ARCHITECTURE
TECHNOLOGY

COURSE CATALOGUE
SPRING 2022

Image: Spring 2021 The Outside Project Seminar

COLUMBIA

GSAPP

BUILDING SCIENCE
&
TECHNOLOGY

ARCHITECTURE TECHNOLOGY

Course Catalogue

Spring 2022

Lola Ben-Alon

Assistant Professor
Director, Building Science and Technology sequence

With our return to campus, I look forward to a Spring semester that will continue to offer new avenues for engagement: including new inspiring elective courses and the Tech event series.

Today, more than ever before, we realize the extent to which the design of healthier built environments by means of architectural design is critical for occupant-related outcomes. We spend more than 90% of our lives within architectural spaces, designed to create situated interactions between people, the environment, and the materials that surround them. With emerging global challenges of social and environmental equity that arise from resource scarcity and public health emergencies, novel approaches to making buildings more resource-efficient, comfortable, and affordable for all, are necessary.

To this end, this year's elective courses at the Building Science and Technology sequence will be geared towards creating novel and radical experimental forms of technology, while celebrating the tactile interaction between people, materials, structures, and the built environments. We will cover a range of topics, from fabrication technologies and emerging healthy assemblies, through supply chain mechanisms of low-carbon and readily available building materials, to net zero and passive housing. This course selection not only provides tools for performance analysis, but also to crafting new ways of understanding and imagining socially equitable and environmentally sound futures.

Also awaiting your discovery are the sequence Spring event series. The newly launched Tech Shops will converge hands-on opportunities to engage with building technology from a variety of perspectives and scales. Focusing on the social and environmental impacts of building and urban technologies and narratives, this year's event series will include creative interventions with a revised outlook on social, cultural, and economic forces on building and ecological systems.

Finally, I want to recognize that we are starting a year not just with excitement but also with an eye towards a communal effort for a better built environment. I hope you will use the semester ahead to advance your role in creating buildings that are healthier, more resource-efficient, and affordable for all.

With best wishes for the semester ahead,

Lola Ben-Alon
Assistant Professor
Director, Building Science and
Technology sequence

The 3D Printed Earth project at The Natural Materials Lab.
Principle Investigator:
Reem Makkawi

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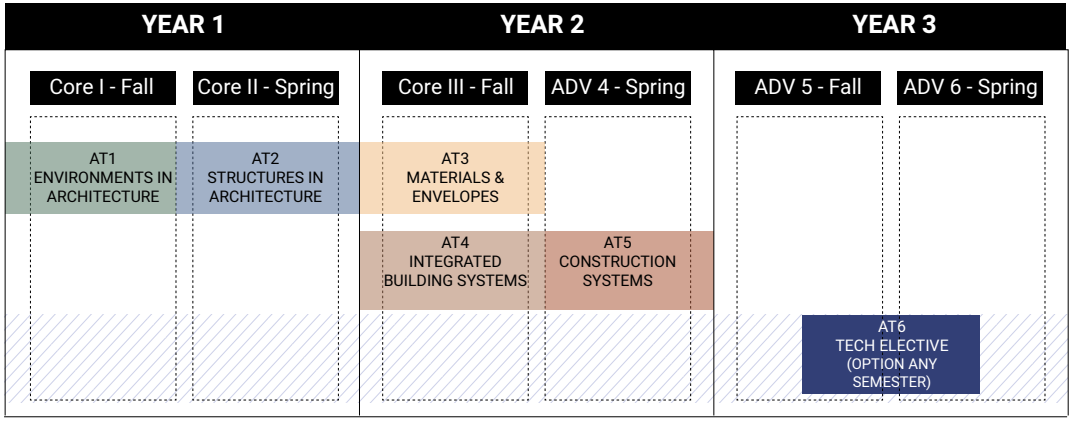
CORE TECH SEQUENCE OVERVIEW

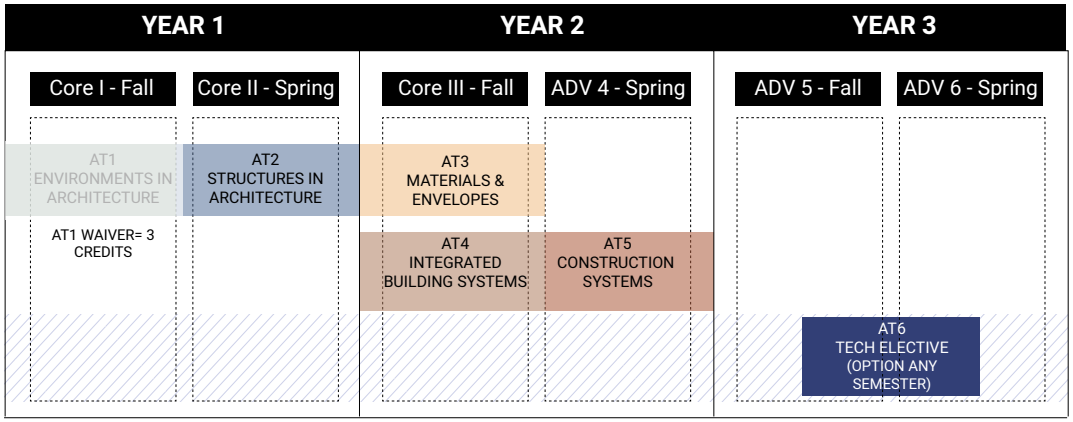
OPTION -1 - NO WAIVERS



CORE TECH SEQUENCE - 18 CREDIT HRS.
REQUIRED CLASSES
(no waivers)

AT1/AT2/AT3 FUNDAMENTALS
AT4/AT5 INTEGRATION
AT6 ELECTIVE

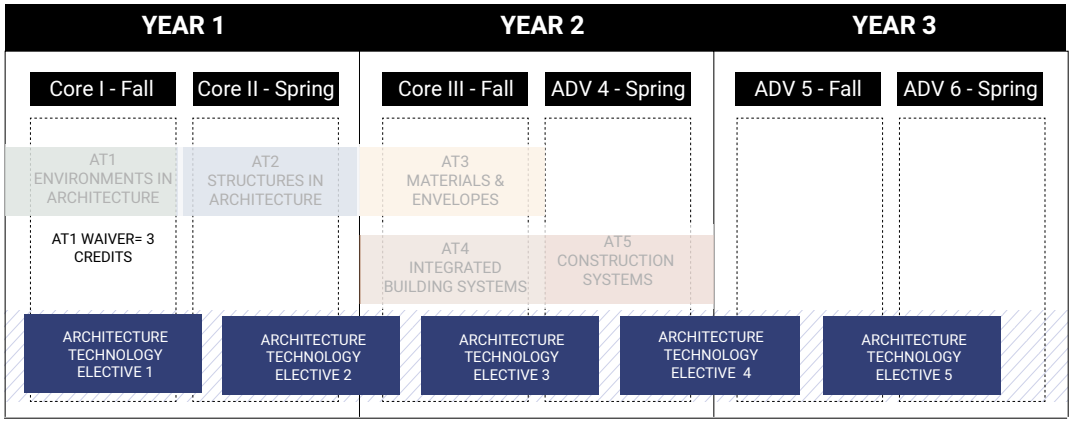
OPTION -2 - AT1 WAIVED



CORE TECH SEQUENCE - 15 CREDIT HRS.
REQUIRED CLASSES
(AT1 WAIVED)

