Spitzer The Bernard & Anne Spitzer School of Architecture

Type of Course: ARCH 51000 Advanced Studio
Class Meetings: M/TH 2:00-5:50pm
Office Hours: Friday, 9:00 – 1:00 in Robotics Lab (Rm 212) or via zoom.
Other times by appointment
Instructor: Professor Gordon A. Gebert (see contact and further info below)
Location: Rm. 320; some sessions on Zoom
Semester/Year Fall 2021

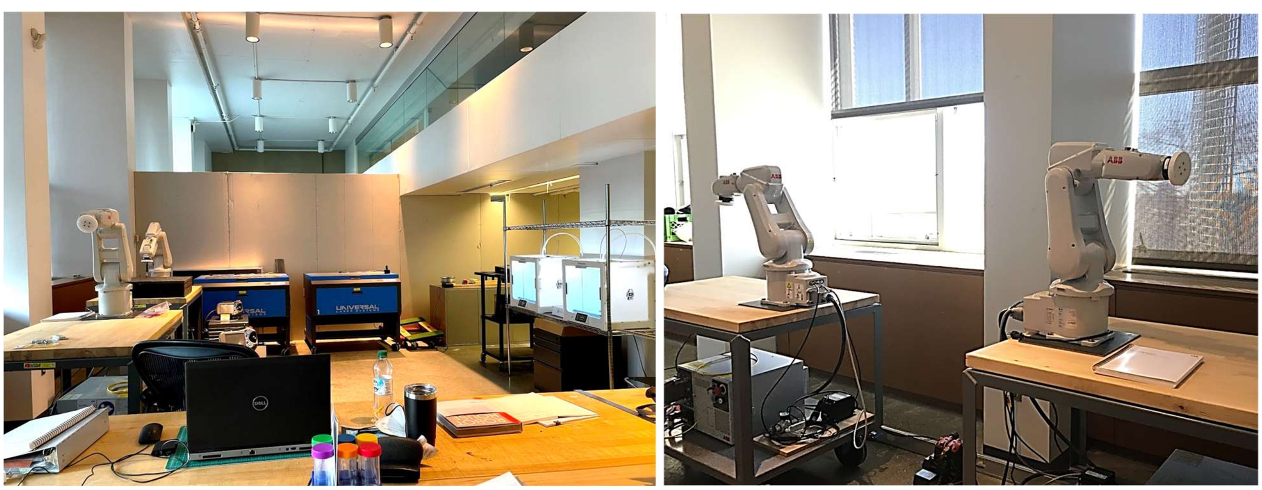
ROBOTICS, ARCHITECTURE AND PRACTICE

OVERVIEW

"Examining Robotics and Design Practice"

We will critically explore robotics and examine the potential this rapidly expanding domain of digital fabrication has to transform, and perhaps disrupt, modes of present and future design practice. By engaging in intensive research and hands-on project work in the Spitzer Robotics Lab, we will develop mastery of the technology examining through direct experience its potentials and its many applications to architectural conceptualization, design, fabrication and construction. We will simultaneously examine through the lens of social and economic power, the outcomes and effects – intended and unintended - of automation in general and of industrial robots in particular. Does the technology present a zero-sum game, and how does it affect resource re-distribution, re-order power and who are the beneficiaries versus who is victimized? How might an exploitative technology be re-cast in a more favorable and broadly beneficial way?

The semester activities will be carried-out employing a collective model of learning and working - non-hierarchically to the extent possible. Thus, we will be modeling, and you will have the opportunity to actively participate in and contribute to, an alternative mode of architectural practice based on collaborative learning, distributed instruction, open information sharing and a mutually-supportive, cooperative working environment.



The Spitzer Robotics Lab – Rm 212

RESEARCH / PROGAM

We will critically examine robotics, a rapidly expanding and exciting domain of digital fabrication which embodies the potential to transform, or perhaps disrupt, modes of practice. Robotics, and automation in general, have been a disruptive force, with tendencies toward privileging the privileged and rewarding those in power. Based on intensive research and direct hands-on development, you will gain mastery over the technology while examining the relationship of, and potentials embodied in, industrial robotic manipulator systems and their many present and future applications to architectural conceptualization, design, fabrication and construction. Underlying the course are the tangible and intangible connections between the notions of technology, craft and design. As the flow of decisions and information from architectural concept through design to construction is almost fully digital, robotics presents a challenge and an opportunity to bring production and assembly into closer alignment with the design processes, and in turn, to more fully inform and enrich the practice of design. In this course we take up the challenge to critically examine robotics in the context of what it can yield, and the many ways it might inspire, inform and guide the design process – from nascent concept to finished fabrication.

