NJ School of Architecture
The Hillier College of Architecture and Design
New Jersey Institute of Technology

ARCH 395 Architecture Studio V

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Course Hours: Monday 1:00-5:20 PM and Thursday 1:00-5:20 PM.
Office hours (on request) will be established by individual section instructors.

Prerequisites: ARCH 224, and (ARCH 296 or ARCH 264), and ARCH 211 or (ARCH 381 and ARCH 382). This course is a continuation of ARCH 296.

INTRODUCTION

The Housing Studio (ARCH395) aims to analyze and address the diverse housing needs within our community (NJ and NY), focusing on accessibility, affordability, and sustainability as well as on the development of livable, human-centered spaces. By integrating principles of universal design, the projects seek to create inclusive living environments that cater to individuals of all ages, abilities, and socioeconomic backgrounds with strong ties to the local community. (1) Through comprehensive site and context analyses, (2) contemporary and relevant precedent studies, (3) an in-depth understanding of constructability, and (4) environmental impact simulations, this study will identify current housing challenges and propose innovative solutions to ensure that everyone has access to safe, comfortable, and dignified housing. The projects' ultimate goal is to foster a more affordable, design-infused, and resilient community where all residents can thrive.

IMPORTANT DATES

Project 1:	Human Factors	9/12
Project 2:	Housing Community in Newark	
	Mid-Review	10/3

	Final	10/24
Project 3:	Mixed Use Development	
	Progress review	11/7 (Please note the conflict with ARCH 309, ECS 1 Exam)
	Pre-final	11/25
	Final	12/9

COURSE SCHEDULE

Each student is expected to attend all class meetings, to verbally participate in class discussions, as well as to develop additional work and ideas beyond the minimum requirement.

The semester is arranged as follows:

WEEK 1 **Introduction | Human Factors + Ergonomics**
9/5 In-Studio Setup and Introductions
Introduction to semester work and studio expectations (3 PM WLH1)
Human Factors + Ergonomics lecture by Prof. Mathew Schwartz (3:45PM WLH1)
Project1 distributed
Individual studio group time

WEEK 2 **Human Factors + Ergonomics**
9/9 Individual studio group time

9/12 Assignment 1 Review + Submission
Red Vienna and Social Housing by Gernot Riether (1:30PM WLH1)
Project 2 distributed

WEEK 3 **Housing Community in Newark: Site + Massing**
9/16 Individual studio group time: Site Visit (on your own), Site and Context Analysis, Site Synthesis, Preliminary Site Design.
A brief presentation on the site analysis and site synthesis (Andrzej Zarzycki)

9/19 In-class Pin-up: Site Investigations + Design (finalized site analyses and synthesis)

Individual studio group time: Preliminary Massing

Design Workflows in BIM (Revit) Lecture by Andrzej Zarzycki (WLH 1, 2:30PM)

WEEK 4 **Housing Community in Newark: Refined Massing + Housing Modules**

9/23 Housing Module Precedent Studies (Individual studio time)

9/26	Individual studio group time: Massing and Housing Module Reconciliation
WEEK 5	**Housing Community in Newark: Preliminary Design**
9/30	Individual studio group time: Preliminary Design Package (site design, floorplans, elevations, perspectives, and other appropriate visualizations).
10/3	Project 2: Mid Review
WEEK 6	**Housing Community in Newark: Schematic Design**
10/7	Individual studio group time: Schematic Design
10/10	Individual studio group time: Schematic Design
WEEK 7	**Housing Community in Newark: Design Development**
10/14	Individual studio group time: Design Development
	Lecture on the use of BIM (Revit) tools for environmental impact and building performance analysis simulations. (John Cays and Andrzej Zarzycki, WLH 1, 2PM)
10/17	Individual studio group time: Environmental and Performance Analysis
WEEK 8	**Housing Community in Newark: Final Design**
10/21	Individual studio group time: Presentation Preparation
10/24	Project 2: Final Review
10/26	Project 2: Final Submission to Google Drive/Kepler Project 3 distributed (site visits over the weekend)
WEEK 9	**Mix-Use Development: Site and Program**
10/28	Site analysis and synthesis
10/31	Program Precedents
	Program Diagrams
WEEK 10	**Mix-Use Development: Massing and Modules**
11/4	Individual studio group time: Massing + Modules
11/7	Progress Review: Site Investigations (analysis + synthesis), Early Design

WEEK 11	**Mix-Use Development: Schematic Design**
11/11	Desk Critiques
	Last Day to Withdraw from Classes
11/14	Desk Critiques

WEEK12	**Mix-Use Development: Design Development**
11/18	Desk Critiques
11/21	Desk Critiques

WEEK13	**Mix-Use Development: Design Development** (Thanksgiving Week—Schedule Changed!)
11/25	Pre-Final Review (in-class)
11/26	Desk Critiques

WEEK 14	**Mix-Use Development: Documentation**
12/2	Desk Critiques
12/5	Desk Critiques

WEEK 15	**Mix-Use Development: Presentation**
12/9	Final Review
12/12	Final Documentation Due, (Kepler Upload + Google Drive)

Final Grades due, Saturday, December 23rd

See the academic calendar: https://www.njit.edu/registrar/fall-2024-academic-calendar

Lectures

Spatial Ergonomics and Human Factors by Mathew Schwartz

Red Vienna and Social Housing by Gernot Riether

Design Workflows in BIM (Revit) by Andrzej Zarzycki

Environmental Impact and Building Performance Considerations in Design (John Cays?)