AT2/AT3 FUNDAMENTALS
AT4/AT5 INTEGRATION
AT6 ELECTIVE

OPTION -3 - AT2-5 WAIVED



CORE TECH SEQUENCE - 15 CREDIT HRS.
REQUIRED CLASSES
(AT2-5 WAIVED)

MINIMUM 5 TECHNOLOGY COURSES, ONE ELECTIVE FOR EACH WAIVED COURSE PLUS AT6 ELECTIVE (OPTION ANY SEMESTER)

COLUMBIA GSAPP BUILDING SCIENCE & TECHNOLOGY

ARCHITECTURE TECHNOLOGY
Course Listings

FND FUNDAMENTAL TECHNOLOGIES

INT INTEGRATED TECHNOLOGIES

COM COMPUTATIONAL TECHNOLOGIES

ENV ENVIRONMENTAL TECHNOLOGIES

CON CONSTRUCTED TECHNOLOGIES

Spring 2022

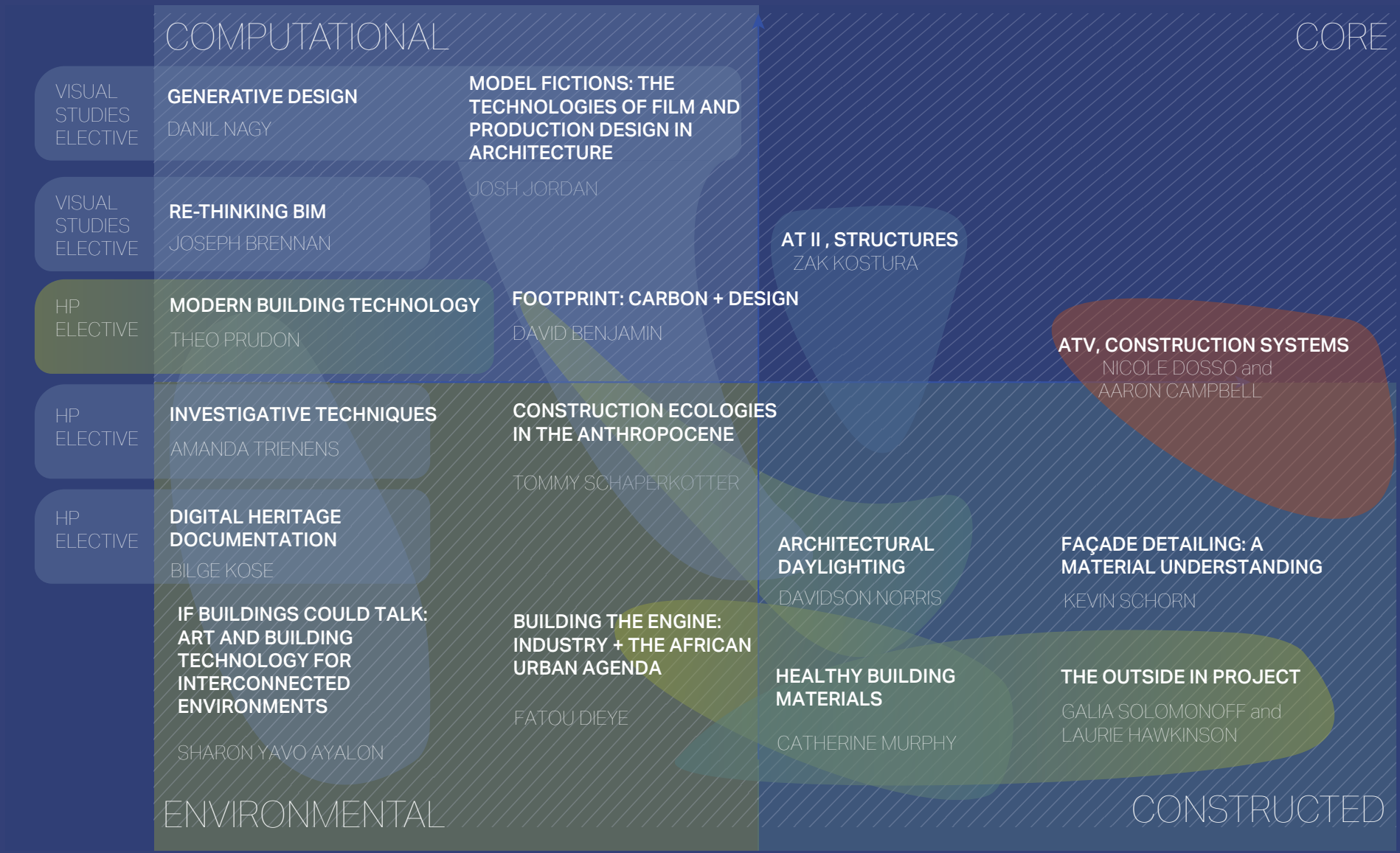
Call#	Course Title	Instructor	Type
A4112	AT2: Structures in Architecture	Zak Kostura	FND
A4115	AT5: Construction Systems	Nicole Dosso	INT
A4845	Generative Design	Danil Nagy	COM
A4715	Re-Thinking BIM	Joseph Brennan	COM
A4815	X- Information Modeling	Luc Wilson & Snoweria Zhang	COM
A4860	Model Fictions	Josh Jordan	COM
A4861	Footprint: Carbon + Design	David Benjamin	ENV
A4124	Modern Building Technology	Theo Prudon	COM
A6702	Investigative Techniques	Amanda Trienens	ENV
A6414	Digital Heritage Documentation	Bilge Kose	ENV
A4854	If Buildings Could Talk	Sharon Yavo Ayalon	ENV
A4874	Construction Ecologies in the Anthropocene	Tommy Schperkotter	ENV
A6886	Building the Engine: Industry + The African Urban Agenda	Fatou Dieye	ENV
A4635	Architectural Daylighting	Davidson Norris	CON
A4849	Healthy Building Materials	Catherine Murphy	CON
A4854	The Outside In Project	Galia Solomonoff & Laurie Hawkinson	CON
A4444	Facade Detailing	Kevin Schorn	CON

COLUMBIA GSAPP BUILDING SCIENCE & TECHNOLOGY

ARCHITECTURE TECHNOLOGY

Course Listings

SPRING 2022



COLUMBIA GSAPP BUILDING SCIENCE & TECHNOLOGY

ARCHITECTURE TECHNOLOGY

Course Listings

SPRING 2022

DATES AND TIMES ARE SUBJECT TO CHANGE

TECH SEQUENCE MEET UP

JANUARY 19th, 2022
12:30 PM - 2 PM
ZOOM

MEET WITH TECH ELECTIVE FACULTY AND LEARN ABOUT THE SPRING 2022 ELECTIVES AND WORKSHOPS.

TechShop STORYTELLING

FEBRUARY 7th, 2022
11 AM - 12 PM
LOCATION : TBD

Storytelling and how to adapt it to building tech will be hosted by a member of the Columbia Startup Lab and will focus on framing technology ventures using the 'lean start-up method' with Tenlie Mourning from the Columbia Start-Up Lab.

TechShop WORLD BUILDING

FEBRUARY 14th 2022
11 AM - 12 PM
ZOOM

World Building and your activist voice in the city will be led by a team from a cross-disciplinary group of scientists/ artists/ students.

