CIEE Global Institute – Berlin

Course name:	Future Cities Design Studio
Course number:	ARCH 3001 GGAD
Program offering course:	Berlin Global Architecture and Design
Language of instruction:	English
U.S. semester credits:	6
Contact hours:	90
Term:	Fall 2019

Course Description

For the first time in history, the majority of human population now lives in cities, a milestone that coincides with the awareness that earth's systems are increasingly influenced by human activity. This studio supposes extreme solutions to an extreme predicament, asking the question: How will future cities simultaneously serve demanding human populations and support natural systems? The studio views the forms, systems, and technologies of the city collectively and synthesizes urban studies with the field of ecology. Project sites are selected based on significance in dynamic ongoing development in Berlin. Students will develop a program and urban design solution. Students receive training in software for digital design, environmental analysis, as well as rapid prototyping. Students in this course will have access to the Global Fab Lab for 3D printing and CNC milling. The course is taught "vertically" meaning that students are assessed individually per their level of experience.

Learning Objectives

By the end of the course, students will be able to:

- begin to understand the practice of architecture and design within an emerging global context.
- conduct urban investigations and present their findings coherently in verbal and graphic formats.
- learn from relevant urban precedents.
- critically communicate architectural and urban design ideas.
- develop a comprehensive project, in other words, be able to tell a complete story using a range of media.
- have a rudimentary understanding of the phenomenon of building at all scales, from detail to city.

- work productively in a group. Students should begin to understand the relationship of architecture and design to allied disciplines; students should be able to work in interdisciplinary teams.

Course Prerequisites

To participate in the Global Architecture and Design program, students must be majoring in Architecture, Environmental Design, Industrial Design, Interior Design, Landscape Architecture, Sustainability Studies, Urban Design or minoring in these areas--and have completed 2-3 semesters of design studio or a project-based course in their major.

Methods of Instruction

Class presentations and discussions, readings, and site visits. The studio has a vertical and highly individualized structure to teach students with varied experience. This also means that students must be prepared to exhibit more self-motivation and discipline. Design exercises are gradually applied to the project. The studio operates in tangent with the concepts introduced in the Design and Sustainability Seminar and the skills learned in the Science and Technology Workshop. A range of tools may be deployed including computational and/or parametric modeling, performance simulation, physical experimentation, and rapid prototyping equipment, e.g. 3D printing, vacuum forming, CNC or laser cutting.

The studio project is developed in three phases during three six-week blocks. Students receive a new assignment brief at the beginning of each block. The course is taught vertically, meaning students with various experience levels can participate in assignments.

Assessment and Final Grade

1. Participation:	20%
2. First Presentation:	15%
3. Mid-Review Presentation:	20%
4. Final Presentation:	25%
5. Final Documentation (Book):	20%
TOTAL:	100%

Course Requirements

First Presentation

In a 15-minute presentation, students identify the main objective(s) for the design and metrics for success. With the guidance of the instructor, students are asked to address how the abstractions can be applied in context (and on the site model) to meet project objectives.

Mid-Review Presentation

(1) Research Presentation

- Site typology and site analysis: exploded axonometric drawings including morphology, context, circulation, and environment analysis
- Supporting research

(2) Concept Proposal

- Program and parti diagram(s)
- Circulation and Sun Shading diagrams and/or video(s)
- Physical model massing and form-finding studies
- Site plan and section, scale 1:1000
- Perspective (model photo or digital render)

Final Documentation and Presentation

The Final Project is documented in both a presentation as well as more detailed "book," for print and web publishing. Boards may be required depending on the presentation venue. Remember to include drawings from the mid review to provide supporting argument.

Final Deliverables – Exhibition Presentation Drawings:

- Background Research
- Exploded Isometric or Axonometric Environmental Analysis
- Program / Functional Diagrams / Conceptual Design Drawings / Models
- Digital rendering - Aerial Perspective(s)
- Digital rendering - Ground Perspective(s)
- Location Plan M 1:500
- Section, Elevation M 1:50
- Final Model M 1:50

- Prototype M 1:1
- Details as Required

Participation

Participation is valued as meaningful contribution in the digital and tangible classroom, utilizing the resources and materials presented to students as part of the course. Meaningful contribution requires students to be prepared in advance of each class session and to have regular attendance. Students must clearly demonstrate they have engaged with the materials as directed, for example, through classroom discussions, online discussion boards, peer-to-peer feedback (after presentations), interaction with guest speakers, and attentiveness on co-curricular and outside-of-classroom activities.

