bootcamps, readings, and projects, students will develop technical skills alongside a critical understanding of computational design.

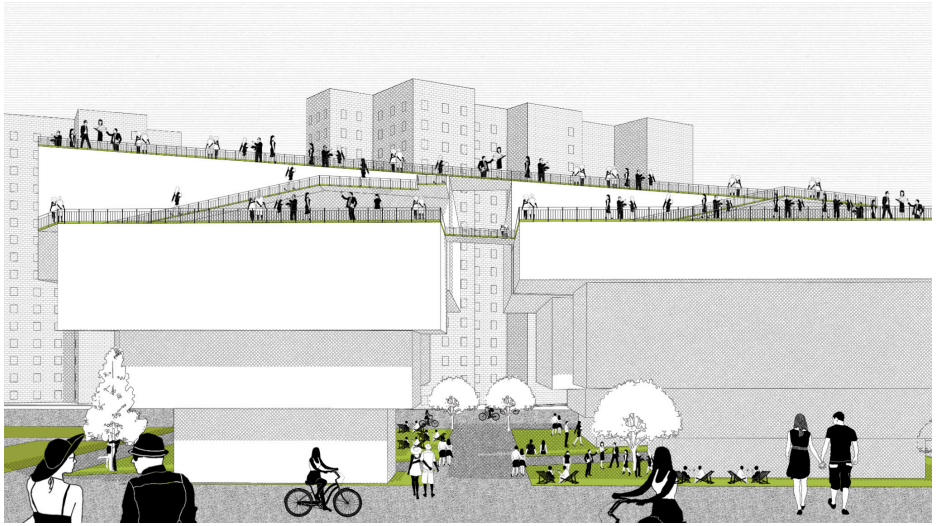
The techniques introduced in this course are applicable across architectural and urban scales; at its core, this class is about creating tools to measure performance, drawing with data, and visualization for decision making. However, the projects will focus on the urban scale and develop new spatial metrics, data visualization, performative zoning/ policies, and data-driven building types. Projects must be spatial, speculative, iteratively tested, and quantitatively evaluated.

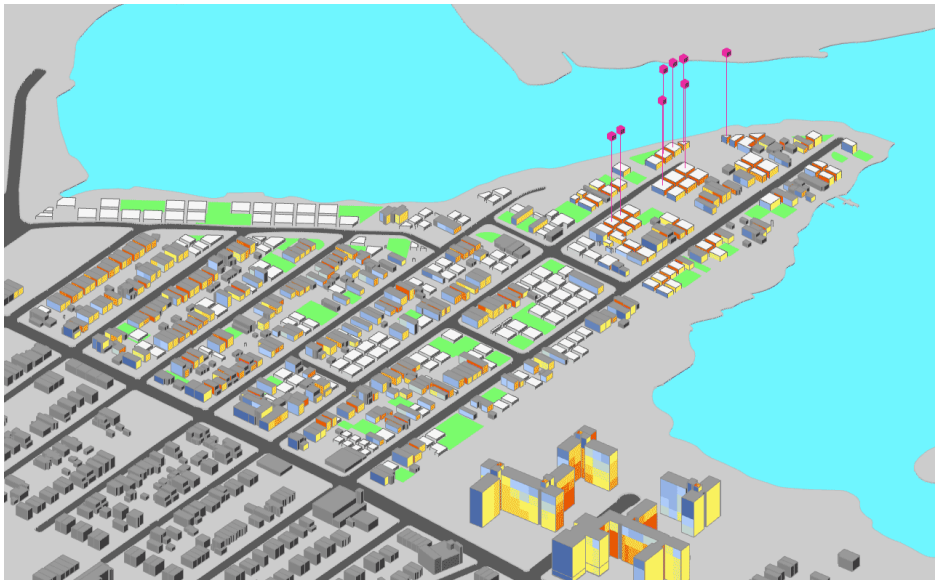
This course will be structured as a flipped classroom. With a few exceptions, technical content will be taught through video tutorials outside of class. Class time will be for reviews, reading discussions and in-class workshops. Help sessions will be provided out of class to help with the technical content as needed.

Students must know some Rhino. Grasshopper proficiency is not required, but a basic understanding is. This class assumes that you have done this Intro Grasshopper tutorial sequence (1-3) as a prerequisite to take the course.

Grading will be 30% attendance + class participation, 40% weekly assignments, and 30% for the final project.

A4815 | X Information Modeling
Location: Ware Lounge
Date & Time: Thursday 9AM - 11AM
Call No.: 11421
Cross Registered with Visual Studies





CONSERVATION OF CONCRETE, CAST STONE, AND MORTAR

Norman Weiss and Heather Hartshorn

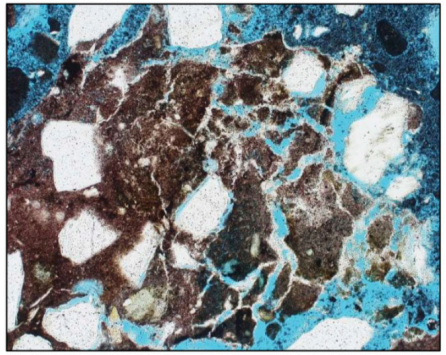
Clim. Lo/Hi HP

Use of mortar and stucco originated in the Neolithic period. The Romans expanded this technology with the development of cast-in-place concrete construction. The course discusses the growing importance of these materials and techniques during the Industrial Revolution, reviewing discoveries that led to the development of novel lime-and cement-based compositions from the late 18th century to the present. By the 20th century, advances in technology transformed concrete and precast from functional engineering media into the most expressive and sculptural substances of modernism.

The visual simplicity of these materials belies the complexity of their curing and aging mechanisms. Materials science is a fundamental tool used tot examine history, and to define suitable repair, replication and maintenance methods for masonry and concrete structures. Key topics are binder types and curing mechanisms; the role of aggregates and admixtures; building performance criteria; construction/manufacturing methods; and field and laboratory evaluation.

A6788 is one of a group of courses on architectural materials recommended to historic preservation students focusing on technical conservation issues.

A6788 | Conservation of Concrete, Cast Stone, & Mortar
Location: 655 Schermerhorn
Session B, beginning March 6th
Date & Time: Monday 2PM -5PM
Call No.: 11515
Cross Registered with Historic Preservation



EXPERIMENTAL PRESERVATION

Jorge Otero-Pailos

Clim. Lo/Hi HP

This hands-on course will employ experimental preservation methods to reimagine the entrance of Avery Hall as an environmental sensor. The semester will be divided in 3 phases. During the first phase, students will learn a combination of techniques such as on-site documentation, 3D scanning, and scientific materials analyses, that will allow them to read the current depositions of dust and weathering patterns on the facades and encoded environmental information.

The second phase will involve studying archival photos and plans of Avery's entrance, which show sculptural lions in front of the stairs. Students will also study air monitoring devices to incorporate them inside a new design for the lions, and accessibility codes for ramp design.

During the third phase students will design a new entrance to Avery Hall, and learn to use VR software to create an immersive experience of their design. Students will work as a team on a collective design, with each participant developing a different aspect of the project, from dust-gathering materials, air monitoring, and accessibility. A physical mockup of the lions will be proposed for the GSAPP end of the year show.

A6714 | Experimental Preservation
Location: 200 Buell
Date & Time: Thursday 11AM - 1PM
Call No.: 11512
Cross Registered with Historic Preservation