TechShop WORKING WITH COVE.TOOL

MARCH 23rd, 2022
1 PM - 2 PM
ZOOM

Working with Covetool - beautiful analysis graphics for energy, daylight, carbon, and HVAC will show students how to use Covetool to create beautiful analysis graphics for energy, daylight, carbon and HVAC.

TechShop BUILDING TECH PRESERVATION

APRIL 4TH, 2022
11 AM - 12 PM
LOCATION : MORNINGSIDE HEIGHTS CAMPUS

Building Tech Preservation Architecture technology histories at Columbia University will include a material sampling/ drawing workshop around Columbia University led by Tim Michiels

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Course Descriptions

Spring 2022

Student Work Samples
Toward Construction Scale 3D
Printing of Ornamented Gypsum
Walls, Independent Study 2021
Jonathan Foy

AT2: STRUCTURES

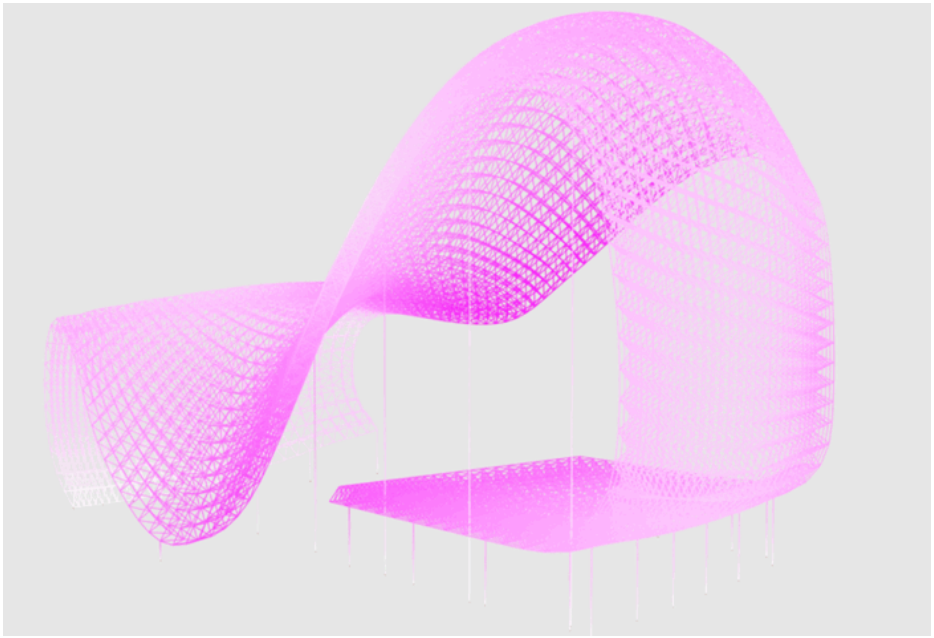
FND CON

Zak Kostura

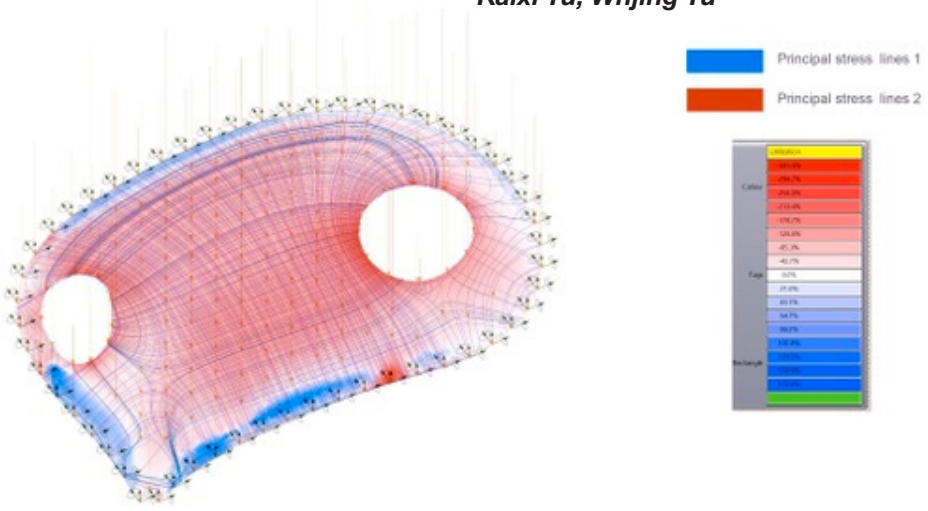
ATII Structures in Architecture provides students with an understanding of what structural design means and how it's carried out. Students gain familiarity with basic elemental forms, structural assemblies and systems, and new and emerging materials. Through project-based and hands-on work, students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

A4112 | AT2 STRUCTURES IN ARCHITECTURE
LOCATION: AVERY 114
DATE & TIME:
TUESDAY 9:00 AM -12:00 PM
CALL NO.: 14334

Student Work Samples
Min Soo Jeon, Roman Karki-William Rose, Dongxiao Yang. Elaine Yu



Student Work Samples
Maxine Gao, Yiyi Gao, Hanyu Liu, Kaixi Tu, Wnjing Tu



Principal stress lines and material utilization

AT5: CONSTRUCTION SYSTEMS

INT CON

Nicole Dosso

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 detail components, interrelationships and construction sequencing. Students will be provided construction shop drawing and will be expected to analyze the details and construct the assembly. During the first half of the semester students working in assigned groups of (4) will develop chunk model drawings and a physical three-dimensional printed model that will document the components and sequencing of one of the predefined building conditions.

· Floor Assembly
· Vertical Transportation
· Curtainwall – (4) way intersection

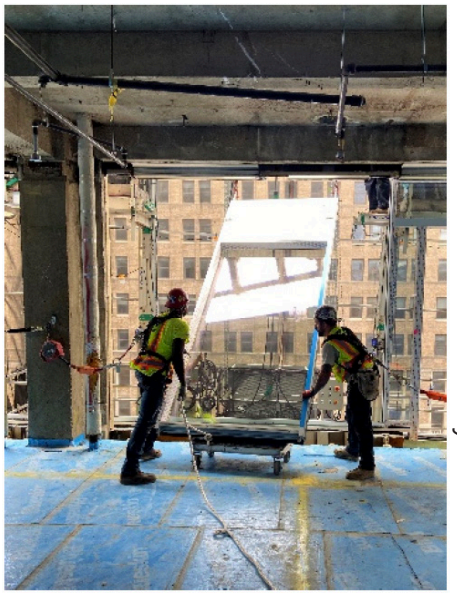
During the second half of the semester students working in the same groups of (4) will trace the evolution of the design process from shop drawings back through the architectural phases of design documentation (schematic, design development and construction documents).

The final review will consist of presentation of the physical three-dimensional printed model and further developed chunk model drawing of the assigned condition and evolution.

Throughout the semester the class will explore topics such as:
· Translation of construction documents to fabrication
· Roles and responsibilities of the architect, contractor, fabricator
· Project management: cost analysis, bidding, scheduling
· Construction sequencing and logistics
· Construction means: hoist, formwork, off site fabrication
· Global market and the supply chain

Classes will incorporate presentations, in-depth discussion of building conditions, Q&A sessions to engage student participation and presentation and discussions with industry leaders in the building industry: architects, general contractors and fabricators.