Individual progress is also considered an important part of participation in the course. This is defined as a consistent effort to develop the semester assignment. Although the studio project is due at the end of the semester, you should not wait until the end to work seriously. Points are also awarded for written responses to readings and site visits, especially during the first block. As a studio course, students should be ready to engage in group activities as well as manage their time appropriately for individual design work.

Attendance Policy

Regular class attendance is required throughout the program, and all unexcused absences will result in a lower participation grade for any affected CIEE course. Due to the intensive schedules for Open Campus and Short Term programs, unexcused absences that constitute more than 10% of the total course will result in a written warning.

Students who transfer from one CIEE class to another during the add/drop period will not be considered absent from the first session(s) of their new class, provided they were marked present for the first session(s) of their original class. Otherwise, the absence(s) from the original class carry over to the new class and count against the grade in that class.

For CIEE classes, excessively tardy (over 15 minutes late) students must be marked absent. Attendance policies also apply to any required co-curricular class excursion or event, as well as to Internship, Service Learning, or required field placement. Students who miss class for personal travel, including unforeseen delays that arise as a result of personal travel, will be marked as absent and unexcused. No make-up or re-sit opportunity will be provided.

Attendance policies also apply to any required class excursion, with the exception that some class excursions cannot accommodate any tardiness, and students risk being marked as absent if they fail to be present at the appointed time.

Unexcused absences will lead to the following penalties:

Percentage of Total Course Hours Missed	*Equivalent Number of Open Campus Semester classes*	*Minimum Penalty*
Up to 10%	1 content classes, or up to 2 language classes	Participation graded as per class requirements
10 – 20%	2 content classes, or 3-4 language classes	Participation graded as per class requirements; **written warning**
More than 20%	3 content classes, or 5 language classes	Automatic **course failure**, and possible expulsion

Project Introduction

Teufelsberg Field Station Berlin

NOTE: *The project is subject to change based on ongoing consideration in Berlin.*

The project site is an 80m high artificial hill located in western Berlin called Teufelsberg (translated as Devil's Mountain). Teufelsburg, much like Berlin itself, has a layered history, dynamic present, and an exciting future. Teufelsberg was the site of the "Wehrtechnische Fakultät", a military-technical college designed by Albert Speer but never completed, and later "Field Station Berlin" an NSA spy station during the Cold War. "The Hill" as it was called by spies and soldiers was in operation until shortly after reunification. Following reunification, Field Station Berlin was stripped bare and abandoned to the forces of nature and change. The massive concrete architecture and remote location was taken over by street artists and other elements Berlin underground culture.

Developers later purchased the site for construction of a hotel, but this project never materialized, and the site was re-zoned as protected forest. Currently, Teufelsberg, though still in private hands, remains an important location for street art and is accessible via guided tours. The existing structures themselves are valued as art, but also host an ever-changing collection of murals and installations, and on occasion concerts, dance, and performance art.

Weekly Schedule

NOTE: This schedule is subject to change at the discretion of the instructor to take advantage of current experiential learning opportunities.

Block I **Research and Analysis, Program** (One class session per week)

In the first block students conduct research and are encouraged to integrate their own ideas into the project program.

Week 1 **Introduction**

The program and studio project are introduced to students in an overview presentation. Students also begin conducting initial site research, physical, and digital modeling of the project site at multiple scales.

Beginning at urban scale research, students download and use GIS software to conduct an initial analysis of Berlin systems including building and landscape morphology, water systems, and transportation infrastructure. This analysis is displayed in a series of layered maps. Students should explore parallels between the systems. To get to know Berlin, students are asked to visit a site based on the layering study and observe the patterns of development first hand, which is due in Week 3.

Week 2 **Introduction to Project Site**

Students receive a tour of the project site, conduct on-site investigations begin physical and digital modeling.

The project site investigations focus on local context including typology and morphology studies, local culture study, and

environmental analysis. Students will be provided a range of tools analysis and graphic representation.

