Architecture Climate Change & Society

Buell Center
2021 Course Development Prize

THE BUILT ENVIRONMENT

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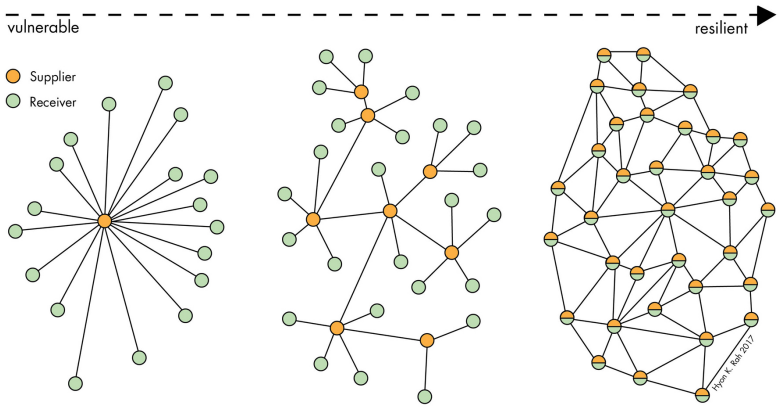


Climate change, increasingly frequent and devastating disasters, and the built environment are inextricably linked. This calls for a fundamental shift in how we design, plan, and manage the built environment – from self-referential and siloed to more contextualized and systems-based. This course takes a holistic look at different scales and disciplines contributing to the built environment and at social, economic, and environmental interdependencies and influences. Various design, technical, financial, and policy tools and strategies are explored. The goal is to better prepare our students for increasingly complex and challenging conditions and the role of interdisciplinary facilitator architects are required play.

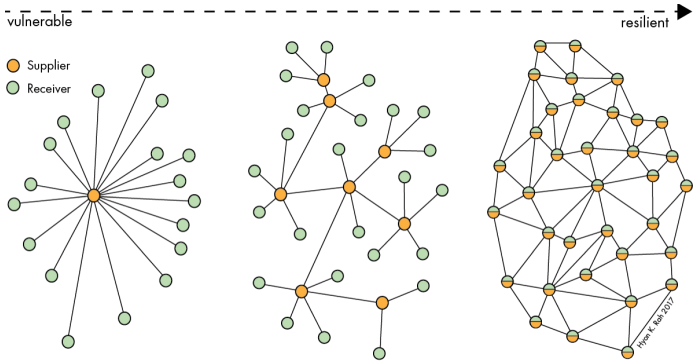
Association of Collegiate Schools of Architecture
Columbia University's Temple Hoyne Buell Center for the Study of American Architecture

University of the District of Columbia

ARCP256: The Built Environment

Hyon K. Rah

Everything is connected.



COURSE DESCRIPTION

Climate change, increasingly frequent and devastating disasters, and the built environment are inextricably linked. This calls for a fundamental shift in how we design, plan, and manage our built environment – from self-referential and siloed to more contextualized and systems-based. This course takes a holistic look at different scales and disciplines contributing to the built environment and at social, economic, and environmental interdependencies and influences, including impacts on the livelihoods of affected communities. Available tools and strategies against threats from climate change are explored and examined, ranging from design and technology to policy, regulations, and financing. The key focus of the course is to strengthen students' capabilities in systems thinking and interdisciplinary facilitation and to prepare them to work effectively with professionals from other disciplines to tackle the causes and effects of climate change.

"The Built Environment" is an introductory course which is required for all undergraduate architecture students at the University of the District of Columbia, a Historically Black College and University (HBCU). It is cross-listed for related majors within the College of Agriculture, Urban Sustainability & Environmental Sciences. The course was redesigned by the current instructor in 2018. While the current scope of the course focuses on interdisciplinary and systems-based practice in the built environment, the issue of climate change has not been fully integrated. The proposed reconfiguration positions climate change impacts, adaptation, and mitigation as the overarching and binding theme of the entire course.

Consisting of lectures, case studies, reading materials, student presentations, and in-class discussions, the course will focus on building students' technical competency to incorporate climate change-related concerns and issues into the development and maintenance of the built environment. It also aims to foster soft skills to be able to understand the different priorities of stakeholders from other disciplines and to communicate and collaborate effectively.

Case studies will be used to illustrate the interdependencies among climate change impacts on the built environment and location-specific social and economic factors. Student presentations will help reinforce these concepts. The course will also feature guest speakers from the public, private, and nonprofit sectors in order to provide students with different disciplinary perspectives as well as opportunities to become acquainted with industry leaders.

COURSE OBJECTIVE

The goal of this course is to better prepare our students for increasingly challenging environmental conditions and the role of interdisciplinary facilitator architects are required play. The course aims to provide future professionals with both soft (e.g., communication) and hard (e.g., technical concepts) skills necessary to be effective stewards of climate action in an interdisciplinary environment.