A4115 | CONSTRUCTION SYSTEMS
LOCATION: AVERY 114
DATE & TIME:
FRIDAY 2 PM - 5:00 PM
CALL NO.: 14335



Student Work Samples
Anirudh Chandar,Daniel Kim,
Jacob Li & Shuang Bi

COM VS ELECTIVE

Danil Nagy

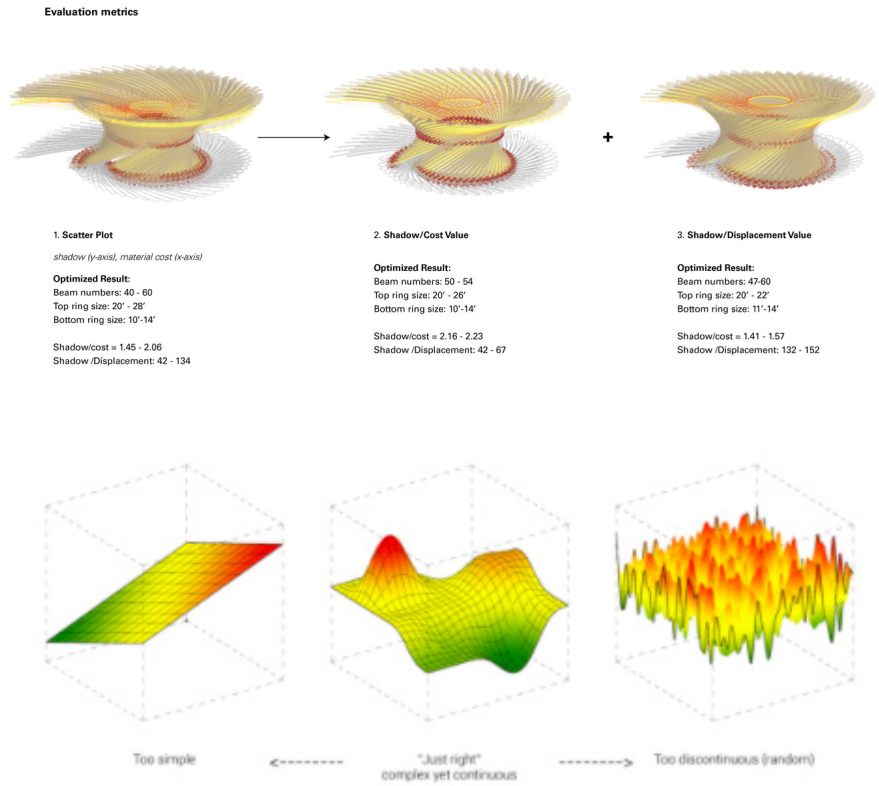
In the past decade, our interaction with the world has been deeply affected by artificial intelligence. Many industries including finance, science, and manufacturing have been revolutionized by developments in Machine Learning, optimization, and other artificial intelligence technologies, which have 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: AVERY 114
DATE & TIME:
TUESDAY 9AM - 11AM
CALL NO.: 14324



COM VS ELECTIVE

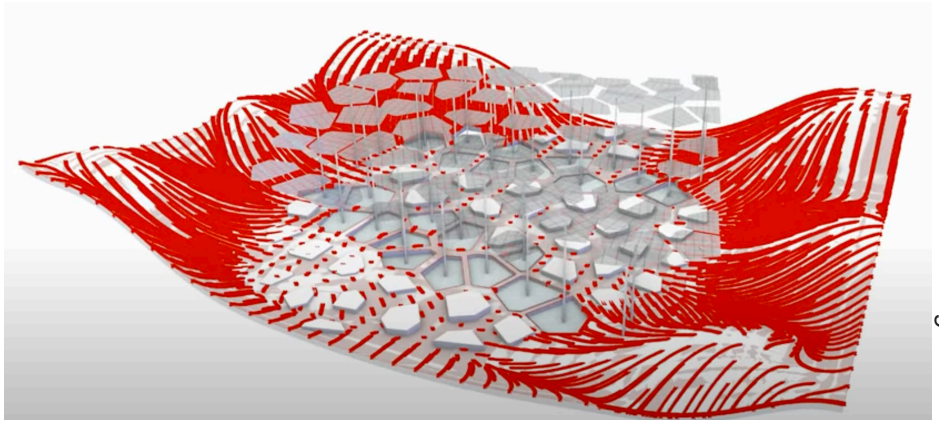
Joseph Brennan

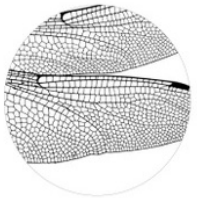
Our capabilities as architects today, to create and leverage organized building information, is continuously expanding the possibilities for designing and understanding what we build and how we can build it. Developing a literacy of the digital tools and how to leverage them through informed design practices that exist both within the architectural field and more broadly, is an increasingly essential competency for designers. This class challenges students to develop robust methodologies and frameworks to better drive possibilities for creative iteration and validation of design solutions through analysis, automation, simulation, optimization, and representation.

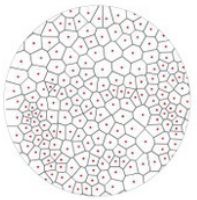
This course is intended to provide foundational knowledge of building information modeling (BIM) practices, as well as relevant options for alternative design-platform interoperability and integration. Sessions will include case-study review and discussion, critical analysis of design and design-technology strategies, and overall exposure to diverse approaches to industry design practices. Guest lecturers will introduce industry-proven examples of platform integrations, and demonstrate methodologies for students to consider for their own design problem. The guest lectures will each take a different lens of informed design interventions and interoperability, including computational and iterative design, advanced interoperability for design optimization, performance-based strategies to address energy and environmental design considerations, and cloud-BIM strategies to iterate at the detail level of building articulation. Throughout the guest-lecture portion of the semester, students will be introduced to a sampling of more specialized tools that will enable them to take a deeper investigation into topics of interest.

For the final project, students will select one or more approach to interoperability and design intervention, leverage the affiliated platform(s) to develop their advanced parametric and design-informed methodologies, and apply them to the models developed earlier in the semester with a revised set of design goals.

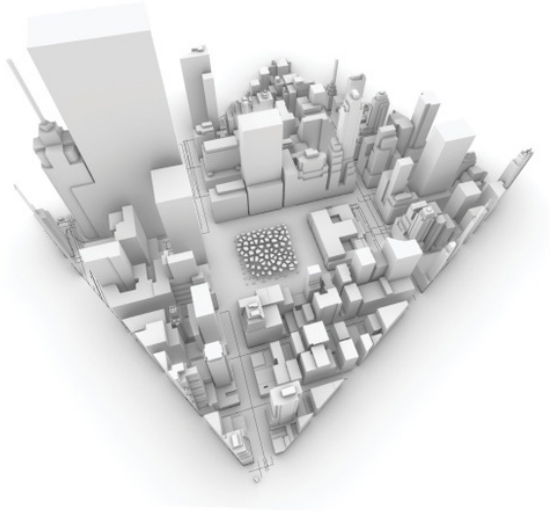
A4715 | RE-THINKING BIM
LOCATION: AVERY 115
DATE & TIME:
THURSDAY 7PM - 9PM
CALL NO.: 14318







Inspiration



X Information Modeling

COM VS ELECTIVE

Snoweria Zhang & Luc Wilson

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 Scout, an interactive 3D web platform for visual exploration of design and data.

