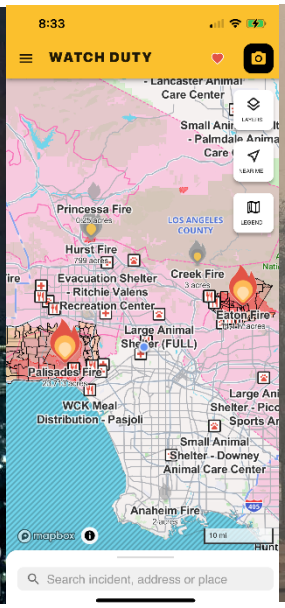
Architecture 218

Resilient Design: Adapting Los Angeles

Units: 3
Spring 2025, Tuesdays from 9:00 AM to 11:50 AM

Location: Harris 115A

Instructor: Russell Fortmeyer
Office: N/A
Office Hours: Tuesdays from 8-9AM or by appointment.
Contact Info: fortmeye@usc.edu



Course Description

The Paris Climate Accord in 2015 established a 1.5°C threshold for global average temperature rise this century in order to avoid the most catastrophic effects of climate change. Recent predictive models indicate that the inability for countries to adequately curb emissions has ensured we will not only surpass 1.5, but will likely hit 3°C or even 4°C average rise by 2100. The ability to plan or design our way out of this crisis has passed; we have instead entered an anthropecene marked by a need to adapt to harsh new conditions, restore and regenerate natural systems and species where possible, and view climate change in moral terms to assist underserved, disadvantaged and vulnerable communities.

In this seminar, students will learn how architecture, design, and the building industry contribute toward global emissions and climate change impacts, as well as resource scarcity, environmental contamination, and social inequality. Through lectures, readings, discussion, and assignments, students will explore topics related to greenhouse gas emissions and carbon, hazards and natural disasters, ecosystem services and nature-based solutions, models of resilient and restorative design, material supply chain ethics and environmental impacts, lifecycle assessments, circularity, and biophilic design. Students will examine existing opportunities through products, materials, design choices, and design strategies at the level of a product or a furnishing in or on a building up to the level of urban design at the neighborhood or city. Students will have the opportunity to explore sustainable and resilient solutions through design at a variety of levels throughout this course. Sustainability and resiliency in business practices will also be studied -- students will examine the opportunities in creating businesses devoted to sustainability or resiliency through design and will posit what opportunities in this area of design may exist in the near future.

UPDATE: Topics will be explored in the context of Los Angeles given the catastrophic wildfires that have marked the start of 2025. We will consider the recent wildfires and their devastation for the potential to inform models of adaptation of LA's built environment through resilient design practices. While we will primarily focus on wildfires, we will also consider their accompanying risks such as flooding, landslides, air pollution, ecosystem disruption, and environmental contamination.

Learning Objectives

The course aims to encourage students to:

- Learn about a variety of topics affecting resiliency in the built environment and in design. Current movements at the intersection of sustainability and design will be examined. Students will be expected to demonstrate their understanding of these topics via reading responses and essay assignments.
- Utilize design learning and knowledge of the problems affecting resilient design to create design solutions for problems created by global warming, extreme weather, wildfires, etc. as part of assignments and reading responses.
- Analyze how the various design disciplines have contributed to our current issues with climate change, extreme weather and natural disasters, etc. Use this analysis to hypothesize on how to remedy these issues through design as part of class assignments.
- Develop applied skills related to lifecycle assessment methods and tools for assessing the environmental impact of products, technologies, and buildings.

Prerequisite(s): None
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: ARCH 108: Idea to Reality

Course Notes

Assignments, readings, and class communication will be conducted using the Brightspace platform. We will also use a Slack channel for informal communication and collaboration. It is expected that

students will come to class with their laptop computer and be prepared to work using the software listed below, if required.

Technological Proficiency and Hardware/Software Required

This course will use some software and websites as part of our weekly assignments and class projects. These will be explained in class and are tools provided at no cost.