Supporting background research concerns the evolution of thought and practice in the area of sustainable design innovation, urban ecology, and biologically-inspired design.

Reading selections from:

- Mostafavi, Mohsen, ed. *Ecological Urbanism*. Zurich: Lars Mueller, 2010.
- Myers, William. *Bio Design: Nature. Science. Creativity.* London: Thames & Hudson, 2012.

Week 3

Background Research

Presentation of layered urban scale studies and visit to the planning offices for an overview of history and development in Berlin. The diverse, sometimes even divergent planning reflects the tumultuous history of the city.

The background research continues with a focus on the physical morphology of the project site. Students will develop site axonometric studies of local context including landscape, building morphology, and environment. Digital and physical site models are started.

Reading selections from:

- Güney, “Type and Typology,” Sandalack, “Typology of Public Space”

Week 4

Overview of Ecological Urbanism

Students receive an overview of the current thought, research, and practice of ecological urbanism. How does ecology improve cities and what is the difference anyway?

Susannah Hagen writes that the goal of ecological urbanism is to create an "artificial ecosystem" that achieve the same interdependent efficiencies and life-preserving redundancies as natural ecosystems, turning the current linear patterns into a loop: waste becomes energy.

Readings and in-class presentations and discussions are reinforced with walking tours to related projects such as Potsdamer Platz by Renzo Piano Workshop and Atelier Dreiseitl, Park Gleisdreieck by Loidl Landscape Architects, and Velodrome by Perault Architects.

Reading selections from:

- Hoyer, J., Dickhaut, W., Kronawitter L, *Water Sensitive Urban Design*

- Ecological Urbanism, *The Architectural Review*, March 16 2015, Susannah Hagan

- Waldheim, Charles. *Landscape Urbanism: A General Theory*. Princeton University Press, 2016

Week 5

Overview and Design Workshop: Emergence and Bioinspiration

Nature has been an inspiration for designers throughout recorded history. In this course, bioinspiration experimentation teaches students about the relationships of form and function found in nature while also introducing the concept of emergent design. Recent advances in computational design have enabled designers to "mimic" the mathematical "rules" found in nature, and even program adaptability, yielding sophisticated and provocative results.

The process is applicable to a range of design backgrounds. Students initially select from samples provided, or choose their own, and perform investigation into the relationship between geometry, form, materiality, and performance. The result is modular "series". This design thinking will later be applied to the project.

Selected Readings from the following text are intended to inspire students as they explore their individual creative design process.

- Hensel, Michael and Achim Menges, eds. *Versatility and Vicissitude: Performance in Morpho-Ecological Design*. New York: Wiley, 2008.

Week 6 **First Presentation: Research and Analysis**

Students identify the main objective(s) for the design and metrics for success. Design Workshop(s) continue and students consider how the abstractions can be applied in context (and on the site model) to meet project objectives.

Block II **Theoretical/Conceptual Design** (Two class sessions per week)

In the second block the primary design challenge will be to develop supporting structures to accommodate the needs of lab, resident artists, and visitors. These installations are used for research and also include micro-housing units. The task will act as a vessel to explore dimensions of self-sufficiency, while also responding to practical needs of stakeholders for shelter, informal gathering space, event space, and generation of resources (renewable energy, rainwater harvesting, agroecology). The design approach therefore must be modular and scalable. Computational design and digital fabrication techniques taught in the workshop are employed in the studio project.

Week 7 **Climate Adaptive and Performative Design 1**

Input is provided on researching local climates, passive design strategies for comfort, and active technologies for generating renewable energy and harvesting rainwater on-site.

The approach taken in abstract form-finding studies from Block II is adapted for the project site and response to local environmental conditions.

Methods for solar data, sun-shading, and solar irradiation studies are taught in the second class session of this week.

Week 8

Conceptual Design Development

The conceptual design is developed physically and digitally. Students continue developing the project morphology, also integrating component and structural logic. Students should also consider users and especially accessibility.

Study Tour to another Central European City

Students participate in an excursion that explores urban and architectural design. Projects visited complement the studio agenda, while also offering new perspectives on design in a different historical and environmental context.

