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| **Type of Course:** | **Advanced Studio ARCH 51000 / ARCH 85101 / ARCH 92102** |
| **Class Meetings:** | **Mon/Thu 2:00-5:50 pm; Thursday lectures @ 5:30 pm** |
| **Instructor:** | **Professor Frank Melendez** |
| **Location:** | **Spitzer Room 320** |
| **Semester/Year** | **Spring 2020** |

# Bio-designed Objects

**STUDIO OVERVIEW**

This studio focuses on novel sustainable and ecological approaches to architecture and design, through the conflation of material experimentation and computational design processes. Architecture consists of static physical constructs (walls, floors, roofs, etc.), as well as dynamic environmental phenomena (light, sound, temperature, etc.). The studio is twofold; on one hand, speculating about new possibilities of hybrid formations between synthetic and natural systems, aiming to use studio research and design development as a test bed for making prototypes for the physical construct of architecture through the use of sustainable bio-composite materials, and on the other hand, considering new opportunities for analyzing and mapping existing environmental conditions through the use of computation and data.

*Bio-design.* The studio aims to address topics pertaining to the current climate crisis, and to advance the recent movement in upcycling organic and inorganic matter to make products, through speculative architectural scenarios. The studio will situate design within research into ecosystems, bio-technology, bio-materials, and experimental processes for making bio-composites, to test architectural properties and qualities such as structure, texture, form, translucency/opacity, and tectonics. These methods require architects and designers to think ecologically and consider circular approaches towards the built environment.



Emma Sicher, *From Peel to Peel*

*Computational design*. Paradoxically, bio-design will be explored within a framework of digital technologies. Computational tools provide methods for exploring complex systems through analysis, simulation, digital fabrication, sensing, scanning, data-visualization, machine learning, and robotics. These methods require architects and designers to think systematically, algorithmically, dynamically, and to consider the potentials of architecture as open and/or closed loop systems.

This experimental design studio will test these ideas and workflows through the design of a small scale urban intervention consisting of an enclosing structure for public spaces and an exterior (green) space. Situated within a site that merges the city, infrastructure, architecture, and nature, these urban interventions promote bio-design solutions that result in a blurring of the analog and digital, the natural and artificial.

**RESEARCH**

Participants in this studio will work in teams to design a small scale structure, that will serve as a public education center for climate change. Research into bio-composite materials, digital fabrication, sensing, and data visualization will serve as a framework for design strategies that consider circular approaches to design and rethink relationships between architecture and environments. The primary mode of idea development will be working unit to system, at various scales, and merging analog and digital fabrication techniques. The prospect of this studio is to connect design thinking and technological prowess, and instill a culture of architectural design at the intersection of computation, electronics, simulation, and prototyping. The bio-composites research will focus on material experimentation through making. The studio will focus on forming material through casting processes using analog and digital fabrication methods. The data visualization research will focus on image making through the use of physical computing, 3D modeling software, and video editing software. The studio will focus on collecting data using sensors and real-time visualizations within the 3D modeling environment. Both research topics will be explored through experimental methods and workflows.

**PROGRAM**

The project program will consist of public spaces including an exhibit area, lecture room, workshop rooms, restrooms, café, and outdoor (green) space. Each team will determine the project relates to and/or affects larger ecological, landscape, infrastructure, urban, and architectural systems.

**SITE**

The site for the structure will be located within the Concrete Plant Park in the Bronx, NY. This site consists of a public park, hardscape, landscape, and infrastructure, within an urban context and adjacent to a water front, the Bronx River. This space supports public activities often associated with public parks, such as walking, cycling, sitting areas, etc. Historical elements within the park include refinished structures that were part of the original concrete plant, as well as a dilapidated train station on the northern edge of the park. The 'performative' criteria for each project will be developed through individual / team research and based on a site analysis, of visible / invisible, tangible / intangible information / data, which will be acquired and used in the design process in order to improve existing conditions. It is up to each team to determine the appropriate response to the program and intervention of the project within the site.



Concrete Plant Park, Bronx, NY

**SOFTWARE**

The studio will focus on the use of various design programs and digital technologies as well as specific techniques and workflows. Students are expected to have basic knowledge and skills using the 'base programs' listed below. Workshops will be provided to introduce students to the software specified in the 'introduced programs' list. Students are required to participate in the workshops and be proactive in practicing and advancing their knowledge and skills of these software.

