Option Studio, Spring 2021
Register for: ARCH 463, Section Nr. 002
Delivery Mode: Synchronous Online

Architectural Form Finding through Parametric Design and Performance Analysis

Caroline Grieco

With the increasing demand for sustainable design, the ability to first simulate performance of building systems in virtual models then measure actual performance post occupancy is becoming a driving force behind architectural design decisions. Facades translate the continuous interaction between the functional activities of the indoor space and outdoor environment. The quality of this interaction determines level of human comfort for inhabitants and the building's responsibility to nature.

This Option Studio will generate iterative adaptive façade systems through an array of contemporary computational tools. Students will then conduct simulation analysis through the integration of façade forms and given architectural program utilizing BIM. Students will evaluate and record measurable environmental impact of each generated system, identifying positive and negative aspects per formal approach to improve further iterations. Analysis will include quantity and quality of daylight illuminance, views, and fresh air circulation. Skins will be applied to the architectural structure of a vertical urban park, which will include conditioned and unconditioned program. Students will be challenged to respond to contemporary needs for well ventilated public spaces and connection to the natural environment in an urban setting. The outcome of the studio will be an optimal architectural façade system design demonstrating an array of formal conditions aptly applied to the architectural structure. Final documentation will include a journal of the generative process highlighting relationships between design variables and environmental performance metrics.

Photo credit: DSC + RN, The Broad, Los Angeles. Through computational modeling, the 'veil' was designed to prevent direct sunlight from entering the top floor gallery space, while providing ample amount of indirect natural lighting. (dsrn.com/project/the-broad)

SKETCH →	SIMULATION →	ANALYSIS →	REPRESENTATION
Hand-drawings of new ideas on trace, paper, etc. for team review.	*Digital and Physical construction of 3D or 4D compositions.*	*Placing Simulation Model in context and recording insight.*	*Presenting architectural solutions demonstrating profit from Analysis.*
New Individual and Team Sketches are expected for every class.	New Team-generated models (Revit) are req'd every unit.	Analysis (Shadow Studies, Thermal Gain, Budgets, etc.) are req'd every unit.	Final Orthographic Drawings, Renderings, Animations, etc. are req'd every unit.

Architectural Design through Modern Construction Technologies

The chosen context for the semester design project includes development of a university dormitory structure, including public podium on the ground floor and modular system of student living units above. Students' attentions will focus on the design process principles that support the management of elemental architecture and mass customization. Students will consider fabrication, assembly, and delivery as a design constraint throughout the course.

"Evolutionary change in vernacular building is a record of lean thought that becomes poetic by virtue of its fitness."