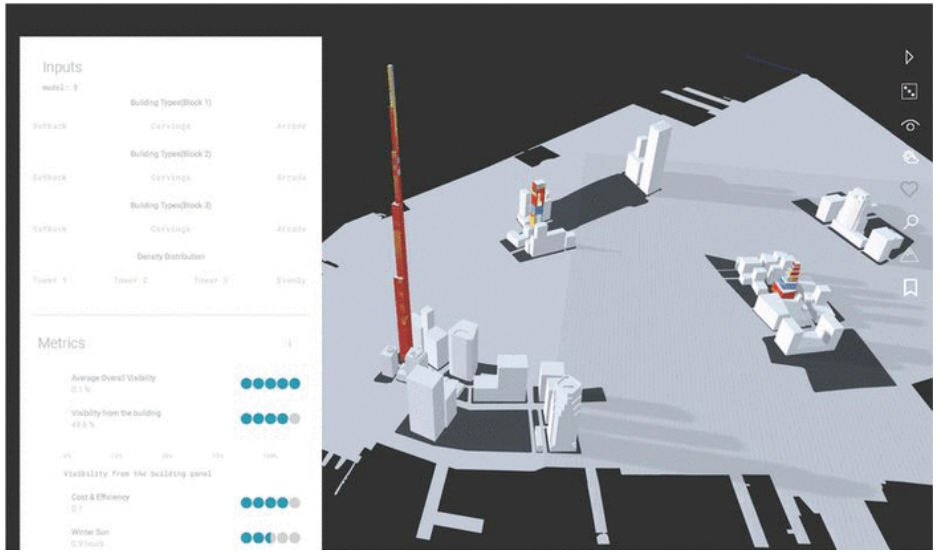
Building Information Modeling has become pervasive throughout the design industry. This class expands the imagination and scope of the model to include geo-spatial data at multiple scales -- cities, neighborhoods, and buildings -- to capture the nuances of urban dwelling. Through a combination of technical 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 (video tutorials available prior to the course). Grasshopper proficiency is not required, but a basic understanding will help. If you are new to grasshopper, it would be helpful to do Intro to Grasshopper and Data Trees prior to the first class.

A4815 | X INFORMATION MODELING
LOCATION: WARE LOUNGE
DATE & TIME:
THURSDAY 9:00 AM - 11:00 AM
CALL NO.: 14320

Student Work Samples
Shuang Bi, Yuan Li & David Musa(above)
Cheng Ju Lee & Jonathan Chester(below)



Model Fictions: The Technologies of Film and Production Design in Architecture

Student Work Samples from Summer 2021 Workshop

COM VS ELECTIVE

Josh Jordan

In this course we engage the skills, ideas, and technologies shared between the practices of production design (for film) and architecture. Consider three topics around which this overlap occurs: the methodological, the conceptual, and the technical.

Methodologically, we will study the scale model as a medium for expressing and developing a moving, complex design idea. Most deliverables in the course are organized around scale models and various extensions of their utility.

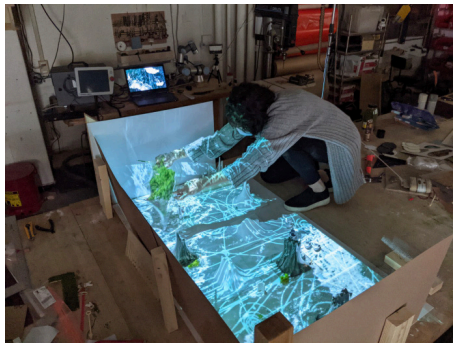
Conceptually, we will discuss the role of designers as storytellers and authors of unique environments/ worlds in which characters live and actions occur.

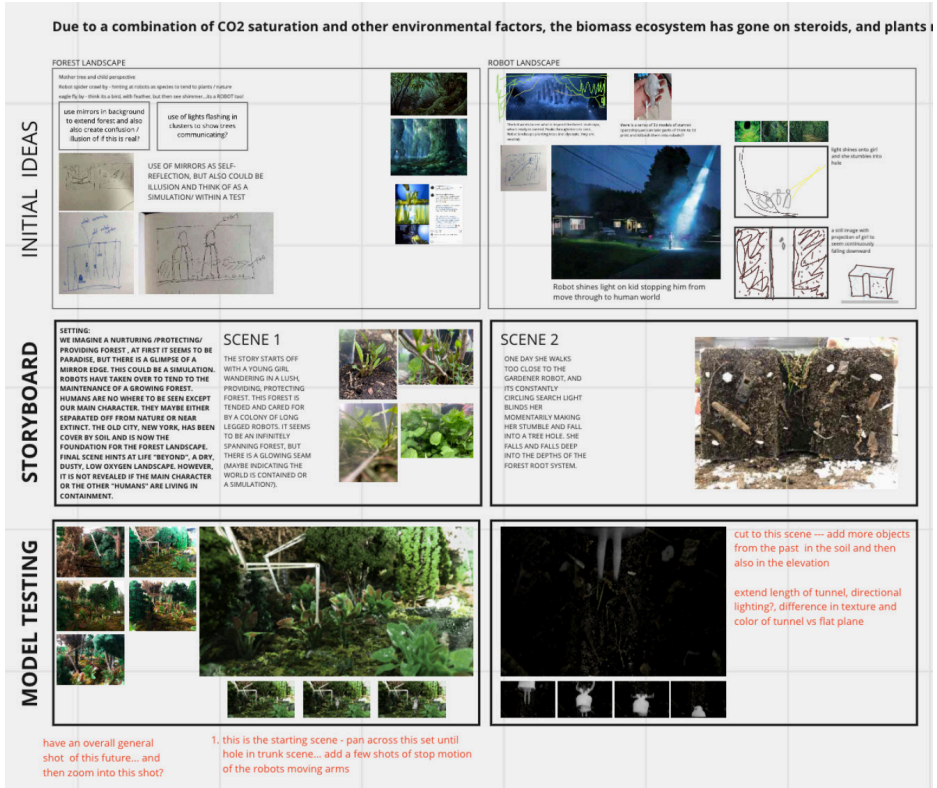
Technically, we will utilize the tools of the GSAPP shops (and those of our own design) to stage, animate, and capture new forms of representation of these stories, worlds, and ideas in motion. This will include building equipment to achieve certain shots, and testing existing equipment's capacity for this sort of documentation.

We will accomplish this by starting with a story, building models, and filming them. Small groups of students will be given premises for fictional future scenarios, and they will develop and articulate the worlds in which these stories occur by making working, detailed, scenographic scale models. These models will be then filmed in a series of scenes developed in consultation with your peers and instructor. The ultimate deliverable for the course is a short film (or series of clips) of these highly developed models.

Learning from production design also means learning from filmmaking, so we will study some basics of the practice and build a vocabulary of terms and techniques that are inheritable and applicable to our own practices of architectural design. This will include guest lectures from artists and experts in the world of film, and (circumstances willing) trips around NYC.

