

Transformable Places | Explore Innovative Solutions for Climate Action and Urbanization

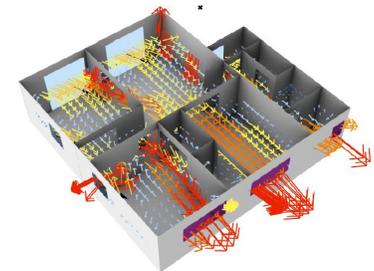
This year's special focus: Options Studio by Taro Narahara

In recent years, the world has become increasingly urbanized. According to data released by the United Nations Department of Economic and Social Affairs, cities have housed more than half of the world's population since 2007, with that figure expected to rise to 60% by 2030. Cities and metropolitan areas currently account for 60% of global GDP. However, they do account for more than 70% of global carbon emissions and 60% of resource consumption. Rapid urbanization has begun to cause a variety of issues, including inadequate infrastructure and services for water collection, sanitation, and transportation systems, pollution, urban sprawl, food scarcity, and an increase in the number of slum dwellers.

In this studio, students are expected to investigate unconventional, creative solutions in architecture and urban design to such problems. Students are encouraged to investigate novel ideas that promote sustainability and seek solutions to climate change. Some of the suggested research topics include: a transformable design that responds to various changes in usage patterns and environmental conditions; augmented/symbiotic usages of AI in design generations; integration of energy generation into building design; a city built around nature; a city without cars and streets; autonomous drone taxis; aerial rideshares; AI-driven new services; vertical farming; hydroponic farming; etc. We will focus not only on environmental performance but also on social and cultural issues in contemporary cities, such as the exponential increase in populations, diversifying cultural values associated with various conditions in public spaces, and undergoing socio-technological transformations.

While new technologies may help us improve our environmental conditions, the anticipated technological convergence is expected to cause radical changes in our lifestyles. Autonomous cars and drones, cloud computing, wireless energy and communications, and artificial intelligence are examples of next-generation technologies that could realize a transformative vision for a new way of life for future generations. Autonomous habitable drones, for example, would allow us to live, work, and travel wherever we want by acting as mobile pods. Under such hypothetical conditions, we will develop and acquire very different lifestyles, values, ethics, and social structures, and such changes will undoubtedly influence our real estate value system.

The studio is interdisciplinary by nature, and experts in urban design, computer science, and related fields will be scheduled to visit and share their ideas. We will use Rhinoceros Grasshopper and its various Plugins, such as ClimateStudio and some Python programming for validation and assessment of environmental performance based on solar exposure, views, etc., as well as Head-Mounted Displays (HMD) such as Quest2 and Game Engines such as Twinmotion for visualizations. For years, the instructor has advocated for the use of virtual reality (VR) beyond the representation of design projects. We will further use the technology to evaluate, revise, and test digital models using VR. Based on students' needs and projects' potentials, proof-of-concept physical prototype developments to demonstrate the sustainable performance of proposed systems can be offered as an alternative to virtual explorations using the instructor's experience with electronics and machine learning algorithms.



Images (top to bottom): The Yilong Futuristic City Project developed by enzymeApd team in collaboration with TAKENAKA using the Twinmotion software, The OCT Xi'an International Center (OXIC) in Xi'an, China by EID Architecture, Air Flow analysis using Butterfly plugin, Thumbs up signs in VR associated with locations (a concept sketch for evaluations in VR), "Defy Reality", Oculus Rift Head-Mounted Display, Apocalyptic imagery by Tokyo Gensou. Algae-based Tubular manifold photobioreactors installed at Roquette Klötze & Co. KG (Germany). eVolo Skyscraper Competition (middle left).

LEARNING OBJECTIVES:

This studio will engage students in architectural research to test and evaluate innovations in the field, utilizing knowledge and skills gained in the first three years of studios, such as analytical and critical thinking skills, conceptual thinking, fundamental design skills, and presentation skills, as well as knowledge gained in core courses such as Building Construction. Students will learn about site conditions, programs, user requirements, regulatory requirements, accessible design, life safety systems, the basics of structural systems, building envelope systems, and building assembly systems. Students will learn leadership approaches, how to work in teams with diverse stakeholder constituents, and how to apply effective collaboration skills to solve complex problems responsibly.