*Base programs:*
- Rhino 3D
- Grasshopper
- Illustrator
- Photoshop

*Introduced programs:*
- Arduino
- Various Grasshopper add-ons

**READINGS**

A series of readings will be provided throughout the semester. These readings focus on topics that will be discussed in class and related to the studio project, such as, bio-design, bio-materials, bio-technology, digital design, digital fabrication, sensing, physical computing, etc.

**BIBLIOGRAPHY**

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**FIELD TRIPS**

Currently, the studio is planning two field trips for student to attend exhibitions that support the research and topics of the studio. These exhibitions include Frei Otto, Yale School of Architecture, New Haven, CT and Neri Oxman, Museum of Modern Art, New York, NY.

**WEEKLY SCHEDULE, M/TH 2:00-5:50 pm**
*Note: schedule below is subject to revision through the duration of the semester.*

**W1**
Mon 01.27          **LOTTERY in Rm 107 @ 2 pm, followed by first studio meeting**
Thu  01.30          Studio
                          **5:00pm. Convocation,** Aaron Davis Hall

**W2**
Mon 02.03          Studio
                          Portfolios DUE: 4<sup>th</sup> year B.Arch students (by midnight, box in front of Rm 131)
Thu  02.06          Studio

**W3**
Mon 02.10          Studio
Thu  02.13          Studio (tentative YSOA field trip)
                          **5:30pm. Lecture: Lucretia Montemayor**

**W4**
Mon 02.17          College Closed / Presidents Day
Thu  02.20          Studio
                          **5:30pm. Lecture: V. Mitch McEwen**

**W5**
Mon 02.24          Studio
Thu  02.27          Studio (tentative MOMA field trip)
                          **5:30pm. Lecture: Carlo Bailey**

**W6**
Mon 03.02          Studio
Thu  03.05          Studio
                          **5:30pm. Lecture: Sumayya Vally + Sarah de Villiers of Counterspace**

**W7**
Mon 03.09          Studio
Thu  03.12          Studio
                          **5:30pm. Lecture: DK Osseo-Asare**

**W8**
Mon 03.16          Studio
Thu  03.19          Studio
                          **5:30pm. Lecture: Virginia Hanusik** *(Melendez Studio to Attend)*

**W9**
Mon 03.23          Studio
                          **5:30pm. Lecture: Christian Benimana**
Thu  03.26          Studio
                          **5:30pm. Lecture: Vincent Boudreau and Lesley Lokko** *(Melendez Studio to Attend)*

**W10**
Mon 03.30          Studio
Thu  04.02          Studio
                          **6:00pm. Migrant Urbanisms Panel Discussion**

**W11**
Mon 04.06          Studio
                          **5:30pm. Panel: Kelly Bair + guests** *(Melendez Studio to Attend)*

04.08 - 04.16   S P R I N G   R E C E S S

**W12**
Mon 04.20          Studio
Thu  04.23          **ADVANCED STUDIO SHARING in Rm 107, 1:30-3pm**; Studio
                   **5:30pm. Lecture: Alessandra Cianchetta**

**W13**
Mon 04.27          Studio
Thu  04.30          Studio
                   **5:30pm. Lecture: Mae-ling Lokko**

**W14**
Mon 05.04          Studio
Thu  05.07          Studio
                   **5:30pm. Lecture: Hanif Kara + Simon Alfred**

**W15**
Mon 05.11          **FINAL REVIEWS**
Wed 05.13          **FINAL REVIEWS**
Thu 05.14          Super Jury
Fri  05.15          Studio Clean-up Day

**W16**
TBD                Final Class Meeting, Exit interviews
                   Studio Materials due for: SSA/CCNY Archive, Summer Show, etc. as directed by instructor


## GRADING/ATTENDANCE POLICIES AND STUDIO CULTURE

**Course Expectations:**
- That students will develop a high level of independent thought and rigor and a willingness to go beyond both basic project requirements and their own perceived limits and abilities.
- That students will successfully complete all project requirements. No make-up or postponed project submissions will be accepted except in the case of medical emergencies or other extraordinary circumstances. Excused absences and project delays must be officially cleared by professor in advance in order to be considered valid.