BIM (Revit) Tools for Environmental Impact and Building Performance Analysis Simulations. (Andrzej Zarzycki, WLH 1, 2PM)

ASSIGNMENTS

The studio work will involve three projects requiring individual work:

Project 1: Human Factors + Ergonomics

In this assignment, students will focus on the analytical and investigative aspects of the built environment. They will critically look at existing (residential) buildings and evaluate them from the perspective of the Americans with the Disabilities (ADA) Act guides to enhance the Universal Design qualities of the built environment. Ask yourself how enhanced accessibility and environmental inclusivity can enhance everyone's quality of living.

Specifically, students will choose one of the sections from the ADA guides (https://www.access-board.gov/ada/guides/), get familiar with these guides, analyze their chosen residential environment, identify possible limitations, and propose a design intervention to alleviate these impediments.

The outputs of this project will consist of a series of diagrams (see lecture references) and two computer (BIM) models showing pre-intervention space.

Additional assignment information will be distributed before the assignment start date.

Reference

Using Digital Human Models to Evaluate the Ergonomic Comfort of Interior Layouts and Furniture Design, by Yomna El-Ghazouly Ahmed El Antably
https://doi.org/10.1080/24751448.2021.1967061

Project 2: Housing Community in Newark, NJ

The focus of this project is on designing a community-focused residential development that responds to the rich history, cultural identity, of natural features (geography and topography) of Newark's Iron Bound district. The housing will feature a wide variety of apartment modules from studio and one-bedroom to up to three-bedroom units that will accommodate diverse types of residents and family units, from single occupants to large and multi-generational families.

The community aspect needs to be addressed on multiple scales from shared communal facilities shared by the residents to outdoor spaces with various levels of public and open access.

Housing units, while supporting diverse family structures, need to be modularized to promote affordability and construction/maintenance efficiencies. The modularity of units will be greatly facilitated by building information modeling (BIM) tools.

Additional assignment information will be distributed before the assignment start date.

Project 3: Mixed-Use Development, Brooklyn, NY

This project provides an opportunity to reconceptualize conventional residential (housing) programs by transferring some of the semi-private residential functions to semi-public, shared, and communal facilities serving the entire population of the building. It pursues high-efficiency housing modules with generous and shared facilities.

Note: Work developed for Project 3 will also be used for the professional practice (ARCH-XXX) course to evaluate the economic and construction feasibility of individual designs.

Additional assignment information will be distributed before the assignment start date.

EVALUATION

Completion of ALL assigned projects and presentations is required to complete this course. All assignments are due at the beginning of class. Your performance will be graded based on the successful completion of the class objectives, projects, presentation, and documentation requirements. The NJIT- Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.

Project 1: Human Factors + Ergonomics	5%
Project 2: Housing Community in Newark	45%
Project 3: Mixed-Use Development	45%
Digital Documentation (Required)	5%
Final Kepler/Canvas Posting (due Dec 14th)	
Final Google Drive Folder (due Dec 14th)	

COURSE GRADING CRITERIA

The final grades are broken down as follows:

A	4.0	Superior	92 -- 100%
B+	3.5	Excellent	86 -- 91.99%
B	3.0	Very Good	80 – 85.99%

C+	2.5	Good	74 – 79.99%
C	2.0	Acceptable	67 – 73.99%
D	1.0	Minimum	60 – 66.99%
F	0.0	Inadequate	below 60%

DOCUMENTATION

Digital documentation of the entire semester's work, including process and progress imagery, will be required from each student/group. This documentation will provide the Department with a review of your study, and information contained in the digital files might be used in future electronic or printed media publications, either in whole or in part. This record will also enable interested students, faculty, and others to have access to your work in the future.

DELIVERABLES

All work needs to be submitted to the Google Drive folder provided by the instructor:

Google Drive\ARCH395_F24 and by uploading works in the Assignments page of the Canvas platform (*https://canvas.njit.edu/* or *https://njit.instructure.com/courses/37705*) and to Kepler. Please use PDF formats for all Canvas uploads. The Google Drive folder should have all native files/formats. This includes final products as well as individual components.