Week 9

Conceptual Design Development Continues

The conceptual design is developed physically and digitally. Students continue developing the project morphology, also integrating component and structural logic. Students should also consider users and especially accessibility.

Selected readings from the following text are intended to inspire students as they explore their individual creative design process.

Reading selections from:

- Spyrotoulos. *Adaptive Ecologies, Correlated Systems of Living*.
- *Global Fab Lab Manual* (safety test required before using equipment).

In the second session of this week, tools learned in the computational design workshop will aid in analysis and decision-making. Digital fabrication training begins. Conceptual design models can be built, or 3D printed, and inserted into the site model.

Week 10 **Digital Design and fabrication training continues**
Conceptual design models are built, or 3D printed and inserted into the site model. Although digital fabrication techniques will be taught, students are encouraged to design to their strengths. Some students may be adept with digital design and others with "analog" or "hands-on" physical modeling.

Week 11 **Conceptual Design Development Continues**
Final conceptual design input emphasizes the importance of design drawings in plan, section, and elevation. Templates and requirements for the mid-review presentation are provided.

Week 12 **Mid-Review Presentation: Conceptual Design**

Block III **Proof of Concept / Prototyping** (Two class sessions per week)
In the third block students work closely with professors to prove their concept with more advanced research, design, modeling and even 1:1 prototypes.

Week 13 **Discussion of Presentation and Strategy for Proof of Concept**
In the third block students reflect on the input from the mid review presentation and develop a project plan and schedule based on their experience and abilities. Project drawings are developed for further consideration of construction and technical schematics, and utilization of digital fabrication technology may be used to realize the project. In the final stage of the project students will be able to realize a part of their project on site.

Week 14 **Design and Prototyping**

The project is developed further with focus on finalizing design drawings, developing construction drawings and details to realize final models and 1:1 prototypes.

Weeks 15-16 **Prototyping Workshop(s)**

Students participate in workshops at the project site where prototypes are developed from simple materials. These prototypes are simplified designs based on conceptual explorations from the second block. The prototypes also include participation from visitors and local community groups at Teufelsberg.

Week 17 **Final Exhibition**

Finalize the presentation and project book, and rehearse the final oral report with strong and clear visual presentation.

Week 18 **Conclusion**

Final Submission of Deliverables Due

Readings

Allen, Stan and Marc McQuade. *Landform Building: Architecture's New Terrain.* Zurich: Lars Mueller, 2011.

Angles, Magda. *In Favour of Public Space: Ten Years of the European Prize for Urban Public Space.* New York: Actar, 2010.

Garcia, Mark. *The Diagrams of Architecture: Volume 1 of AD Reader.* New York: Wiley, 2010.

Hensel, Michael and Achim Menges, eds. *Versatility and Vicissitude: Performance in Morpho-Ecological Design.* New York: Wiley, 2008.

Hensel, Michael, Achim Menges, and Michael Weinstock, eds. *Techniques and Technologies in Morphogenetic Design.* New York: Wiley, 2006.

Hensel, Michael, Achim Menges, and Christopher Hight, eds. *Space Reader: Heterogeneous Space in Architecture.* New York: Wiley, 2009.

Hou, Jeffrey. *Insurgent Public Space: Guerrilla Urbanism and the Remaking of Contemporary Cities.* New York and London: Routledge, 2010.

Menges, Achim, ed. *Material Computation: Higher Integration in Morphogenetic Design.* New York: Wiley, 2012.

Mostafavi, Mohsen, ed. *Ecological Urbanism.* Zurich: Lars Mueller, 2010.

Myers, William. *Bio Design: Nature. Science. Creativity.* London: Thames & Hudson, 2012.

Spyrotoulos, Theodore. *Adaptive Ecologies, Correlated Systems of Living.* London: Architectural Association, 2013.

Weinstock, Michael. "Fabricating Architecture, Self Organization and Materials Computation," in Rober Corser, ed. *Fabricating Architecture: Selected Readings in Digital Design and Manufacturing.* New York: Princeton Architectural Press, 2010.

White, Mason, Lola Sheppard, and Neera Bhatia. *Pamphlet Architecture 30: Coupling Strategies for Infrastructural Opportunism.* New York: Princeton Architectural Press, 2011.