COURSE OUTLINE & RESOURCES LIST*

*Relevant and timely articles will be shared with students in addition to the listed items. This list includes required and optional materials.

The 15-week course is divided into the following modules to progressively build course concepts:

1. Core Concepts/Terminologies

Sustainability Brundtland, G. H. (1987). Our Common Future—Call for Action. *Environmental Conservation*, 14(4), 291-294. doi:10.1017/s0376892900016805. un-documents.net/our-common-future.pdf.

Resilience The National Institute of Building Sciences, Excerpted from the 12th Edition of Architectural Graphic Standards. (2018, August 01). *Building Resilience*. http://www.wbdg.org/resources/building-resiliency

Greenhouse Gases Environmental Protection Agency. (2020, September 08). Overview of Greenhouse Gases. http://www.epa.gov/ghgemissions/overview-greenhouse-gases

Climate Change Irfan, U., Barclay, E., & Sukumar, K. (2019, July 19). America is warming fast. See how your city's weather will be different by 2050. Vox. www.vox.com/a/weather-climate-change-us-cities-global-warming

Disasters National Climatic Data Center. (2020, June). Billion-Dollar Weather and Climate Disasters: Overview. http://www.ncdc.noaa.gov/billions/

Adaptation Guzzetta, M. (2019, July 25). Need to Relocate? Bring the House, Too. *The Wall Street Journal*. www.wsj.com/articles/need-to-relocate-bring-the-house-too-11564070995

Mitigation Intergovernmental Panel on Climate Change. (2011). Summary for Policymakers - Special Report on Renewable Energy Sources and Climate Change Mitigation (Tech.). www.ipcc.ch/report/renewable-energy-sources-and-climate-change-mitigation/

2. Scales

Introduction Eames, R., & Eames, C. (1977). Powers of Ten. http://www.youtube.com/watch?v=0fKBhvDjuy0

Product McDonough, W., Braungart, M., Anastas, P. T., & Zimmerman, J. (2003, December 1). Applying the principles of Green Engineering to cradle-to-cradle design. https://pubmed.ncbi.nlm.nih.gov/14700308/

Building Steven Winter Associates. (2016, February 08). Net Zero Energy Buildings. http://www.wbdg.org/resources/net-zero-energy-buildings

National Park Service. (2013). Sustainability for Rehabilitating Historic Buildings-Sustainability Guidelines. https://www.nps.gov/tps/standards/rehabilitation/guidelines/index.htm

Infrastructure Environmental Protection Agency. (2016, December 22). Climate Impacts on Transportation. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-transportation_.html

Déau, T. (2020). Why sustainable infrastructure is a critical part of rebuilding the post-COVID economy. World Economic Forum. www.weforum.org/agenda/2020/09/sustainable-infrastructure-post-pandemic-rebuilding-economy-great-reset-meridiam-laguardia-terminal-b-project/

Wilby, R. (2007). A Review of Climate Change Impacts on the Built Environment. Built Environment, 33(1), 31-45. doi:10.2148/benv.33.1.31. https://static.sustainability.asu.edu/docs/ugec/other-conferences/wilby-paper.pdf

City City of Houston. (2020, April). Climate Action Plan. http://greenhoustontx.gov/climateactionplan/

Flavelle, C. (2019, October 2). In Houston, a Rash of Storms Tests the Limits of Coping with Climate Change". *The New York Times*. www.nytimes.com/2019/10/02/climate/hurricane-adaptation-houston.html.

Region State of California. (2019, February). Climate Action Plan. https://water.ca.gov/Programs/All-Programs/Climate-Change-Program/Climate-Action-Plan

3. Key Elements

Land American Meteorological Society (Ed.). (2020, January). Explaining Extreme Events from a Climate Perspective. Retrieved from http://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/

Intergovernmental Panel on Climate Change. (2019, August). Summary for Policymakers - Special Report on Climate Change and Land (Tech.). www.ipcc.ch/srccl/chapter/summary-for-policymakers/.

Ocean International Union for Conservation of Nature. (2018, August 31). Coral reefs and climate change. http://www.iucn.org/resources/issues-briefs/coral-reefs-and-climate-change

Simon, M. (2019, January 14). Desalination Is Booming. But What About All That Toxic Brine? Wired. www.wired.com/story/desalination-is-booming-but-what-about-all-that-toxic-brine

Union of Concerned Scientists. (2018, June 18). Underwater: Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate. https://www.ucsusa.org/resources/underwater

Air World Green Building Council. (2019). Impacts of Air Pollution from and on the Built Environment. Retrieved from https://worldgbc.org/clean-air-buildings/impacts

Water Andréassian, V. (2020, September 03). 'Day Zero': From Cape Town to São Paulo, large cities are facing water shortages. *The Conversation*. theconversation.com/day-zero-from-cape-town-to-sao-paulo-large-cities-are-facing-water-shortages-98535

Russell, P. R. (2020, July 21). Threats of 'Day Zero' Water Scarcity Multiply. *Engineering News-Record.* www.enr.com/articles/49714-threats-of-day-zero-water-scarcity-multiply

Yudelson, J. (2010). Dry run preventing the next urban water crisis. Gabriola Island, BC: New Society.