A4860| MODEL FICTIONS
LOCATION: AVERY 115
DATE & TIME:
WEDNESDAY 7PM - 9PM
CALL NO.: 14347





Footprint: Carbon + Design

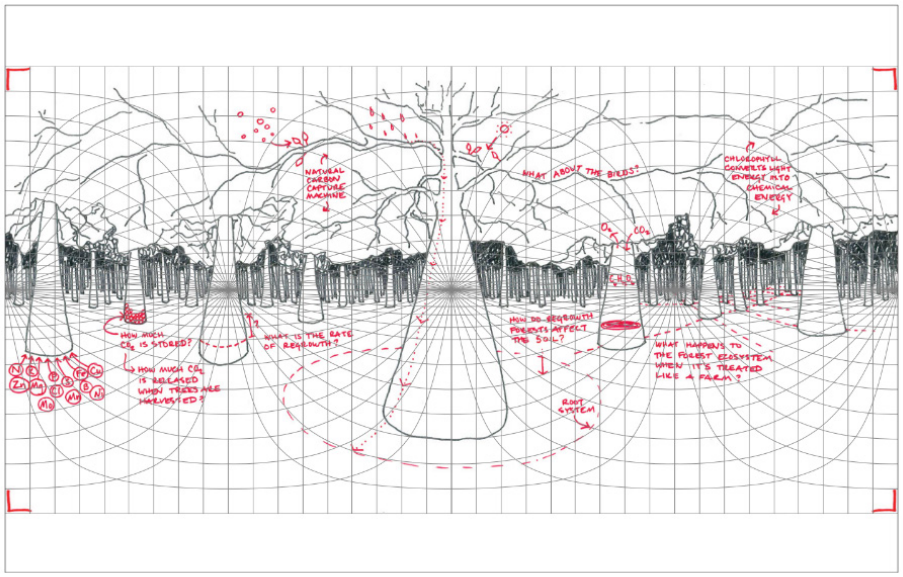
COM ENV

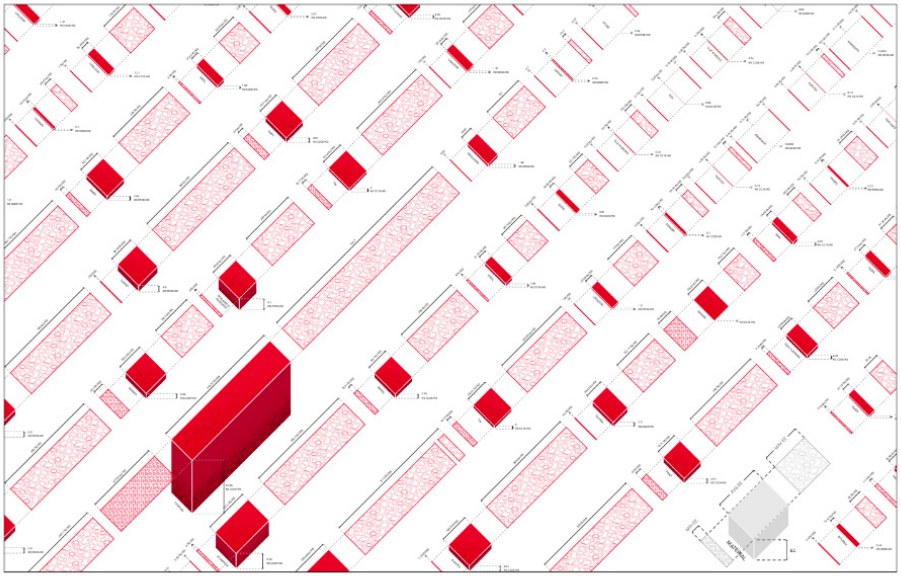
David Benjamin

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 dissembly.

A4861 | FOOTPRINT: CARBON AND DESIGN
LOCATION: AVERY 409
DATE & TIME:
THURSDAY 11 AM - 1PM
CALL NO.: 14350





Embodied Energy Pilot Project at GSAPP (drawings by Lindsey Wikstrom, Thomas Wegener, and Accurat)

Modern Building Technology

Photograph: Flat Iron Building, New York NY c.1906

COM ENV HP ELECTIVE

Theo Prudon

Building technology changed fundamentally during the 19th and 20th century. Traditional loadbearing masonry and wood framing technologies were gradually abandoned in favor of technologies that enabled larger and taller buildings that had open spaces with large clear spans, had thinner walls and were more 'fireproof'. While the development of the structural frame and architectural materials and detailing are known examples, advances in many other disciplines and trades made this possible.

Aside from engineering and material sciences, other less obvious factors played a role. Railroad engineers brought structural engineering to building design and affected construction and erection practices. Industrial production brought off site fabrication and prefabrication. The many new and different disciplines and trades requiring greater coordination and communication produced many more and different drawings needing more advanced reproduction technologies.

Scheduling became important to reduce construction times, the concept of 'core and shell' and lesser use of the 'wet (masonry) trades' minimized the impact of weather and labor.

Many of these changes will be studied by tracing the evolution of skyscrapers to the rise of postwar residential design and corporate structures. The development of modern architecture will be placed in the broader context of changes and advances in various directly related and more general technologies and how these developments affected design and form giving. In turn, it will provide an understanding of what is continuing to affect design, technology and preservation.

A4124| MODERN BUILDING TECHNOLOG Y
LOCATION: 655 SCHERMERHORN
DATE & TIME:
FRIDAY 11AM - 1PM
CALL NO.: 14358

ENV COM HP ELECTIVE

Amanda Trienens

Buildings are complex assemblies. The study of existing buildings allows us to understand their construction and present condition and to evaluate compatible materials and methods for their conservation. Investigation also gives us a way to recognize alterations that have been done over time, and to determine the critical role played by architectural decisions made during construction and subsequent repairs.

The tools and techniques of building investigation in use today are numerous and vary widely from low to high tech approaches, providing practitioners an array of options to study their structures. In the field some tools include infrared (IR) imaging, rebound hammer strength measurement, Karsten tube testing, ground penetrating radar (GPR), X-ray fluorescence (XRF), and ultrasound. Sampling allows us to carry out additional studies in the laboratory, based on some knowledge of statistics and data treatment.

Off-site techniques include microchemistry, mortar characterization by gravimetric analysis, water absorption studies, and freeze-thaw testing.

This course will include hands-on site testing, laboratory testing, lectures, and guest speakers.

A6702 | INVESTIGATIVE TECHNIQUES
LOCATION: 655 SCHERMERHORN
DATE & TIME:
WEDNESDAY 1 PM - 3 PM
CALL NO.: 14370

Digital Heritage Documentation

Student Work Samples
Spring 2021 Studio

ENV COM HP ELECTIVE

Blige Kose

Heritage places are areas of complex data with spatial relations. In order to make pertinent preservation, planning, and management decisions on heritage places, the spatial data regarding these places should be derived, stored, structured, analyzed and presented with a systematic and robust approach. Thus, a well-constructed heritage recording and information management system has a crucial role for the future of the heritage places. “Digital Heritage Documentation: GIS, Building Surveying and Data Management” course is designed to give information about different techniques and tools in heritage recording and information management in different contexts and cases according to place’s scale, accessibility, and required outcome.

The course consists of two cores. The first core focuses on the digital documentation and information management of heritage places in site and urban scale. Geographic Information System (GIS), which is an essential data management tool to store, process, analyze and present complex spatial data collected from various sources like site surveys, archives, and literature, will be introduced during this part of the course. The second core focuses on the documentation and information management of heritage places in site, building and feature scales. In this part, different heritage surveying and recording techniques like photogrammetry 3D laser scanning, and traditional techniques will be introduced.