NAAB Criteria: The National Architectural Accrediting Board (NAAB) accredits NJIT's architecture program. The NAAB has criteria that must be covered by any architectural curriculum to attain their approval. This course directly addresses (all or in part) the following, as outlined in the **2020 NAAB Conditions for Accreditation**: **PC.2** Design, **PC.3** Ecological Knowledge & Responsibility, **PC.5** Research & Innovation, **PC.7** Learning & Teaching Culture, **PC.8** Social Equity & Inclusion, **SC.1** Health, Safety, and Welfare in the Built Environment, **SC.3** Regulatory Context, and **SC.4** Technical Knowledge. For the definitions of each of the criteria, see pages 4-7 of the 2020 NAAB Conditions for Accreditation.

PC.2 Design—How the program instills in students the role of the design process in shaping the built environment and conveys the methods by which design processes integrate multiple factors in different settings and scales of development, from buildings to cities.

PC.3 Ecological Knowledge and Responsibility—How the program instills in students a holistic understanding of the dynamic between built and natural environments, enabling future architects to mitigate climate change responsibly by leveraging ecological, advanced building performance, adaptation, and resilience principles in their work and advocacy activities.

PC.5 Research and Innovation—How the program prepares students to engage and participate in architectural research to test and evaluate innovations in the field.

PC.7 Learning and Teaching Culture—How the program fosters and ensures a positive and respectful environment that encourages optimism, respect, sharing, engagement, and innovation among its faculty, students, administration, and staff.

PC.8 Social Equity and Inclusion—How the program furthers and deepens students' understanding of diverse cultural and social contexts and helps them translate that understanding into built environments that equitably support and include people of different backgrounds, resources, and abilities.

SC.1 Health, Safety, and Welfare in the Built Environment—How the program ensures that students understand the impact of the built environment on human health, safety, and welfare at multiple scales, from buildings to cities.

SC.3 Regulatory Context—How the program ensures that students understand the fundamental principles of life safety, land use, and current laws and regulations that apply to buildings and sites in the United States and the evaluative process architects use to comply with those laws and regulations as part of a project.

SC.4 Technical Knowledge—How the program ensures that students understand the established and emerging systems, technologies, and assemblies of building construction and the methods and criteria architects use to assess those technologies against the design, economics, and performance objectives of projects.

OVERVIEW SCHEDULE

This semester, we will look at a site in China called **Honeymoon Lake Area**, located in the central area of **Shenzhen**, which is one of the famous scenic spots and landmarks in the Shenzhen area. (Unless you have any other specific locations of interest with sufficient resources for research) You will select and propose a public building with landscape (public spaces around your building) from 4 building types: **Museum, Conference Center, Performance Center, and Mixed-use Office Tower**.

The studio will be divided into roughly 2 phases (Research & Final Project) as follows:

RESEARCH: (Preparing for the project)

Reviews: October 3 (TBD) & November 22 (TBD)

This phase will involve in-depth research and analysis into **Technologies** and **Computational Methods** for:

- 1. Core Concept of Your Project**
- 2. Site Conditions to be shared.**

We might work in groups for specific investigations, such as VR, 3-D site study, environmental analysis, etc. The outcomes will include a research booklet (format to be determined), a 3-D site model, and preliminary design hypotheses.