1. UC Berkeley's Clima tool: https://clima.cbe.berkeley.edu/
2. Bookmark the Center for the Built Environment Online Tools https://cbe.berkeley.edu/resources/tools/
3. Cal-Adapt's many resources, including its Wildfire Tool https://cal-adapt.org/tools/wildfire/
4. California Healthy Places Index Heat Map https://heat.healthyplacesindex.org/
5. State of California's MyHazards https://myhazards.caloes.ca.gov/
6. Carbon Leadership Forum / EC3 LCA tool https://www.buildingtransparency.org/tools/ec3/
7. Build Carbon Neutral https://www.buildcarbonneutral.org/
8. EPA Environmental Justice Screening Tool https://www.epa.gov/ejscreen
9. World Bank Climate Change Knowledge Portal https://climateknowledgeportal.worldbank.org/
10. LBNL's Building Performance Database https://buildings.lbl.gov/cbs/bpd
11. Other tools that will be introduced during the semester.

Required Readings and Supplementary Materials

Weekly readings will be assigned from handouts and online resources. Readings are mandatory, although students will also be given references that are voluntary and provided for those students who need additional understanding on weekly topics. It is expected that students complete the required readings prior to class to engage in discussion prior to the lecture; questions for the readings will be assigned each week and students will be expected to engage them in class. The readings may change throughout the semester, but that will be announced in class. Readings are available in Brightspace on the class page.

Description and Assessment of Assignments

Attendance and Participation / Reading Responses: 10%
Students are responsible for attending each lecture and to participate in class discussions concerning the readings. Each week, students will be required to submit a one-page, single-spaced reading response comprised of three questions by the student regarding the weekly reading. Reading responses must be submitted via Brightspace prior to class.

1. **Assignment 1: My Risks: 5%**
   If resilience is the ability to adapt within an environmental context that has been eroded, understanding the risks to one's environment are key for developing models of personal resilience through a resilient design practices. This assignment asks students to identify their daily risks, starting with their own dwelling, but also their use of public infrastructure and the USC campus.

2. **Assignment 2: Urban Observations: 10%**
   Students will identify a "marginal" public space in Los Angeles and analyze the climatic conditions, materials, environmental strategies (either natural or designed) over the course of an hour or more. They will then propose a simple intervention to improve conditions in relation to a person's health and comfort.

3. **Assignment 3: Urban-Wildland Interface Assessment: 10%**
   Where are nature's boundaries with the city? You will explore an area of Los Angeles to identify where natural conditions exist within proximity to urban development, assessing how these conditions may contribute to vulnerability and hazards, how design plays a role in limiting

these impacts, ultimately to propose approaches based on precedents that strengthen both natural and urban conditions.

4. **Assignment 4: Ecosystem Survey: 10%**
   Take a “hike” in Los Angeles to find an ecosystem, which can be constructed or a hybrid of natural conditions and interventions. You will document the site through photos and drawings, providing an assessment of how the “natural” components of the ecosystem contribute to the urban environment, human health and well-being, and biodiversity, among other considerations.

5. **Assignment 5: Passive Survivability Intervention: 10%**
   Analyzing an existing space, you will “reverse engineer” the active systems that support environmental control in a space to understand how buildings and systems support passive operation to minimize energy and water use in the built environment.

6. **Assignment 6: Zero Carbon Design Strategy: 10%**
   Students will select a case study project to benchmark and analyze approaches to net zero carbon design.

7. **Assignment 7: Product Lifecycle Assessment: 10%**
   Using EC3 and other available resources, you will assess architectural products, materials, and technologies to make comparative evaluations between variations. Students will also consider alternative materials and approaches to improve the overall LCA outcomes.

8. **Final Exam: 25%**
   The final exam will be a cumulative exam with written and sketched requirements on the scheduled final exam date.

Grading Breakdown

Assignment	**Rated % of Total Grade**
Assignments	65%
Final Exam	25%
Class participation / discussions	10%
TOTAL	100%

Grading Scale
Course final grades will be determined using the following scale

A	95-100%
A-	90-94
B+	87-89
B	83-86
B-+*9	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

Assignment Submission Policy
All assignments must be completed and uploaded online prior to class time on the day they are due.

Grading Timeline
Work will be graded within two weeks of the due date unless noted otherwise.

Extra Credit
There is no extra credit awarded for this course.

Attendance and Late Work
Attending classes is a basic responsibility of every USC student who is enrolled in courses at the School of Architecture. Although any student should be evaluated primarily on their demonstrated know-ledge through project development, papers, quizzes, and exams, the School believes important skills such as verbal presentation, design discussion and articulation of critical issues within each course are equal additional measures of demonstrated knowledge, particularly for our professional degree programs.