~Refabricating Architecture, Stephen Kieran and James Timberlake

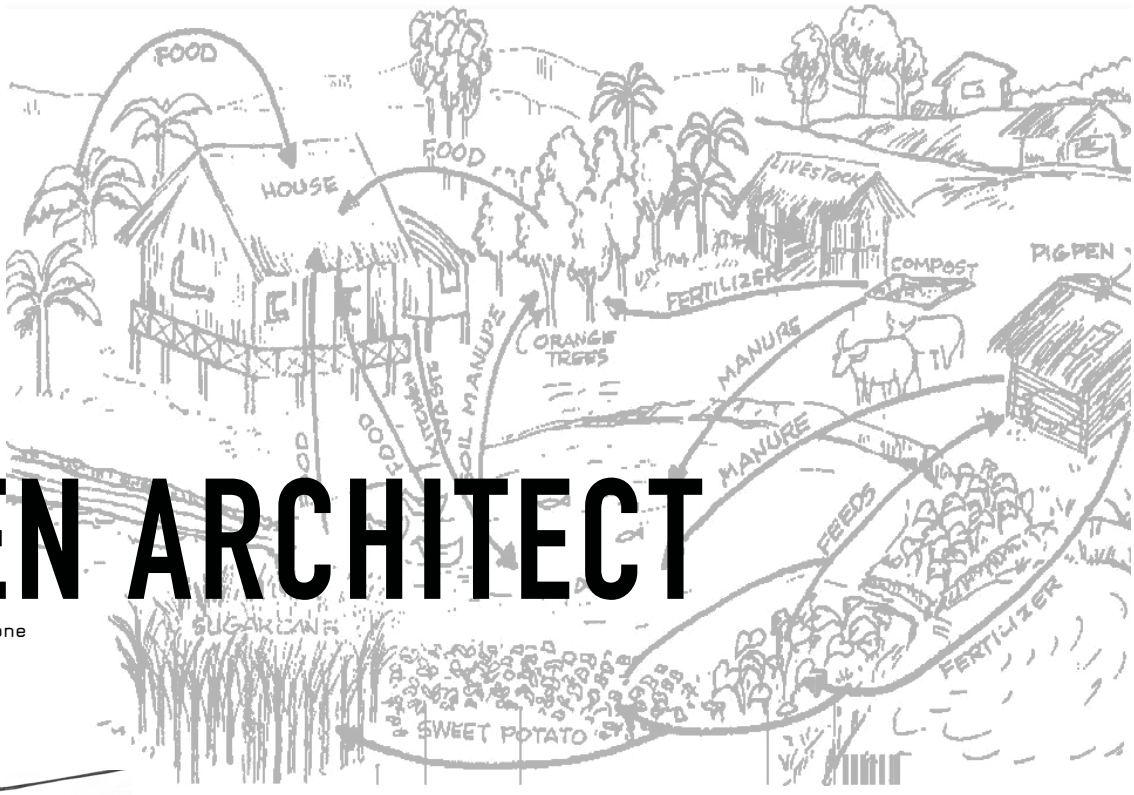
An emphasis is placed on systems integration, environmental analysis and materials selection associated with the comprehensive design of buildings using Building Information Modeling (BIM). The design of a harmonious relationship between the site and building is stressed. Emphasis is placed on creativity in the process of integrating all building systems (spatial, structural, mechanical and electrical) in the design.

This course teaches integration techniques by requiring student teams to engage their design process in Units. Each Unit generally requires this four-step protocol. **SKETCH → SIMULATION → ANALYSIS → REPRESENTATION**

Option Studio, Spring 2021
register for:
ARCH 463, **Section Nr. 008**
Delivery Mode: Converged

CITIZEN ARCHITECT

Erin Pellegrino + Charlie Firestone



'You have to get an individual who's willing to actually struggle with the system to change it. As long as you have people who – to make substantive changes, make infrastructure changes.'

-Amiri Baraka

STUDIO AIMS AND OBJECTIVES

The issues of climate change, social justice, and food access are inextricably linked. As the climate changes and the population expands, access to food is becoming a pressing issue for an increasingly large percentage of households. As the amount of rural land suitable for farming runs out, as soil quality degrades, the cost and environmental impact of food production and transportation are becoming larger problems every year.

Increasingly, as grocery prices rise, and access to nutritious, quality food becomes more difficult, residents of urban areas are turning to local agricultural solutions. Urban farming can take many forms: from small community gardens, to large scale vertical hydroponics, from rooftops, to vacant lots, to adaptive reuse of industrial buildings. All these solutions (and may more) are beginning to take root in Newark. In addition to filling the very real gap of food access in under-resourced areas of the city, urban farms increase green cover (decreasing heat-island intensity), they increase the livability of urban areas, and they increase community engagement – with the potential to give communities ownership not only of the physical space within their neighborhood but also over the means of production of their own sustenance.

STUDIO OUTPUT

In this studio, students will be asked to think deeply about the role architecture plays within systems of all scales.
By framing the design challenge as a vehicle for supporting life (not only human but also vegetal and possibly animal) the students will also develop a deep sensitivity to the environmental forces at play. They will be asked to study the systems of food production from a global perspective (considering the impact of food growth, processing, and delivery on the environment and the people involved in this system). They will also be asked to examine the process of producing food on the local and hyper-local level – creating conditions that are sensitive to the necessary environmental factors for producing crops, and to the processes involved with production and distribution. As the students begin to understand and develop a perspective, they will be asked to think creatively about the program of the urban farm and how it will operate within, outside of, or in opposition to existing systems.