WORK BACKUP

You are expected to keep multiple backups of all coursework and to have your current project files available at all times during class time. You are encouraged to keep a cloud storage account in addition to a physical backup.

NAAB CONDITIONS FOR ACCREDITATION

The following represent course learning objectives and the National Architectural Accreditation Board (NAAB) criteria satisfied by this course.

Student Criteria (SC): Student Learning Objectives and Outcomes

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

Project 1 focuses on human factors and ergonomics fostering inclusive and universal design. Students develop critical thinking skills about the built environment from the perspective of human health and safety. Projects 2 and 3 incorporate a range of environmental factors, such as

daylighting, energy performance, and life cycle assessment in addition to life safety, egress, and ADA/Universal Design considerations.

SC.2 Professional Practice: *How the studio ensures that students understand professional ethics, the regulatory requirements, the fundamental business processes relevant to architecture practice in the United States, and the forces influencing change in these subjects.*

Projects 2 and 3 are developed using building information modeling (BIM) tools following professional practice and integrated project delivery pipelines. Students will consider local codes (UBC for the NJ site and NYC code for the Brooklyn site), understand zoning, and work with budgetary and construction constraints (Net and Gross areas, Gross/Net ratio, FAR, and occupancy).

SC.3 Regulatory Context: *How the studio 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.*

Projects 2 and 3 will address (1) accessibility (ADA), (2) means of egress, (3) local zoning requirements, and (4) environmental impact and building performance.

SC.4 Technical Knowledge: *How the studio 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.*

The semester projects are proposed to develop a specific type of building construction assembly, starting with balloon frame or light gauge metal framing (off-the-shelf materials), second with load-bearing walls (masonry blocks, precast panels), followed by steel frame construction, and CLT panels on the concrete base.

SC.5 Design Synthesis: *How the studio ensures that students develop the ability to make design decisions within architectural projects while demonstrating synthesis of user requirements, regulatory requirements, site conditions, and accessible design, and consideration of the measurable environmental impacts of their design decisions.*

Projects 2 and 3 will synthesize design, programmatic, building technology, human factors, and environmental considerations. Specifically, they will address: (1) program interdependencies between various dwelling unit types and shared facilities, (2) the interplay of the repetitive dwelling units and individualized façade design (3) the development of dwelling units, their modularity, and the impact on affordability, and (4) environmental impact and building performance simulations using BIM tools.

SC.6 Building Integration: *How the studio ensures that students develop the ability to make design decisions within architectural projects while demonstrating integration of building envelope systems and assemblies, structural systems, environmental control systems, life safety systems, and the measurable out- comes of building performance.*

Projects 2 and 3 will demonstrate design development-level integration of structural systems, building envelope systems and assemblies, passive environmental control systems, and life safety/ADA regulations.

ACADEMIC INTEGRITY

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 on Academic Integrity: *https://www.njit.edu/dos/academic-integrity* and to the Code of Student Conduct: *https://www.njit.edu/dos/policies/conductcode/index.php*

The HCAD library has assembled resources for a students on using images, citing, and plagiarism: https://researchguides.njit.edu/c.php?g=671665&p=4727920

GENERATIVE ARTIFICIAL INTELLIGENCE (AI) TOOL POLICY

The usage of generative artificial intelligence (AI), such as Stable Diffusion, is permitted in this course. If and when students use artificial intelligence in this course, the AI must be cited as is shown within the *NJIT Library AI citation page* for AI.

https://ist.njit.edu/guidelines-instructors-ai

ABSENCES

Each student is expected to attend all class meetings, to verbally participate in class discussions, as well as to develop additional work and ideas beyond the minimum requirements. Everyone is expected to be punctual and prepared with each assignment. Excessive lateness will be counted as if a student is absent. After three recorded absences, your grade will be lowered by ½ grade point for each additional absence, if the absence is not approved by the Dean of Students (DOS).

The NJIT office of the Dean of Students (DOS) maintains a way for students to explain absences that instructors can use to regulate absenteeism. By providing verifiable documentation through filing an online Student Absence Excuse Request form related to the absences within 14 days, a student can ask for accommodation and that their absences not affect their grade. Once the absence has

been verified, the DOS will communicate with the instructor. Nonetheless, the DOS only verifies documentation, and it remains the instructor's discretion to provide any accommodation and the student's responsibility to follow up with the instructor. Accepted reasons for absence include bereavement, medical concerns, military activity, legal obligations, or university-sponsored events. Additional DOS information outlined here: https://www.njit.edu/dos/student-excusals

DESIGN TOOLS

All mid and final project reviews will be delivered via digital presentations accompanied by high-quality and high-resolution imagery (diagrams, drawings, and renderings).