FINAL PROJECT (10/12-12/10) **Social / Sharable / Transformable / Public Places** for People

Proposed Title: - **"Transformable and Adaptable Public Spaces & Architecture"**

Mid-review: November 09 (TBD) (work alone or in a group of up to 3)

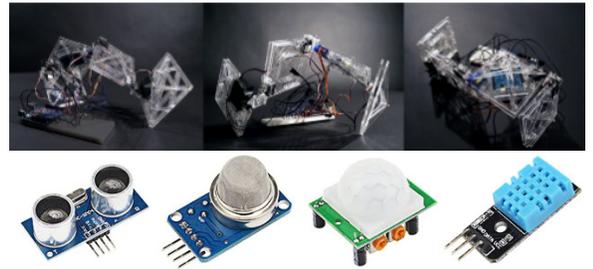
Final Review deadline: December 02, 05, or 09 (TBD)

Using new technologies of your choice, you will **propose public architecture and spaces that can transform and accommodate various different conditions and needs (ex., time of the day, seasons, events, etc.) at the site** that you select. You need to consider different occupant types, environmental conditions, changes in event-based physical settings, etc. (Notes: If you need a specific site assigned by the instructor, like the way a conventional studio project works, he will help and guide you.)

We will work between the urban design scale and the architectural scale from the compact and individual scales from the previous project, introduced incrementally. The goal is that each group develops its own strategic framework for the larger site while also in some way incorporating conceptual and technical findings from previous phases. Each group can emphasize one aspect of this spectrum as is most germane to their interests. More detailed breakdowns of each phase will be distributed subsequently.

KEY DATES

First day studio:	1/18
Midterm Reviews:	3/07
Deadline for Midterm Warning:	3/21
Last day to Withdraw:	4/01
Spring Recess:	3/10 - 3/16
Final Reviews:	4/22, 4/25, or 4/29 (TBD)
Super Jury:	5/02 (TBD)
Last day of class:	4/30



GRADING POLICY / MEANS OF EVALUATION

As an upper-level studio, participants are expected to approach their work with initiative and resourcefulness. While the programs and scales will vary, the process of developing and evaluating a range of alternative responses will play a significant role. Among other things, this will help prepare students for future projects.

The design projects will be assessed not simply on completeness but on a student's ability to articulate an architectural proposition and clearly demonstrate how her or his design project responds to this proposition. Evaluation is based on a number of factors, including overall work quality, improvement, effort, ambition, initiative, and enthusiasm. The NAAB distinction between understanding and ability is useful to keep in mind as it offers a way for students to reflect on their own work. E.g., they might ask, "What understandings and abilities does this particular drawing reflect?" and use the answer to make decisions about how to develop the project.

Projects will be evaluated based on the studio milestones described above, with impact distributed as follows:

Research	(25%)
Final Project	(65%: graded in several steps)
Demonstrated initiative/engagement:	(10%)

In almost every case, dramatic improvement of both understanding and ability through hard work, commitment, and initiative will be positively supported in terms of assessment. In an effort to further clarify the grading policy, below are brief summaries of the kind of work appropriate to each grade based on the NJIT undergraduate grading scale:

A (Superior): Work demonstrates an advanced understanding of learning objectives and a high level of execution in terms of production abilities. Work is reflective of an intensive process of development that goes above and beyond expectations. Work is connected to larger architectural discussions and pursuant to specific architectural aims. Products demonstrate a high level of sophistication, craft, attention to detail, and willingness to explore a wide range of production techniques. Work is further supported by advanced levels of independent initiative and research. Work excels in response to the criteria for integration described above.

B+ (Excellent) / B (Very Good): Work demonstrates a good understanding of learning objectives and a good level of production abilities. Work is reflective of a process of development that generates multiple alternatives, assesses, selects, refines, and so on. Products demonstrate a high level of sophistication, craft, attention to detail, and willingness to explore a wide range of production techniques. Work is further supported by independent initiative and investigation, as well as active participation in the studio and consistent engagement of course material. Work demonstrates a sophisticated understanding of integration criteria.

C+ (Good) / C (Acceptable): Work fulfills the requirements of the studio in terms of conceptual understanding and technical ability, including the integration requirements. Work takes few risks and has some engagement with an iterative design process. Products demonstrate a good level of craft and are carefully made. E.g., drawings are legible and correct; models are carefully cut and cleanly assembled. Work demonstrates a basic level of independent initiative. Work improves over the course of the semester and reflects a genuine effort to improve in ability and understanding.

