

<b>Semester</b>	Fall 2023
<b>Time</b>	Tuesday & Thursday 9:30AM - 10:50AM
<b>Location</b>	Harris Hall - 101
<b>Instructor</b>	<b>Anthony</b> Brower, AIA, LEED Fellow <a href="mailto:anthony.brower@usc.edu">anthony.brower@usc.edu</a> Global Director, Climate Action & Sustainability <b>Gensler</b>
<b>Office Hours</b>	Monday – Friday 11:30-12:30 by availability and appointment only <a href="https://calendly.com/anthonybrower/usc-office-hours">https://calendly.com/anthonybrower/usc-office-hours</a>
<b>Class</b>	<b>Sandra</b> Maestre <a href="mailto:smaestre@usc.edu">smaestre@usc.edu</a>
<b>Assistants</b>	Office Hours Tuesday's 12:30-1:30 <b>Hunter</b> Barnett <a href="mailto:hbarnett@usc.edu">hbarnett@usc.edu</a> Office Hours Wednesday's 12:30-1:30

## Our Opportunity and Responsibility as Architects

Fueled by population growth, within the next twenty years - according to Architecture 2030 - the global built environment will be redesigned, added to, or remade, adding an area equal to 3.5 times the existing buildings of the United States (900 billion square feet). In the process, energy patterns will be locked in for our cities, and as a result for our planet, for the following 50 years. If Climate Change is to be manageable and not catastrophic, future development must be defined by an awareness and a commitment to high performance, deep energy efficiency, and even carbon neutral design.

During the past century, the architectural profession has moved, by and large, away from a century's old awareness of the environment, a deeper understanding of local climates, and a knowledge of how to maintain balance between building and environment. As a result, deeper dependencies on mechanized heating and cooling, especially when buildings were designed with ingrained inefficiencies, became the norm and the solution to any problem. Energy use in buildings skyrocketed as a result, fueling the need for more power plants to supply energy for inefficient buildings and cities.

For generations, this energy has been provided, by and large, by fossil fuel fired power plants, leading to increased CO2 emissions. Recently, there has been a professional awakening around the role architects play in contributing to the problem of climate change. In the October 2003 edition of Metropolis, Ed Mazria called out the profession pointing out that, "Architects Pollute". In the immediate aftermath, the American Institute of Architects (AIA) brought focus to energy efficiency and sustainability - both of which are now core doctrines for the AIA.

Architects see problems and solve problems. This is critically important when it comes to energy dependence and climate change. We are living through a time when the profession is in transition. Designing without understanding the impacts for energy, water and resource consumption is no longer possible. State and National Energy Codes now place limits on the amount of energy that can be used by buildings. This is a time of great challenge for architects (and future architects). It is also a time of great opportunity.

## Course Description

This course will discuss Climate Change and the critical role architects play in the discussion in the context of understanding and designing for the thermal environment of buildings. Through the semester, students will discuss and review basic concepts of sustainability, gaining an understanding of climate appropriate design, passive heating and cooling, and renewable energy systems. At the same time, through weekly readings and exercises, students will use tools to help them understand, measure, and design better buildings. They will be exposed to and will learn the international language of sustainability.

During the semester, students will explore concepts and test ideas that should be used to drive building design in current and future design studios. Utilizing passive energy features, understanding daylighting, and other concepts that, when combined, lead to the design of Zero Net Energy Buildings.

## Required Textbook

Heating, Cooling, Lighting: Sustainable Design Methods for Architects

By Norbert M. Lechner, 4th Edition, ISBN: 978-1118582428, 720 pages, 2014

[https://uosc.primo.exlibrisgroup.com/discovery/fulldisplay?context=PC&vid=01USC\\_INST:01USC&search\\_scope=MyInst\\_and\\_CI&tab=Everything&docid=cdi\\_askewsholts\\_vlebooks\\_9781118849453](https://uosc.primo.exlibrisgroup.com/discovery/fulldisplay?context=PC&vid=01USC_INST:01USC&search_scope=MyInst_and_CI&tab=Everything&docid=cdi_askewsholts_vlebooks_9781118849453)

## Catalog Description

A one semester course focused on climate awareness and the impact that architects and architecture have on the planet. The course will cover human comfort, climate analysis, passive and active systems, heating and cooling, energy analysis, and water reuse.

This course will be focused on translating basic physics concepts into usable and understandable design strategies that you will utilize to give buildings form.

This course, with a special emphasis on climate awareness, energy efficiency, and sustainable design, provides an understanding of the basic principles and appropriate application required for high performance building systems. Students will learn, incrementally, what it takes to design a highly energy efficient, carbon neutral building. Discussions and assignments will focus on climate analysis, climate appropriate design strategies; passive heating, cooling, ventilation cooling; mechanized electrical, mechanical, and plumbing of buildings; and renewable energy and water systems.