We will examine at each step, through the lens of social and economic power, the context, implications, the outcomes and effects – intended and unintended - of automation in general and of industrial robots in particular. Does the technology present a zero-sum game in which, for every win or winner there must be a loss or losers? If so, how does it affect resource re-distribution? How might this technology re-order power and who are the beneficiaries versus who is victimized? Can we conceptualize ways in which the technology could be deployed in a more broadly beneficial and less exploitive manner ?

From the first day you will gain hands-on experience with industrial robots - the two small, but powerful and scalable, industrial-grade six-axis robotic arms in the Spitzer School. These units will be accessible throughout the course and into the future. In the initial several weeks we will examine the literature, reports and other published materials relating to robotics in the profession and in society. You will be provided with a base set of full-text readings, as well as source materials.

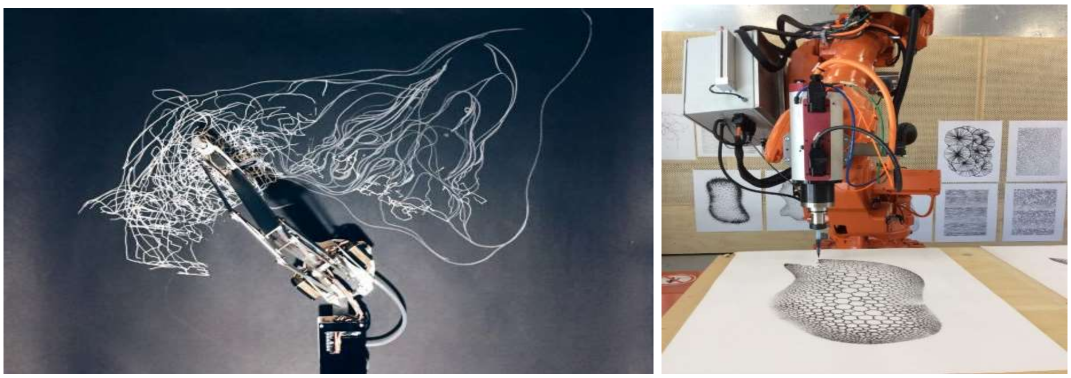
An important component of the semester will be each students' documentation of their research, design and project development activity. And, as part of this intensive research and documentation effort you will extend the search and contribute your findings to a shared reading/materials information base with citations and media developed from your research and literature surveys. Thus, we will be collectively, and directly, contributing to Spitzer's growing archive of resources, and building a shared knowledge base and skill set within the school which will contribute to future student and faculty use of our growing technology resources.

The class research and development activity will be supported by lectures, demonstrations, and a wide selection of tutorial materials – video and PDF's - covering basic robot operation and control as well as coding techniques, most of which are directly related to Rhino, Grasshopper and Maya. You will be provided with ample resources to learn these new techniques as well as to remediate any individual gaps in understanding of the base applications. After successfully completing an initial orientation dedicated to safety and proper use, you will have extensive access to the robotic systems – the entire second-floor robotics lab including arms, the software, end of arm tooling, our dedicated equipment and tools and the control systems. You will be able to load on your own computer the specialized software and plug-ins and thus will have immediate and full access on your own computer and on those in the robotics lab, to the robust and realistic industry-standard robot simulation software which enables your projects to be realistically carried-out virtually through the specialized software as well as through familiar Grasshopper and Maya interfaces and plug-ins.

SEMESTER ACTIVITIES

You will carry-out three initial learning/exercise projects focused in three areas: drawing, motion control, and material forming. In the latter half of the semester, you will select and rdefine as an individual or as member of a small team, a specific problem, technique, task or issue central to robotics, architecture and practice.