D (Minimum): Work barely fulfills the requirements of each phase of the studio in terms of conceptual understanding and technical ability. The work process is not evident. Products demonstrate poor development of craft and/or do not demonstrate improvement over the course of the semester. Work demonstrates no additional initiative or engagement.

F (Failing): Work is incomplete and does not demonstrate an understanding of the course content or abilities related to required skills.

Evaluation of studio work will take place through design reviews and by each studio critic in discussion with other faculty. Incompletes are only granted in the event of a documented medical or family emergency and must be approved by the instructor, coordinator, and advisor.

NJIT issues mid-term warnings for students who are not performing at a satisfactory level. Any student issued a warning will be required to have a conference with the instructor to evaluate satisfactory completion of the work for the semester. At any point during the semester, students can arrange to meet with the instructor to inquire how their performance is progressing and how they may improve.

Students must complete all assignments on time and must be present and active in all class sessions. Students will be counted absent if they are not in the studio 15 minutes after the scheduled start time. If a student is late for any reason, it is his or her responsibility to notify their instructor.

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NJIT SPRING 2024

ARCH 464-003 - OPTIONS STUDIO I & II (formerly listed as an options studio I)

Mondays 12:00pm – 5:45pm / Thursdays 12:00pm – 5:45pm

Prerequisite: ARCH 364

INSTRUCTOR: Taro Narahara | Associate Professor | narahara@njit.edu | Weston 677
(Office hours: M/TH after studio or by an appointment)

TECHNOLOGICAL ASPECTS OF THE STUDIO

■ This studio explores how anticipated new technologies for the 21st century—emerging materials such as carbon nanotubes, new energy harvesting technologies, autonomous drones/spacecraft, space elevators, satellites, robotics, and AI—could realize a transformative vision for new structures that could be developed to move, house, and sustain people in the near future (20-200 years). Along with research on the digital revolution, adaptability, and globalization, we will investigate the possible new relationships between man and nature, private and public, and the collective and the individual through the use of novel technologies, materials, programs, aesthetics, and spatial organizations. For a long time, there have been many Sci-Fi proposals such as space colonies and Ringworlds and utopian visions for Megastructures by architects such as Yona Friedman, Archigram, and Japanese Metabolists. We question these retro visions based on speculative yet thoroughly rigorous (not sci-fi) scientific studies and will envision or redefine structures that could be constructed using innovative technologies and ideas that had yet to be fully introduced in their times.

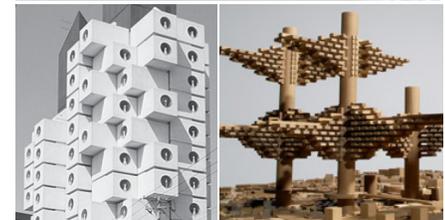
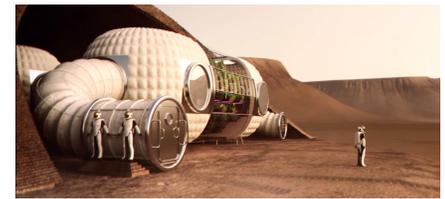
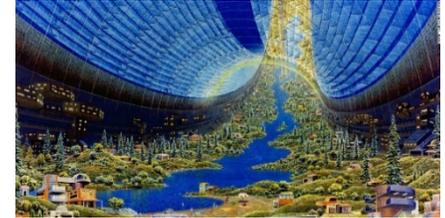
■ Proposed structures should explore sustainable systems and respond to social and cultural issues in contemporary cities, such as the exponential increase in populations and pollution, through creative solutions using anticipated technologies. The studio begins with research on certain technologies selected by students, and the optimal application site, program, and size will be discovered over the course of the semester (no restrictions at the beginning and can include structures for space explorations). The initial research on emergent technologies could be potentially developed into the prototyping of a system. However, students will be expected to present convincing architectural propositions.