More than two unexcused absences may result in a failing grade. More than two instances of unexcused tardiness will be counted as an absence. Work turned in late will not be accepted unless a serious circumstance prevented the work from being completed and submitted on schedule. Timely communication with the instructor is necessary for late work to be accepted.

Any student not in class within the first 10 minutes is considered tardy, and any student absent (in any form including sleep, technological distraction, or by leaving mid class for a long bathroom/water break) for more than 1/3 of the class time can be considered fully absent. It is always the student's responsibility to seek means (if possible) to make up work missed due to absences, not the instructor's, although such recourse is not always an option due to the nature of the material covered.

Course Schedule: A Weekly Breakdown

Week 1: January 14	
Lecture	Climate change, eco-systems and cities Introduce Assignment 1
DUE	N/A
Readings	N/A
Week 2: January 21	
Lecture	Observations and evidence Introduce Assignment 2
DUE	N/A
Readings	1. California's 4th Climate Change Assessment (2018), Summary, pp. 8-17 2. Kolbert, *Field Notes*, Part 1, pp. 1-87
Week 3: January 28	
Lecture	Urban-Wildland interfaces Introduce Assignment 3
DUE	Assignment 2
Readings	1. Kolbert, *Field Notes*, Part 2, pp. 89-187
Week 4: February 4	
Lecture	Hazards and disasters
DUE	N/A
Readings	1. Davis, pp. 95-147 2. Nordenson, pp. 1-11, 167-182
Week 5: February 11	
Lecture	Risk and resilience
DUE	Assignment 3
Readings	1. Bejan and Zane, pp. 54-76 2. Meadows, pp. 11-34
Week 6: February 18	

Lecture	Eco-system services and restorative landscapes Introduce Assignment 4
DUE	N/A
Readings	1. Cairns, “Ecosystem Services,” in *Engineering Within Ecological Constraints*, pp. 13-30. 2. Watson, pp. 202-271
Week 7: February 25	
Lecture	Urban microclimates, health, and comfort
DUE	N/A
Readings	1. Benedito, pp. 210-269
Week 8: March 4	
Lecture	Passive design Introduce Assignment 5
DUE	Assignment 4
Readings	1. Benedito, pp. 168-209. 2. Olgyay, pp. 14-23.
Week 9: March 11	
Lecture	Passive and high-performance design
DUE	N/A
Readings	1. Addington, pp. 79-87 2. Gokce, “Inhabiting the Spaceship,” in *Climates: Architecture and the Planetary* Imaginary, pp. 361-371
Week 10: March 18: Spring Recess	
Week 11: March 25	
Lecture	Biophilic design and biomimicry
DUE	Assignment 5
Readings	1. Benyus, pp. 1-10 2. Browning, pp. 1-18
Week 12: April 1	
Lecture	Efficient design, zero waste, and zero carbon Introduce Assignment 6
DUE	N/A
Readings	1. McDonough and Braungart, pp. 17-117 2. McDade, “Beyond Zero”, pp. 7-12, in *The New Carbon Architecture*
Week 13: April 8	
Lecture	Field Trip: Interior Removal Services (IRS Demo), City of Industry (To be confirmed)
DUE	N/A
Readings	1. McDonough and Braungart, pp. 118-186
Week 14: April 15	
Lecture	Introduction to lifecycle assessment Introduce Assignment 7
DUE	Assignment 6
Readings	1. Andraos, “What Does Climate Change? (For Architecture),” in *Climates: Architecture and the Planetary Imaginary*, pp. 297-301 2. Simonen, pp. 1-63
Week 15: April 22	
Lecture	EPDs, HPDs, and big data
DUE	N/A
Readings	1. Spiegel and Meadows, pp. 27-86.
Week 16: April 29	
Lecture	Regenerative futures
DUE	Assignment 7
Readings	1. Hawken, pp. 1-21 and 111-124. 2. Design for Freedom Toolkit

Week 17: May 6: Final Exam

Selected Reading and Reference List

1. Addington, Michelle. “The Unbounded Boundary,” in *Thermodynamic Interactions*. Barcelona: Actar Publishers, 2017. Pages 79-87.