Drawing / Capturing Precise Movement



Robots Drawing – left:light source on end of arm recorded with extended exposure. Right: Scribing a pattern

In the early weeks, after safety and best practices orientation, you will learn and explore ways that robotics can be interactive by starting with something familiar…drawing. We will produce code to control the robot with attached drawing instruments such as pencils, pens and styli drawing on planar material such as paper, marker boards and clay tablets. Objects for holding a pen attached to the end of the arm will be available, and you will have the opportunity to design and produce in the robotics lab additional tooling to explore other media such as wet pigment, ink and other modes of image-making.

Motion Control / Expanding Control of Time

Robots Controlling lighting and object placement along with Marques Brownlee showing robotic camera rig

We will also examine the ways robotic motion can be controlled with increasing precision to carry-out robust image and video capture techniques. You will experiment with and document the nature of robotic motion using such means as mounted cameras recording simple scenes, and mounted lights whose motion can be recorded through animation as well as extended image exposure and video capture. Video recording with cameras affixed to the moving arms will provide an opportunity to explore the field of robotic cinematography, and precise and creative control of movement in time will allow experiments with robot choreography and entertainment.

Shaping and Forming / Exploring Movement and Material

Milling Plaster and Foam. Assembly of geometries.

In the third project, we will also explore the application of robotics to materials and assembly, devising and developing means of mounting tools such as scrapers, small mills and hot wire equipment to cut and form relatively soft and workable materials such as foam, clay and sand casts. In addition, we will use mounted gripping devices to assemble simple and light-weight geometric components into compositions and mount extruders to carry-out additive form-making.

Final Project / Creating a Tangible Conclusion and Contribution

In the final 8-9 weeks of the semester, you will, individually or as part of a small team, define and carry-out, to a fully-documented conclusion, a project which addresses a specific problem, technique, task or issue related to robotics, architecture and practice. The project should build on your research, the knowledge you have gained, the skills you acquired and the understanding which you have developed. It is expected that this project, by virtue of its topic, execution and thorough and thoughtful documentation, will constitute a significant contribution to the school by providing a tangible asset such as an innovative technique, an extension of an existing approach, a new or expanded insight, an operational piece of software or some similar tangible addition to Spitzer's growing robotics capabilities and facilities.

Development of the final project will begin by the third or fourth week of the semester and will proceed in parallel with the earlier projects. You will be expected to formulate a clear, concise project description, maintain full documentation of your progress and develop a final presentation for delivery to the class, reviewers and the school's shared robotic knowledge base.

Simulation and Performative Testing

Your experience with robotics throughout this course will be enhanced and accelerated by the use of virtual simulation and testing software wherein robot operations, motion control and coding – from simple movement to complex motion, 3-D path definition and tooling – is dynamically and operationally represented in real-time through visually accurate and fully performative computer-based simulation in real time. You can access these simulation systems in the robotics lab and load them on your own computer so that you can develop and verify the control routines – the code – virtually and off-line. When work executes successfully in the simulation, it can be loaded onto the actual robots for a 'real run'. This means you can develop and check your results nearly anywhere and anytime using 'virtual' robots and tools preparing to deploy work on the lab robots for verification and materialization.

Robotics in Context

While the two robotic units now in the Spitzer School are relatively small and with limited force-weight capacity, they are complete industrial systems, with important educational benefit because they are fully and directly scalable up to the very largest arms available including a medium-sized collaborative arm which is currently on order and two large units which are expected to be installed in Spitzer when required infrastructure is constructed within the next year. That is, the control software, activating mechanics, geometry and configuration of these units is exactly the same as that utilized across the full range of industrial robotic arms. Therefore, the control programs, techniques and types of effectors, and most important, the experience you will gain using the small machines, can be easily scaled upwards and moved directly from this relatively diminutive equipment to that of any size including the very largest available.