During the course, the students will have the opportunity to have hands-on experience in the digital heritage documentation processes via lectures, site surveys and lab exercises. In addition to hands-on experiences with various surveying equipment and computer software, students will build and expand their skills in integrated heritage recording, documenting, monitoring, information management, and presentation processes in different scales.

A6414 | DIGITAL HERITAGE DOCUMENTATION
LOCATION: 655 SCHERMERHORN
DATE & TIME:
WEDNESDAY 4PM - 6PM
CALL NO.: 14367

Digital Heritage Documentation

If Buildings Could Talk: Art and Building Technology for Interconnected Environments

ENV COM

Sharon Yavo Ayalon

The histories of art and technology are intertwined in multiple ways in the buildings of urban environments. Both possess the power to duplicate and reproduce power relations or subvert them.

The combination of both can become a powerful tool to elicit social change in innovative ways. Specifically, the course will target the question of distinctions and boundaries, through the way a building interacts with its immediate surroundings - both physically and socially.

Using the timely combination of art and building technology students will have the opportunity to engage with the societal and political challenges of the urban arena. Not only through analytical and theoretical knowledge but also by intervening and affecting the building they learn in - GSAPP Avery Building with the urban environment surrounding it - Harlem Neighborhood.

The course will be based on a dual-format of a seminar and a workshop; Through lectures and readings, we will examine precedents of collaborative and participatory art projects that use advanced technology and big-data. Through the workshop, the students will develop a suggestion for an artistic intervention to analyze, critic, understand, and create better connections between the GSAPP Avery Building and Harlem Neighborhood. Each group will target a specific societal challenge, and suggest a way to create a meaningful dialogue between the building and the neighborhood within which it resides.

A4854 | IF BUILDINGS COULD TALK
LOCATION: AVERY 409
DATE & TIME:
MONDAY 11 AM - 1PM
CALL NO.: 14364

A mapping by 1024 Architecture, projected on the facade of former Lyrical theater the “Celestins”

Krzysztof Wodiczko, The Tijuana Projection, 2001, Public projection: Centro Cultural de Tijuana, Mexico

Construction Ecologies in the Anthropocene

ENV CON

Tommy Schapekotter

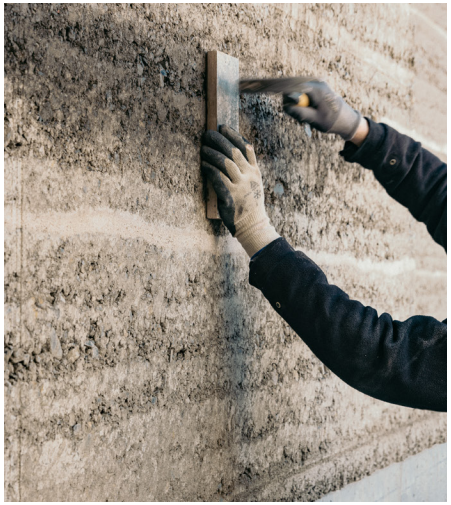
How should designers understand their complicity and capability in the Anthropocene? Is it possible to reconsider our roles and processes within a climatically relevant time frame? Can we make a world worthy of the matter and energy borrowed from it? This course will navigate histories, theories, technologies, and ecologies of construction while posing critical questions about architecture's myriad possibilities for revitalized social and ecological narratives commensurate with the existential challenges of the Anthropocene.

Construction technics, metrics, and ethics will be explored within a disciplinary shift from the perception of buildings as isolated and autonomous objects toward an understanding of buildings and building as inherently open and perpetual socio-ecological processes. Through this system boundary, the course will challenge the prevailing paradigm of innovation and offer nonmodern alternatives through quantitative and qualitative inquiries of energy, carbon, capital, care, repair, labor equity, and life cycle assessment. Students will explore these imperatives through diverse forms of measurement, documentation, and illustration while learning to characterize contemporary architectural and construction practices through the terrestrial web of matter and energy that constitute the temporary vessels we inhabit as buildings.

The course is structured as a seminar that will include workshops and guest lectures, granting students access to other practitioners' tools, techniques, and methods. Weekly discussions will be informed by readings and case studies. Students, working individually or in teams, will select their own topics for a project to manifest themes from the semester.

A4874 | CONSTRUCTION ECOLOGIES
LOCATION: AVERY 300
DATE & TIME:
FRIDAY 9 AM - 11 AM
CALL NO.: 14353

Images:
Hanna Mackowitz



Building the Engine: Industry + the African Urban Agenda

ENV CON HP ELECTIVE RED ELECTIVE

Fatou Dieye

By 2050, it is estimated that nearly 65% of Africa's population will be urban, living and working in cities big and small. This rural to urban shift is taking place at an unprecedented rate, transforming landscapes and economies across the continent. Historically, the urbanization process ushered in a period of intense economic activity, driven in part by a concentrated and increasing demand for space (buildings) and services (infrastructure). So even as national and local governments in Africa grapple with the practical challenges of speedy urbanization (e.g., overcrowding, job and housing scarcity and stress on municipal budgets and natural ecosystems), the hope is that the sheer volume of demands generated by accelerated urban development will serve as an engine of sorts, a primary driver for a country's economic growth.

The relationship between a country' s level of construction activity, its urbanization rate and its stage of economic development has been the subject of study for many years and the performance of a country's construction sector remains a key development indicator. While typically measured, analyzed and discussed at national level (GDP, DFI etc.), the actual mechanics of the construction industry, and therefore its direct impacts on economic development, can best be understood at the urban level, where the supply and delivery of buildings and infrastructure confronts skyrocketing demand. Although many African countries have revised the focus of their urbanization policies to consider urban agglomerations of all sizes as generators of economic growth, their policies and plans often fall short of forging the critical link between ambitious urban development targets and sustainable building and infrastructure supply mechanism that require a healthy and robust construction and building materials sector.

The main goal of this research is to interrogate existing urbanization policies, building practices and planning agendas to create linkages and capitalize on opportunities to ensure sustainable and equitable growth in Africa's growing cities.