A critical part of any design process is a set of tools used to conceptualize design, develop alternatives, and validate design decisions. While the decision process in architecture involves both subjective and objective criteria, in this studio we will emphasize tools and methodologies that provide measurable and evidence-based design thinking. For this reason, all student work in this course will require a Building Information Modeling (BIM) platform. Specifically, students are expected to develop all design, simulation, and evaluation work utilizing Autodesk Revit with building performance and environmental assessment add-ons (plugins), such as Insight and One-Click LCA. The necessary tutorials will be offered via the LinkedIn Learning (LiL) platform and in-class hands-on tutorials. Please also note that the actual BIM (Revit) model will be required for the final submission. The BIM model will be evaluated for the quality and integrity of 3D and building information data in the same way as any other visual/design output. Please also note that the integrity of data (BIM model) is a critical component of the validation of any simulations performed for the project. If the BIM model does not meet 'good practice' standards, it will also impact the evaluation (grading) of the building performance and environmental impact simulations (the so-called 'garbage in and garbage out').

TUTORIALS

To support student learning NJIT offers free access to LinkedIn Learning (LiL) platform with more than 15,000 courses covering business, creative, and technology subjects. This studio course will utilize software tutorials offered by LiL.
To access tutorials, go to this page (https://www.linkedin.com/learning/) and sign in with your NJIT credentials. Specifically, students are expected to watch and absorb material covered by the following Revit tutorials:

Learning Revit 2024
https://www.linkedin.com/learning/learning-revit-2024/how-do-you-get-revit

Please watch the following sections: 1. Getting Started, 2. Building a Model, 3. Working with Views

Revit 2023: Essential Training for Architecture

https://www.linkedin.com/learning/revit-2023-essential-training-for-architecture-imperial-and-metric/revit-2023-for-architecture

Please watch the following sections: 1. Core Concepts, 2. Interface Basics, 3. Starting a Project, 4. Modeling Basics, 7. Stairs, 8. Complex Walls

Additional tutorials will be offered throughout the semester to respond to project needs and customize learning.

IMPORTANT PRECEDENTS

The following list provides students with the starting point in their case study investigations.

Querkraft Architects, Vienna, Austria, https://www.querkraft.at/

ASP Residential Complex Aspern, Querkraft and berger+parkkinen
https://www.querkraft.at/en/projects/asp-holzwohnbau

Apartment buildings by Group8asia
https://www.dezeen.com/2014/07/23/striped-living-group8asia-apartment-buildings-travertine-stone/

Habitat 67, 2600 Avenue Pierre-Dupuy, next to the Marc-Drouin Quay, Moshe Safdie

The Bosco Verticale (Vertical Forest) is a complex of two residential skyscrapers designed by Boeri Studio (Stefano Boeri, Gianandrea Barreca, and Giovanni La Varra)

https://en.wikipedia.org/wiki/Bosco_Verticale

UrbanNext Lexicon Gleis 21 Housing
https://miesarch.com/work/4301

PAST STUDENT WORK

Following examples are past student work utilizing BIM design pipeline

2nd Year Design Studio

See the recorded video presentation

Integrated Studio (Advanced Studio II)

Spring 2022: https://miro.com/app/board/uXjVO7XEwzs=/

Spring 2021: https://miro.com/app/board/o9J_lINtE3k=/

Spring 2020: https://miro.com/app/board/o9J_ktLowik=/

https://miro.com/app/board/o9J_ktLOcAY=/

https://miro.com/app/board/o9J_ktLMZrU=/

https://miro.com/app/board/o9J_ktLMYY8=/

https://miro.com/app/board/o9J_ktLMYbU=/

https://miro.com/app/board/o9J_ktFTxWY=/

REFERENCES

The following list provides useful resources for topics discussed in this studio course.

Universal design refers to the concept of creating environments, products, or services that are accessible and usable by everyone, regardless of age, ability, or other factors. The goal is to design spaces and tools that can accommodate the widest range of users, minimizing the need for adaptations or specialized designs.

Key Principles of Universal Design

1. Equitable Use: The design is useful and marketable to people with diverse abilities.
2. Flexibility in Use: The design accommodates a wide range of individual preferences and abilities.
3. Simple and Intuitive Use: The design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
4. Perceptible Information: The design communicates necessary information effectively, regardless of ambient conditions or the user's sensory abilities.
5. Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. Low Physical Effort: The design can be used efficiently and comfortably with a minimum of fatigue.
7. Size and Space for Approach and Use: Appropriate size and space are provided for approach, reach, manipulation, and use, regardless of the user's body size, posture, or mobility.

Applications of Universal Design

1. Architecture: Buildings with ramps, wide doorways, and elevators.
2. Products: Tools with easy-to-grip handles, phones with large buttons.
3. Technology: Software with customizable interfaces, websites that are accessible to screen readers.

Universal design aims to make the world more inclusive, allowing all individuals to participate fully in everyday activities.