An industrial robotic arm is a sophisticated yet highly generalized multi-axis positioning device capable of very precisely programmed motion with accurate positioning and repeatability. This motion is driven by powerful servo motors controlled by on-board digital processors running specialized software. At SSA we utilize several software tools including HAL, Robots GH plug-in, and Mimic. These interface with familiar applications such as Rhino, Grasshopper and Maya, providing a bridge to Robot Studio, an industrial-grade comprehensive robot control and simulation suite. The number, scope and elaboration of functions, processes and tasks the arm can carry-out are nearly endless. One determinant of this flexibility, and a source of great potential, is the physical interface a robotic arm presents to the world – the tools or effectors which when attached to the end of the arm, allows work to be carried-out. The 'wrist' or the 6th axis is a steel flange which is "open" and flexible and to which can be attached an unlimited number and variety of tools, objects and small systems. Possibilities include all manner of drawing instruments, scribing tools, pointers, grippers and virtually any hand or power tool, extruders, grinders, and milling equipment. Drawing on their precise motion control, connection to robotic arms of cameras, video screens and other visual production devices open an entire realm of possibilities for documentation, expression and entertainment.

READINGS

Following are selected readings related to this course and to robotics in general:

Mitch McEwen – **"Dysbeing"** -a video lecture presented at Princeton Sch. Of Arch- April, 2021 – 1hr, 36min.. https://vimeo.com/541930616

Ruha Benjamin - **"Race After Technology: Abolitionist Tools for a New Jim Code",** Polity Press, 2019

Mahesh Daas and Andrew John Wit, eds, ***Towards a Robotic Architecture****,* Applied Research and Design Publishing

Peter Testa, ***Robotics House – SciArch****,* Thames and Hudson, 2017

Muro, Mark and Andes, Scott, "Robots Improving Productivity – Not costing Jobs", Harvard Bus.Rev, June 2015

Dan Shewan, "Robots Destroying Labor" – The Guardian (U.S.), January 11, 2017

Gunkel, David J., ***Robot Rights*** – M.I.T. Press, *2018*

"Why Can't Architects be automated ?" **https://www.architectmagazine.com/technology/why-architects-cant-be-automated_o**

"Project Dreamcatcher" – Autodesk - **https://autodeskresearch.com/projects/dreamcatcher**

Gramazio, Fabio and Kohler, Matthias, ***Made by Robots: Challenging Architecture at a Larger Scale**, an* edition of Architectural Design – June 2014

Gramazio, Fabio and Kohler, Matthias,*The Robotic Touch: How Robots Change Architecture*, an edition of Architectural Design, June, 2015

ADDITIONAL RESOURCES

SSA Robotics Website - Previous projects and related resources are available on this site

SSA Robotics Drop Box – Contains extensive full-text reference materials including HAL, RobotGH, Mimic, Robot Studio and Grasshopper information and user-oriented guides. Also includes numerous example files from projects carried-out at SSA and number of other venues. See "***Robotics in Architecture***" for full listing

SSA Robotics Platforms - Grass-hopper, Rhino and other files for implementing selected tasks and illustrating specific techniques on our robots. Developed here at SSA, these solutions with extensive notes an documentation are designed to serve as illustrative learning-aids as well as generic 'starting points' for projects. See the SSA Robotics Drop Box.

"Robotics In Architecture" – SSA Comprehensive List of Information Resources, 2021 – Class Dropbox

WEEKLY SCHEDULE, M/TH 2:00-5:50pm

Note: schedule below is subject to revision through the duration of the semester.
"Remote" days are in noted with an "R"

W1			
Th	08.26 **- R**	**LOTTERY via ZOOM @ 12pm, followed by first studio meeting, including *Hour SSA*** **Convocation @ 5:30pm**	
W2			
Mon	08.30	Studio –	Safety Orientation – Lab and Robotic Cell Orienation to robotic cell operations Hour-SSA & Studio Culture
Th	09.02	Studio	Continuation of Robotic Cell Orientation Recap Safety – Lab and Robotic Cell **Course Orientation – semester discussion** **Begin 1st Project - Drawing**
W3			
Mon	09.06	College Closed (Labor Day), no classes scheduled	
Th	09.09 **- R**	Studio	Preliminary Discussion of Final Project
W4			
Mon	09.13	Studio	
Th	09.16	No classes scheduled	
W5			
Mon	09.20	Studio	Begin 2nd Project - Motion Control
Th	09.23	Studio	
W6			
Mon	09.27	Studio	
Th	09.30 **- R**	Studio	Discussion of Final Project and proposals