■ This is a hands-on studio, and we will apply our concepts to physical and digital designs and prototypes. The use of digital design tools such as Rhinoceros, Grasshopper and its various plugins, and Game Engines will be explored for generating forms that satisfy not only performance-based quantitative aspects of architecture, such as solar gains and lighting, but also qualitative values such as aesthetics, representation, and perceptions of spaces. Prototypes that represent novel ways of interactions and engagements between humans and architectural spaces could result in producing interactive mockups that utilize IoT (Internet of Things) technologies, electronics such as sensors, actuators, microcontrollers, and digital fabrication if any proposed project benefits through them. Representations using VR, AR, MR technologies, and head-mounted displays (HMD) will also be explored to promote new ideas based on availability.

■ By nature, the studio is interdisciplinary, and experts in space architecture, computer science, and related disciplines will be scheduled to visit and share their thoughts.

■ There is currently no funding for the studio. Students will explore all facilities available at NJIT for fabrication, electronics, and computing.

■ Results of the research studio could be published in academic journals and conferences, such as Automation in Construction, IJAC, eCAADe, Acadia, and SIGGRAPH, to benefit the larger community beyond architecture. Students are also encouraged to submit their design research to architectural design competitions and exhibitions.



TENTATIVE COURSE SCHEDULE:

Specific dates, including assignment due dates, may be adjusted. The preliminary schedule for the semester is as follows:

Week 1 1/18 (TH)	Introduction Welcome and Introduction to the course by the instructor. We will spend our time briefly introducing ourselves and going over the syllabus.	
Week 2 1/22 (M) 1/25 (TH)	Introduction slides by You (Brief 3-4 slide presentations introducing yourself & your interests in Technologies) Research on Technologies and Computational Methods (Project 1)	<i>Present Intro. slides</i> <i>Assigned: Project 1 & Research Project</i>
Week 3 1/29 (M) 2/1 (TH)	Desk Critiques on the Project 1 Based on your requests, I will give additional desk critiques (please email)	
Week 4 2/5 2/8	Desk Critiques on the Research Project Based on your requests, I will give additional desk critiques (please email) Project 1: Mid Review Presentation	<i>Project 1 Mid-review</i> <i>(Short Presentation)</i>
Week 5 2/12 2/15	Desk Critiques on the Research Project Research Project: Presentation	<i>Due: Research Project</i> <i>(Short Presentation)</i> <i>Assigned: Project 2</i>
Week 6 2/19 2/22	Desk Critiques on the Project Possible slots for additional Desk Critiques (Make-up) Desk Critiques on the Project	<i>Project 1: Review</i>
Week 7 2/26 2/29	Desk Critiques on the Project Possible slots for additional Desk Critiques (Make-up) Desk Critiques on the Project	
Week 8 3/4 3/7	Desk Critiques on the Project Possible slots for additional Desk Critiques (Make-up) Project Presentations	
Week 9 3/11 3/14	Spring Recess	
Week 10 3/18 3/21	Desk Critiques on the Final Project Mid Review: Present your final project in progress (10-minute presentation) Possible slots for additional Desk Critiques (Make-up)	
Week 11 3/25 3/28	Desk Critiques on the Final Project Desk Critiques	<i>Final Project</i> <i>Mid-review</i> <i>(Short Presentation)</i>
Week 12 4/1 4/4	Desk Critiques on the Final Project Desk Critiques on the Final Project Additional sessions for any help	<i>Due: Research Project</i> <i>(Short Presentation)</i>
Week 13 4/8 4/11	Desk Critiques on the Final Project (The instructor will review your draft slides in a PPT format.) Will make up as many hours as possible for any help.	
Week 14 4/15 4/18	Desk Critiques (The instructor will review your draft slides in a PPT format.)	<i>Due: Draft of your</i> <i>slide Presentation</i>
Week 15 4/22 (M) 4/25 (TH)	Final Review (Date TBD): Presentations of your final projects. Final Review (Date TBD): Presentations of your final projects.	<i>Final Project Review</i>
Week 16 4/29 (M) 5/6 (M)	Final Review (Date TBD): Wrap up (The last day of the class). / Super July Monday, 5/6, will be the deadline to submit all materials from your final project and any additional material requested by the instructor.	<i>Final Project Review</i> <i>Final Submission</i>

Guest Lecture(s) (Time and date TBD) will be scheduled based on the availability of guests. (they might be online lectures)
Lecture Series: **Dates will be updated.**

ACADEMIC INTEGRITY:

Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree to which you are working. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at <http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu

KEPLER POSTING:

All files must be resized and renamed. Please fill out all of the metadata information. The maximum size is 2000 x 2000 pixels. Images must retain their original proportions without being enlarged. In cases where the width-to-height ratio exceeds 3:1, you may resize the short dimension to 2000 pixels. To distinguish PROCESS documents from FINAL documents, be sure to enter labeling information in the pull-down metadata section built into each Kepler file.