Energy Environmental Protection Agency. (2016, December 22). Climate Impacts on Energy. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-energy_.html

International Renewable Energy Agency. (2020, September). Reaching Zero with Renewables. https://www.irena.org/publications/2020/Sep/Reaching-Zero-with-Renewables

4. Communities & Equity

Environmental Justice Ambrosio, N. (2020, July 22). Racial Justice and Climate Change: Adaptation. http://427mt.com/2020/07/08/racial-justice-as-a-cornerstone-of-climate-justice/

Ma, L. (2020). Mapping the clean air haves and have-nots. Science, 369(6503), 503-504. doi:10.1126/science.abb0943.

U.S. Water Alliance, & DigDeep. (2020). Closing the Water Access Gap in the United States: A National Action Plan (Rep.). closethewatergap.org/wp-content/uploads/2019/11/Dig-Deep_Closing-the-Water-Access-Gap-in-the-United-States_DIGITAL_compressed.pdf.

Redlining Plumer, B., & Popovich, N. (2020, August 24). How Decades of Racist Housing Policy Left Neighborhoods Sweltering. *The New York Times*. www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html

5. Interdisciplinary Practice & Interconnectedness

In-class lectures introduce the students to the built environment development process disciplines involved (e.g., design, planning, engineering, development, policy, financing, construction) and their relationships with each other. Guest speakers from different disciplines within the built environment reinforce the concepts by sharing their insights and experiences with the students.

GUEST SPEAKERS**

**Speakers vary pending their availability. Only the speakers who granted consent have been listed below.

- **Energy**: Scott Sklar, Energy Director, Environmental & Energy Management Institute at The George Washington University and President, The Stella Group
- **Financing (climate)**: Aloke Barnwal, Sr. Climate Change Specialist, Global Environment Facility
- **Financing (development)**: Barbara Mackin, Senior Vice President, Eagle Bank
- **Infrastructure**: Anthony Kane, CEO and President, Institute for Sustainable Infrastructure
- **Modular Passivhaus Development**: Jessica Pitts and John Miller, Principals, Flywheel Development
- **Policy**: Tommy Wells, Director, DC Department of Energy & Environment (DOEE)

STUDENTS' INVESTIGATIONS

Each student is instructed to select a region to investigate at the beginning of the semester. Students will conduct a site analysis at the regional, urban, and building scales. The site analysis—including climate risk assessment based on relevant environmental, economic, and social conditions—is conducted at a similar pace as the progression of the course, with opportunities for peer-to-peer critique and faculty feedback. Students are asked to present their preliminary findings to the class and further build upon it for their final project. Their task for the final is to formulate climate-resilient and community-centered design criteria/strategies for a retrofit of an existing structure or new construction in their chosen parcel.

FACULTY BIO

Hyon K. Rah, LEED AP, ENV SP, EcoDistricts AP, is an Adjunct Professor of Architecture at the University of the District of Columbia (UDC). As Principal & Founder of RAH Solutions, she provides developers, owners, operators, and investors in real estate, renewable energy, and tourism sectors technical and strategic solutions to align sustainability and resilience—especially for water and energy—with their financial and organizational goals. Communicating in five languages, she has worked and traveled in over 30 countries, navigating different disciplinary, cultural, and regulatory landscapes.

As an appointed member of the Baltimore County Design Review Panel, Rah is part of providing binding recommendations on sustainability and resilience to developers, designers, and planners in the region. She also serves as the Chair of the Environment & Sustainable Development Committee for the National Federation of Business and Professional Women's Clubs (NFBPWC). In this role, she promotes initiatives to support the Sustainable Development Goals (SDGs) on behalf of NFBPWC, a 101-year-old women's organization with UN Special Consultative Status.

In addition to The Built Environment course at UDC, Rah teaches a graduate-level online course she developed on sustainability and resilience for Goucher College's Historic Preservation Master's Program.

Rah received her Master of Architecture from the University of Michigan (Ann Arbor, MI) and her Master of Science in water management and hydroinformatics from the European Commission's EuroAquae Programme, a consortium of: Barcelona Tech (Spain), Newcastle University (UK), BTU-Cottbus (Germany), and Polytech Nice-Sophia Antipolis (France). She studied architecture and Japanese at the University of Washington (Seattle, WA) and at Osaka University (Japan).