

AT I: ENVIRONMENTS IN ARCHITECTURE (A4111)

Lectures: Tuesday 9:30AM-11AM

Lab: Tuesday 11AM-12:30AM

Avery 114 | 3 points

Instructor: Lola Ben-Alon

Teaching Associate for Software: Pragya Gupta

TA: Rasam Aminzadeh

COURSE DESCRIPTION

This course introduces building technology responses for energy conservation and natural conditioning, human comfort, and the site-specific dynamics of climate and environments. Students will be expected to integrate an understanding of the basic laws of comfort and heat flow with the variables of the local environment to create design adaptations for their own work. The state of the art in environmental design and passive heating and cooling technologies will be presented in lectures and supported by software tutorials, readings and assignments.

To illuminate the significance of architectural design decision-making on energy consumption and comfort, design specifications and modifications will be explored for a residential building. Homework assignments will be scaffolded to compile a professional environmental communication video, analyzing energy measures from massing, orientation, organization, enclosure detailing, opening control, to passive system integration and management. An overview of world energy consumption in buildings and energy rating systems will be introduced by lectures on building energy and emerging responsibilities for a broader definition of sustainability. The course will end with a critical and explorative visual communications exercise of environmental considerations that integrate natural and passive systems as well as the potentially dynamic interface of mechanical systems.

Class time will be divided into lectures, lab introductions of software tools, class presentations, and guest lectures. Students are encouraged to apply lessons learned in this class to their studio explorations.

LEARNING OBJECTIVES

- To identify the different relationships developed through building between people and their sensory environments in various situations.
- To analyze selected aspects of the physical environment which directly affect people and buildings, such as climate, weather, solar radiation and heat gain and loss.
- To analyze and demonstrate the means by which environmental factors may be wisely applied and modified as an integral part of the architectural design.

WORKLOAD AND EVALUATION CRITERIA

70% of the final grade will be dependent on 6 homework assignments on analyzing environments, climate, energy, light, and shape, for a residential building for energy conservation and passive conditioning; In addition, 30% of the final grade will be evaluated through a final visual environmental exercise, assembling all calculations and recommendations. All assignments will be submitted digitally; any submitted late will earn one grade lower; assignments 1-5 must be submitted by mid semester grading.

There is an expectation that the work in this course will be reflected in the quality of your studio design work.

COURSE READINGS

Hershong, L., *Thermal delight in architecture*, MIT Press, Cambridge MA (1979)

Lechner, N., *Heating, cooling, lighting: Sustainable design methods for architects*, John Wiley & Sons, 3rd or 4th edition (2014)

Kwok, A. G., & Grondzik, W. *The green studio handbook: Environmental strategies for schematic design*, Routledge, 3rd edition (2018)

DeKay, M., & Brown, G. Z., *Sun, wind, and light: architectural design strategies*. John Wiley & Sons, 4th edition (2014)

Grondzik, Kwok, Stein & Reynolds, *Mechanical and Electrical Equipment for Buildings*, John Wiley and Sons, NY 11th or 12th edition (2014)

These books are not required purchases but invaluable additions to a 'sustainability' library. For simplicity, students should buy *The Visual Handbook of Energy Conservation* by Charlie Wing, Taunton Press. Course lecture slides and additional reference material will be available on Canvas.

SOFTWARE

Several different software packages already available on the GSAPP supplied lab computers will be used to complete assignments. At a minimum, these include Climate Consultant and GH Ladybug, Honeybee, and Diva.

ACADEMIC INTEGRITY & PLAGIARISM

Plagiarism is defined as the use of work or concepts developed by other individuals without proper attribution or citation. Unique ideas or materials taken from another source for either written or oral use must be fully acknowledged in academic work to be graded. Examples of sources expected to be referenced include but are not limited to:

1. Text, either written or spoken, quoted directly or paraphrased.
2. Graphic elements (figures, charts, graphs, images).
3. Mathematical proofs and/or scientific data.
4. Concepts or material derived from the work, published or unpublished, of another person.

Students should take advantage of plagiarism checkers available on the library website, and for editing and writing assistance they should contact the Columbia University Writing Center.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Accommodations may need to be added or adjusted should this course shift from an on-campus to a remote format. If you have a disability and are registered with the Columbia Disability Services, please use their online system to notify me of your accommodations and discuss your needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with Disability Services, I encourage you to contact them at disability@columbia.edu

A11: environments in architecture (A4111)

Lola Ben-Alon / Columbia University / GSAPP / Fall 2020

STATEMENT OF SUPPORT FOR STUDENTS' HEALTH & WELL-BEING

I encourage you to take care of your health and wellbeing. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, applying the recommended COVID-19 precautions, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress.

If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CPS) is here to help 24/7: call 212-854-2878 and visit <https://health.columbia.edu/content/counseling-and-psychological-services>

SYNCHRONOUS ONLINE CLASS RECORDING

Our class sessions will be audio-visually recorded for students who are unable to attend at the scheduled time. Students who participate with their camera engaged or who utilize a profile image are agreeing to have their audio/video or image recorded. Likewise, students who unmute during class and participate orally are agreeing to have their voices recorded.