2. Bejan, Adrian and J. Peder Zane. *Design in Nature: How the Constructal Law Governs Evolution in Biology, Physics, Technology, and Social Organization.* New York: Doubleday, 2012.

3. Benedito, Silvia. “Atmosphere as Shared Situation,” in *Atmosphere Anatomies: On Design, Weather, and Sensation*. Zurich, Switzerland: Lars Muller Publishers, 2021. Pages 210-269. And “Atmosphere as Program.” Pages 168-209.

4. Benyus, Janine. “Echoing Nature,” in *Biomimicry: Innovation Inspired by Nature*. New York: William Morrow, 1997. Pages 1-10.

5. Benjamin, David (ed). *Embodied Energy and Design*. Zurich: Lars Muller Publishers, 2017.

6. Browning, William and Catherine Ryan and Joseph Clancy. *14 Patterns of Biophilic Design*. New York: Terrapin Bright Green, 2014. Pages 1-18.

7. Coolset, Brendan. *Environmental Justice: Key Issues.* New York: Routledge, 2021.

8. Davis, Mike. *Ecology of Fear: Los Angeles and the Imagination of Disaster*. New York: Metropolitan Books, 1998.

9. Graham, James (editor). *Climates: Architecture and the Planetary Imaginary.* Zurich, Switzerland: Lars Muller Publishers, 2016.

10. Hawken, Paul and Amory Lovins and L. Hunter Lovins. *Natural Capitalism: Creating the Next Industrial Revolution.* Boston: Little, Brown and Company, 1999.

11. King, Bruce (editor). *The New Carbon Architecture: Building to Cool the Climate.* Gabriola Island, BC, Canada: New Society Publishers, 2017.

12. Kolbert, Elizabeth. *Field Notes from a Catastrophe: Man, Nature and Climate.* New York: Bloomsbury, 2006.

13. Loonen, R.C.G.M., M. Tr ka, D. Costola, and J.L.M. Hensen. “Climate Adaptive Building Shells: State-of-the-Art and Future Challenges,” *Renewable and Sustainable Energy Reviews* 25 (Sept. 2013): 483-493.

14. McDonough, William and Michael Braungart. *Cradle to Cradle: Remaking the Way We Make*. New York: North Point Press, 2010.

15. Meadows, Donella and others. “The Basics,” in *Thinking in Systems*. White River Junction, Vermont: Chelsea Green Publishing, 2008. Pages 11-34.

16. Nordenson, Catherine Seavitt, Guy Nordenson and Julia Chapman. *Structures of Coastal Resilience.* Washington, DC: Island Press, 2018.

17. Olgyay, Victor. “Bioclimatic Approach,” in *Design with Climate*. Princeton: Princeton University Press, 1963. Pages 14-23.

18. Schulze, Peter C. (editor). *Engineering Within Ecological Constraints*. Washington, DC: National Academy Press, 1996.

19. Simonen, Kathrina. *Life Cycle Assessment*. New York: Routledge, 2014.

20. Spiegel, Ross, and Dru Meadows. *Green Building Materials: A Guide to Product Selection and Specification*. Hoboken, New Jersey: John Wiley and Sons, 2006.

21. Trogal, Kim, Irena Bauman, Ranald Lawrence and Doina Petrescu (eds). *Architecture and Resilience: Interdisciplinary Dialogues.* New York: Routledge, 2018.

22. Watson, Julia. *Lo-Tek Design by Radical Indigenism.* Cologne: Taschen, 2020.

23. Design for Freedom Toolkit, Grace Farms, 2017.

Statement on Academic Conduct and Support Systems

Academic Integrity
The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the USC Student Handbook. All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Course Content Distribution and Synchronous Session Recordings Policies
USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment. Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. (Living our Unifying Values: The USC Student Handbook, page 13). Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relationship to the class, whether obtained in class, via email, on the internet, or via any other media. (Living our Unifying Values: The USC Student Handbook, page 13).

Students and Disability Accommodations:
USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:
Counseling and Mental Health - (213) 740-9355 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.
988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.
Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).
Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.
Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.
The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.
USC Campus Support and Intervention - (213) 740-0411
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.
Diversity, Equity and Inclusion - (213) 740-2101
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.
USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.
USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
Non-emergency assistance or information.
Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.
Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.