A6886 | BUILDING THE ENGINE
LOCATION: AVERY 409
DATE & TIME:
FRIDAY 9 AM - 1 PM
CALL NO.: 15213

Architectural Daylighting

CON ENV COM

Davidson Norris

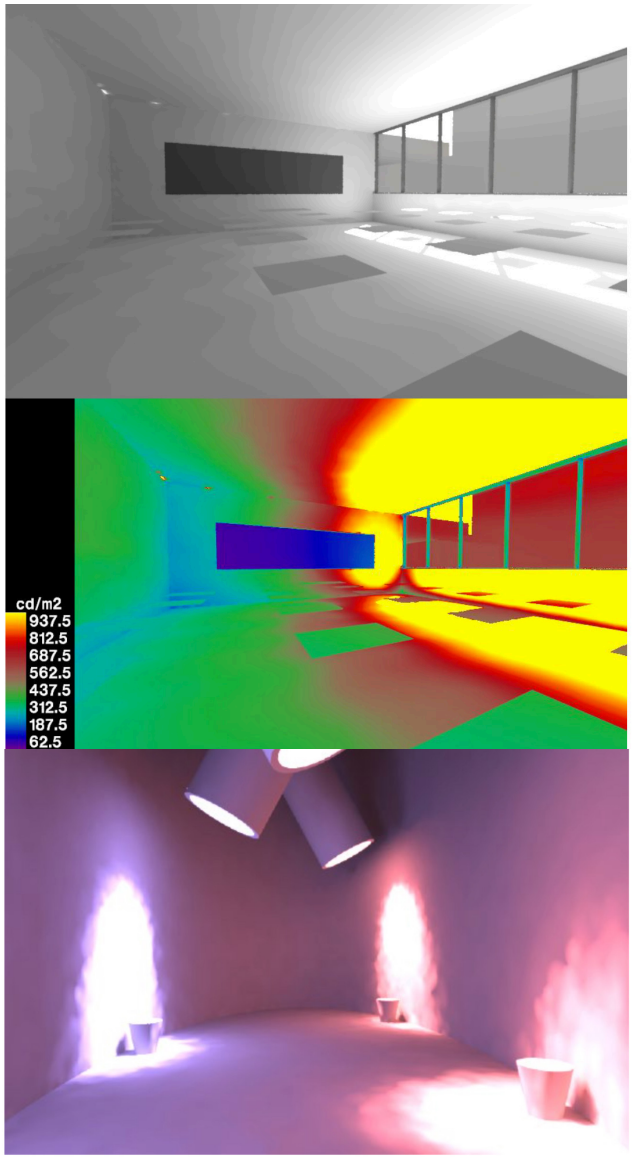
"Natural light is the only light that makes architecture Architecture..." - Louis Kahn

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 504
DATE & TIME:
THURSDAY 11 AM - 1 PM
CALL NO.: 14340

Images:
Diva Study of Classroom Luminance



Healthy Building Materials

CON ENV

Catherine Murphy

At a time when we are so acutely focused on human health, vulnerable populations, and the inequity that exists due to a range of socio-economic barriers, the relationships between health and the built environment are more vivid than ever. This course addresses how architects can overcome the negative health outcomes that have been caused by toxics in building products.

Students will explore the relationships between building materials, chemical toxicity, and environmental exposures that directly impact human health and the communities which are most adversely affected. You will be introduced to materials and products that are used in buildings, understand why chemicals in common building products can be harmful to human health, and explore healthier alternatives.

We will look at current practice to see how leading firms are executing healthier buildings to inform and develop methodologies that can be applied in your 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.

The goal is to empower students to transform architectural practice with the knowledge that healthier buildings lead to healthier lives.

A4849 | HEALTHY BUILDING MATERIALS
LOCATION: AVERY 409
DATE & TIME:
WEDNESDAY 11 AM - 1 PM
CALL NO.: 14342

CON ENV

Galia Solomonoff & Laurie Hawkinson

This initiative shall fulfill the requirement of a Tech Seminar. The focus of this seminar is to investigate, document, design, build and program the activities at a temporary pavilion to be erected by the participants at the Columbia Campus. This seminar will be offered as hybrid teaching and meet weekly on Thursdays between 11 am and 1 pm, for a maximum of 18 students to fulfill the tech seminar requirements of any GSAPP programs. In person participation is encouraged.

The seminar instructors, Laurie Hawkinson and Galia Solomonoff, will be supported with consulting engineers. Additionally, as this seminar will integrate Construction Management into its teachings, we will also be supported by Mark Taylor and Josh Jordan from GSAPP, who will co-teach and lend their expertise throughout construction.

The seminar will begin by researching precedents for temporary pavilions, progress into the design, feasibility study, structural and mechanical consulting and review, project management budget management, and construction.

A4859| THE OUTSIDE IN PROJECT
LOCATION: WARE LOUNGE
DATE & TIME:
THURSDAY 11 AM - 1 PM
CALL NO.: 14344

Facade Detailing: A Material Understanding

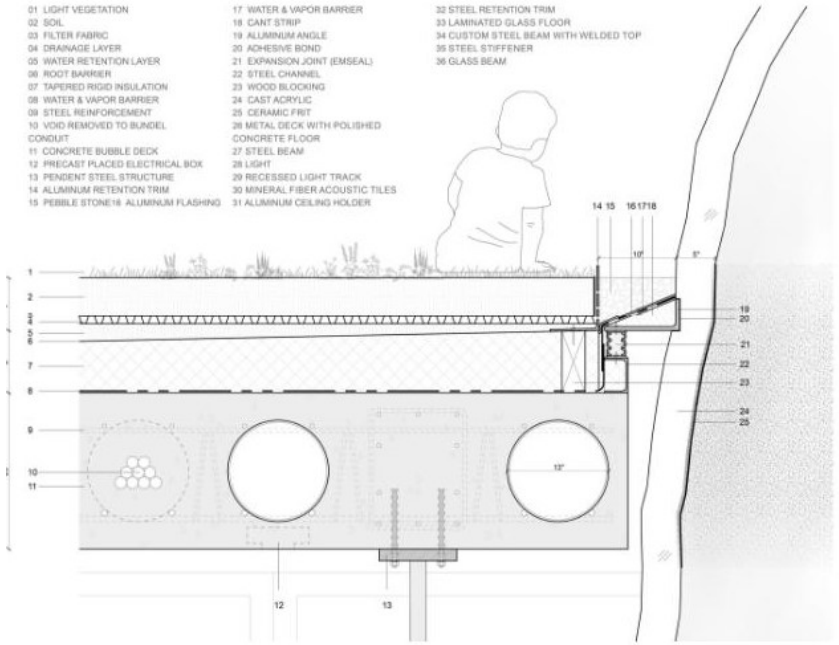
Student Work Samples
Sarah Shi, Cris Liu

CON ENV

Kevin Schorn

This course explores the detailed design of building cladding through an understanding of materials and their physical properties. There is an emphasis on sketching details at large scales (often 1:1) by hand to facilitate a proper understanding of everything involved at the interface between the interior and exterior environments and the other necessary building systems. Students develop a deep understanding of many different cladding materials and what it takes to remain in command of the entire building process from design concept to built work.

A4444 | FACADE DETAILING
LOCATION: AVERY 409
DATE & TIME:
THURSDAY 9 AM - 11 AM
CALL NO.: 14336



Materials	Physical Properties Density (lb/ft^3)	Modulus of Elasticity (ksi)	Yield Strength (ksi)
Aluminum (grade 6063-T6)	168.5	10,000	31
Brick (clay-fired)	93.64 -112.3	1,410 - 5,000	0.3
Mortar (cement, type N)	130	580	0.3
Concrete	156	4,350	0.5
ETFE	70 - 117	126 - 245	0.73-4.35
GFRP (cast, Type "E" fibers)	90	900	12
Glass Annealed	160	10,100	5.8
Tempered	"	"	17-29
Polycarbonate (extruded)	70-80	260-470	8.5-10.2
Rammed Earth	144	0-1,450	-
Steel Structural shapes or plates, grade A36	490	29,000	36
Stainless Steel (Austenitic grade 304)	499	28,000	31
Weathering (Cor-Ten A), t < 3/4"			40-50
Terracotta	130	5,000-6,500	-
Wood - Hardwood	28-50	1,200-2,160	8.5-20.2
Softwood	23-38	1,110-1,950	7.5-13.1