**Methods of Assessment:**
- Attendance and participation in class discussions: 20%
- Project development in response to semester schedule: 50%
- Project presentation, completion and resolution: 30%
*Note: The Research component of the studio will be weighed more heavily in assessment of graduate student work and class performance.*

**Key areas of Grading Assessment:**
- **Studio performance & work habits:** Ability to respond to studio criticism & discourse in a consistent & clear manner throughout the course of the semester as demonstrated in the evolution and development of design work.
- **Clarity of representation & mastery of media:** Ability to utilize both digital and manual drawing and model-making techniques to precisely and creatively represent architectural ideas.
- **Pre-design:** Ability to prepare a comprehensive program for an architectural project that includes such tasks as: an assessment of client and user needs; an inventory of spaces and their requirements; an analysis of site conditions (including existing buildings); a review of the relevant building codes and standards, including relevant sustainability requirements, and an assessment of their implications for the project; and a definition of site selection and design assessment criteria.

- **Research:** Understanding of the theoretical and applied research methodologies and practices used during the design process.
- **Integrated evaluations and decision-making design process:** Ability to demonstrate the skills associated with making integrated decisions across multiple systems and variables in the completion of a design project. This demonstration includes problem identification, setting evaluative criteria, analyzing solutions, and predicting the effectiveness of implementation.
- **Attendance**: Consistent level of preparation and on-time presence for each studio class and scheduled evening lectures.
- **Portfolio**: Completion of portfolio as directed by coordinator and attendance at all scheduled portfolio related events.

**Grading Criteria:**

**A (+/-)** Work meets all requirements and exceeds them. Presentations are virtually flawless, complete, and finely detailed. Work exhibits professional, "museum quality" level of craft. Student has developed an individual design process that shows a high level of independent thought and rigor. Work shows evidence of intense struggle to go beyond expectations, and beyond the student's own perceived limits of their abilities.

**B (+/-)** Work meets all requirements. Presentations are complete and finely detailed. Work exhibits professional level of craft. Student has developed an individual design process that shows a high level of independent thought and rigor.

**C (+/-)** Work meets minimum requirements. While presentations may be complete, student has struggled to develop an individual design process and/or is lacking in craft or design resolution.

**D** Work is below minimum requirements. Presentations are incomplete, student has struggled to develop an individual design process and/or is lacking in craft or design resolution.

**F** Work is well below minimum requirements. Student does not develop adequate design process, and/or does not finish work on time.

**INC** Grades of "incomplete" are not given under any circumstances unless there is evidence of a medical or personal emergency. In such cases, instructor and student develop a contract to complete work by a specified date, as per CCNY policy. Classes / work missed due to illness must be explained with a physician's note.

*Notes:*
C is the lowest passing grade for M.Arch I and M.S. Arch students. D is the lowest passing grade for B.Arch students. No C- or D grades may be given to graduate students.
Working in teams does not guarantee the same grade for each team member; grades are based on a range of criteria for each student.

For more information on grading guidelines and other CCNY policies and procedures, consult the current CCNY academic bulletins: https://www.ccny.cuny.edu/registrar/bulletins

**Office Hours:**
Office hours are set by appointment. If a student needs to speak in private with a studio critic they must email in advance to request a meeting time. Students may seek office hour appointments to discuss any matters of concern including personal, private matters and general inquiries about course related work, grading, assessment and content.

**Probation & Dismissal:** for program specific information related to grades, academic standing, probation and dismissal, please see your program academic advisors:
B.Arch: Michael Miller mmiller@ccny.cuny.edu
     Amy Daniel adaniel@ccny.cuny.edu
M.Arch: Hannah Borgeson hborgeson@ccny.cuny.edu

**Studio Culture:**
Working in the studio is mandatory. Studio culture is an important part of an architectural education. Please see the Spitzer School of Architecture Studio Culture Policy, which can be accessed on the SSA website here: https://ssa.ccny.cuny.edu/about/policies/.

**Absence & Lateness:**
Arriving more than ten minutes late to class will constitute an absence. Two unexcused absences will result in a whole letter grade deduction from a final grade; more than four will result in a failing grade. It is expected that all students will participate in all scheduled working, midterm and final reviews and contribute constructively to the discussion.

**Absences due to Religious Observances:**
Students who will miss any class sessions, exams, presentations, trips, or the like due to a religious observance should notify the instructor at the beginning of the semester so that appropriate adjustments for observance needs can be implemented. This could include an opportunity to make up any examination, study, or work requirement that is missed because of an absence due to a religious observance on any particular day or days.