The filename should be saved according to the following naming convention: **< Firstname Lastname ##.jpg >**. The guidelines described here are in place to promote economic representations of student work and to ensure the sustainability of the Kepler system. Grossly oversized images will be deleted without notice and will not be considered for grading purposes. All final presentation material (including PDF files of presentation boards, PowerPoint files, etc.) must be submitted on your Kepler DVD only. You must submit your slides to Kepler as .jpgs and ensure that the file size is reasonable (<10 MB). You will not receive your final grade until you submit your Kepler DVD. Please consult Kepler's FAQ for further details.

BACKUP YOUR WORK:

Students are required to maintain and complete backups of all their computer-based work. It is the responsibility of each student to restore or recreate any work that is lost for any reason, including the failure of University-provided software and hardware. All backup files should be stored on two independent external locations (not local or CoAD networked locations as they are subject to reformatting without notice).

For suggestions on backup processes, please contact the NJIT HelpDesk (ist.njit.edu/support/index.php).

If you have questions, please contact Taro Narahara at narahara@njit.edu.

Online Resources & Pluralsight (aka Digital-tutors)

You are encouraged to use any online resource in terms of learning skills and techniques for software.

Also, check out new programs from Pluralsight, with tutorials on tons of [software](#) and [subjects](#). Click [here](#) to get to the login page. Registration will only work with your NJIT email address. Once you're registered, you can use the Digital Tutors program for one hour at a time from campus-wide IP ranges only.

Accommodations:

"Any student who, because of a disability, may require some special arrangements to meet course requirements should contact the professor as soon as possible to make necessary accommodations. Students should present appropriate verification from the Disabled Student Services Dean of Students Office. No requirement exists that accommodations be made prior to completion of this approved University process." [TTU-Faculty Handbook, August 98].

PLAGIARISM:

It is extremely important that students and faculty familiarize themselves with a proper way to cite visual and intellectual sources. Plagiarism, whether deliberate or inadvertent, simply cannot be tolerated. Simply put, plagiarism is the use of visual or intellectual material created by others without proper attribution. Even the use of one's own material for more than one assignment can also be considered plagiarism. Students should not do so without the expressed consent of all instructors involved.

Our librarian, Maya Gervits, has assembled excellent resources on copyright, plagiarism citing, and avoiding plagiarism:

<https://researchguides.njit.edu/c.php?g=671665&p=4727920>

MEDICAL OR HEALTH:

If the issue is medical or health-related, students should contact the Dean of Students Office first at <https://www.njit.edu/dos/>

STUDENTS WITH DISABILITIES:

It is the school's moral, ethical, and legal obligation to provide appropriate accommodations for all students with physical and/or learning disabilities. If students need an accommodation related to disabilities, all official documentation must be filed with the Dean of Students and the Disability Support Service Office. It is the student's responsibility to notify the instructor at the beginning of the semester if accommodations are warranted.

Dean of Students: <https://www.njit.edu/dos/>

Disability Support Service: <https://www.njit.edu/studentssuccess/accessibility>

Academic integrity and honesty are of paramount importance. Cheating and plagiarism will not be tolerated. The NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students. All students are responsible for upholding the integrity of NJIT by reporting any violation of academic integrity to the Office of the Dean of Students. The identity of the student filing the report will remain anonymous. All students are expected to adhere to the University Code of Academic Integrity and to the Code of Student Conduct:

<https://www.njit.edu/dos/policies/conductcode/index.php>