W7			
Mon	10.04	Studio	Begin 3rd Project – Shaping, Forming
Th	10.07	Studio	
W8			
Mon	10.11	College Closed (Columbus/Indigenous Peoples' Day); no class	
Th	10.14 **- R**	Studio	Final Project Proposals due, presented and discussed
W9			
Mon	10.18	Studio	Begin Final Project
Th	10.21		**Mid-semester assessments** ***Hour SSA***
W10			
Mon	10.25	Studio	
Th	10.28 **- R**	Studio	
W11			
Mon	11.01	Studio	
Th	11.04	Studio	
W12			
Mon	11.08	Studio	
Th	11.11 **- R**	Studio	**ADVANCED STUDIO SHARING via Zoom, @ 2:00-3:30pm**;
W13			
Mon	11.15	Studio	
Th	11.18	Studio	
W14			
Mon	11.22	Studio	
Th	11.25	College Closed (Thanksgiving); no class	
W15			
Mon	11.29	Studio	
Th	12.02 **- R**	Studio	
W16			
Mon	12.06	Studio	
REVIEWS			
Wed	12.08	Advanced Studio reviews, session 1	
Fri	12.10	Advanced Studio reviews, session 2	
Tu	12.14	End of Semester Assessment (faculty only)	
FINALS			
Th	12.16	Final Class Meeting, **Exit interviews**	
Mon	12.20	Student Portfolios due for: SSA/CCNY Archive, etc. as directed by instructor	
Mon	12.27	Final Grade Submission Deadline	
FINALS WEEK			
Mon	12.14	Final Class Meeting, **Exit interviews**	
Th	12.17	Student Portfolios due for: SSA/CCNY Archive, 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 to be considered valid.

Community Agreement:

- During the first full studio meeting, we will engage in an *Hour SSA* session for a supportive open discussion amongst ourselves..
- Studio members will work *together* to create a community agreement for interacting together over the semester. Definition: "A consensus on what every person in our group needs from each other and commits to each other in order to feel safe, supported, open, productive and trusting… so that we can do our best work." https://www.nationalequityproject.org/tools/developing-community-agreements
- *Hour SSA* will be repeated at the middle of the semester.

Methods of Assessment:

- Attendance and participation in class discussions and other activities: 10%
- Project development in response to semester schedule: 60%
- Project presentation, level of 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, in cases where graduate students are enrolled in the studio.

Key areas of Grading Assessment:

- **Studio performance & work habits:** Ability to respond to studio discourse & feedback in a consistent & clear manner throughout 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 final portfolio or collection of studio work as directed by instructor and/or 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 ambition and effort 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. Deadlines are missed. While presentations may be somewhat 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.

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 and/or 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 individual 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:
Each studio faculty member schedules 30 regular office hours over the semester, as posted at the top of the syllabus. If a student needs to speak in private with a studio critic, they should ask or email in advance to request a specific 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:
Undergrad: Michael Miller mmiller@ccny.cuny.edu
Amy Daniel adaniel@ccny.cuny.edu
Graduate: Hannah Borgeson hborgeson@ccny.cuny.edu

Studio Culture:
Working collaboratively and respectfully on studio assignments, with and alongside others, is an expectation in studio. Studio culture is an important part of an architectural education, and it extends to expectations for Faculty and the School's Administration as well. 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 discussions.

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.

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 as serious an instance of academic dishonesty in this 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). For further information, go to http://www.ccny.cuny.edu/accessability/ or email disabilityservices@ccny.cuny.edu

Health And Wellness Support:
City College's Office of Health and Wellness Services offers free and confidential counseling. Contact: Health and Wellness Services, Marshak Science Building, room J-15: counseling@ccny.cuny.edu.

Gender Based Violence Resources
City College has resources to support you if you have experienced sexual violence, intimate partner/domestic violence, gender-based discrimination, harassment or stalking. For confidential support, you can contact the Student Psychological Counselor: Confidential Advocate at (212) 650-8905 or the Gender Resources Program at (212) 650-8222. If you would like to report sexual misconduct, you can contact the Chief Diversity Officer and Title IX Coordinator, Diana Cuozzo, at 212-650- 7330 or dcuozzo@ccny.cuny.edu. If there is an emergency on campus, you can call Public Safety at 212-650-777 and off campus call 911. Https://www.ccny.cuny.edu/affirmativeaction

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-Rodriguez: 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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