**Noise Policy:**
The studio environment should be a quiet and respectful place where all students can work and think in peace. At no time may students play music out loud in studio, even at a low volume. If you desire to listen to music, either during class hours or after hours, headphones are a requirement. Conversations must also be kept to a reasonable volume to respect classmates and those students in adjacent studios.

**Readings & Journals:**
Students are expected to keep a journal or sketchbook throughout the duration of studio to document their thought process & take notes of any texts, books, terms or references that are mentioned by either the studio critic or fellow classmates and to selectively follow up on these and any other assigned readings before the next class.

**Academic Integrity:**
As a student you are expected to conduct yourself in a manner that reflects the ethical ideas of the profession of architecture. Any act of academic dishonesty not only raises questions about an individual's fitness to practice architecture, but also demeans the academic environment in which it occurred. Giving or receiving aid in examinations, and plagiarism are a violation of an assumed trust between the school and the student.

Plagiarism, i.e. the presentation as one's own work of words, drawings, ideas and opinions of someone else, is a serious instance of academic dishonesty in the context as cheating on examinations. The submission of any piece of work (written, drawn, built, or photocopied) is assumed by the school to guarantee that the thoughts and expressions in it are literally the student's own, executed by the student. All assignments must be the student's original work. Any copying, even short excerpts, from another book, article, or Internet source, published or unpublished, without proper attribution will result in automatic failure of the entire course.

The CCNY Academic Integrity Policy: https://www.ccny.cuny.edu/about/integrity
For citations, the Chicago Manual of Style is recommended:
http://www.chicagomanualofstyle.org/tools_citationguide.html

**AccessAbility Center (Student Disability Services):**
The AccessAbility center (AAC) facilitates equal access and coordinates reasonable accommodations, academic adjustments, and support services for City College students with disabilities while preserving the integrity of academic standards. Students who have self-identified with AAC to receive accommodations should inform the instructor at the beginning of the semester. (North Academic Center 1/218; 212-650-5913 or 212-650-6910 for TTY/TTD). https://www.ccny.cuny.edu/accessability

**Library:**
The school's library is a shared resource that is necessary supplement to all research and design work. Please direct questions to the library staff or the Architecture Librarian Nilda Sanchez: nsanchez@ccny.cuny.edu

**NAAB (National Architectural Accrediting Board):**
The National Architectural Accrediting Board (NAAB) is the sole agency authorized to accredit US professional

degree programs in architecture. Since most state registration boards in the United States require any applicant for licensure to have graduated from a NAAB-accredited program, obtaining such a degree is an essential aspect of preparing for the professional practice of architecture. While graduation from a NAAB-accredited program does not assure registration, the accrediting process is intended to verify that each accredited program substantially meets those standards that, as a whole, comprise an appropriate education for an architect.

More specifically, the NAAB requires an accredited program to produce graduates who: are competent in a range of intellectual, spatial, technical, and interpersonal skills; understand the historical, socio-cultural, and environmental context of architecture; are able to solve architectural design problems, including the integration of technical systems and health and safety requirements; and comprehend architects' roles and responsibilities in society.

The following student performance criteria from the 2014 NAAB Conditions are addressed in this course:

**Realm B: Building Practices, Technical Skills, And Knowledge.** Graduates from NAAB-accredited programs must be able to comprehend the technical aspects of design, systems, and materials and be able to apply that comprehension to architectural solutions. In addition, the impact of such decisions on the environment must be well considered.

> **B.1 Pre-Design:** ability to prepare a comprehensive program for an architectural project that includes an assessment of client and user needs; an inventory of spaces and their requirements; an analysis of site conditions (including existing buildings); a review of the relevant building codes and standards, including relevant sustainability requirements, and an assessment of their implications for the project; and a definition of site selection and design assessment criteria.

**Realm C: Integrated Architectural Solutions.** Graduates from NAAB-accredited programs must be able to demonstrate that they have the ability to synthesize a wide range of variables into an integrated design solution.

> **C.1 Research:** understanding of the theoretical and applied research methodologies and practices used during the design process.

> **C.2 Integrated Evaluations and Decision-Making Design Process:** ability to demonstrate the skills associated with making integrated decisions across multiple systems and variables in the completion of a design project. This demonstration includes problem identification, setting evaluative criteria, analyzing solutions, and predicting the effectiveness of implementation.

*Students should consult the NAAB website www.naab.org for additional information regarding student performance criteria and all other conditions for accreditation.*

**CONTACT INFORMATION:**

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