## Learning Outcomes

Upon completion of this course, it is expected that students will be able to:

1. Perform architecturally focused Climate Analysis, including an evaluation of passive design strategies. Evaluate the impact and potential of solar radiation to both help and hinder high performance buildings. Understand how energy moves through the building envelope and how architectural features can manipulate and control this flow of energy.
2. Understand what design strategies are most appropriate for a specific climate and site. Understand how building envelope, solar shading, and passive energy features can minimize the dependence on mechanized energy systems (heating, cooling, lighting, and heating of hot water).
3. Analyze energy use in buildings to gauge the impact of design alternatives, design approaches, measuring the impact of each individually or in combination to first reduce building energy use, then move towards Zero Net Energy (ZNE), and finally arrive at Carbon Neutrality.
4. Develop and articulate a vocabulary founded in sustainability and focused on high performance energy efficiency and carbon neutral architecture. Create an awareness to building energy codes and high performance, sustainable building programs (California Energy Code, Cal-Green, LEED, and Living Building Challenge).

## Course Schedule

Wk	Date	Ch	Topic
<b>1</b>	8/22/23		Course Overview & The Future of Cities
	8/24/23	1 & 2	Form Givers & Energy
<b>2</b>	8/29/23	5	Climate & Site Analysis
	8/31/23	H	Building Codes & Critical Thinking Workshop
<b>3</b>	9/5/23	11	Site Design & Community Planning
	9/7/23		
<b>4</b>	9/12/23	3	Design Physics
	9/14/23		
<b>5</b>	9/19/23	4	Thermal Comfort
	9/21/23		
<b>6</b>	9/26/23	6 & 7	Solar Geometry & Passive Solar
	9/28/23		
<b>7</b>	10/3/23	9	Exterior Shading ( <i>Point of View concept draft due, 300-words</i> )
	10/5/23		Shading (continued) & Midterm Review ( <i>Extra credit available in-class only</i> )
<b>8</b>	10/10/23		<b>Midterm Exam</b>
	10/12/23		Fall recess – No class
<b>9</b>	10/17/23	10	Passive Cooling
	10/19/23		
<b>10</b>	10/24/23	13	Daylighting
	10/26/23		
<b>11</b>	10/31/23	3 & 15	Thermal Envelope Design
	11/2/23		Thermal Envelope Design
<b>12</b>	11/7/23	16	Mechanical Systems (Chapter sections 16.1 through 16.16)
	11/9/23		
<b>13</b>	11/14/23	16	Ventilation Systems (Chapter sections 16.17 through 16.22)
	11/16/23		
<b>14</b>	11/21/23	P	Design Profession ( <i>Point of View final draft due, 600-words</i> )
	11/23/23		Thanksgiving - No Class
<b>15</b>	11/28/23	8	Renewable Energy Systems
	11/30/23		Review ( <i>final exam extra credit available in-class only</i> )
<b>16</b>	12/5/23		Study Day – No Class
	12/7/23		<b>Final Exam 11am-1pm @ Harris 101</b>

^ Chapters and handouts (H) are to be read in advance of each noted class day  
There will be four pop quizzes replacing a lecture in whole or part

## **Quizzes, Exams & Homework**

There will be homework assigned throughout the semester. Material on quizzes, midterm exams, and the final exam will be heavily related to the homework, required textbook, and other assigned reading & publications. The course textbook, notes, previous exams, previous quizzes may **not** be brought into the exam. Possession of a previous exam, quiz or any webpage while taking an exam will disqualify the exam. Too many students have counted on these in the past, instead of doing the homework, and the result has been a drop in the average grades! (You are encouraged to study using these materials before the exams, but you may not bring them into the exam with you. If you find that you have such materials among your notes, you must immediately take them out and place them upside down on the floor in front of you for the duration of the exam.)

## **Assignments**

...are issued in class and are due Monday's at 5:00 pm pacific time. Completed assignments will contribute to your grade. Incomplete assignments will count as zero. Missing any assignment will also count as zero as well as the reduction of your grade by one letter threshold at the end of the semester.

### **Introduction**

Identify a building whose inspiration was defined by sustainability and explain how that concept influenced design.

### **Chapters 1 & 2**

Understanding how city scale thermodynamics address carbon emissions.

### **Chapter 3**

Calculating heat loss through an assembly

### **Chapter 4**

Designing with psychrometrics

### **Chapter 5**

Climate & Site Analysis

### **Chapter 9**

Evaluation of your design studio project to overlay competing sun angles

### **Chapter 10**

Designing with airflow

### **Chapter 11**

Solar access, evolving your design beyond how the sun impacts your project to understanding how your design will impact others.

### **Chapter 16**

Thermal space planning

### **Building Codes**

Research current day code requirements for your design studio project.

### **Point of View**

Establishing a Point of View is critical for any practicing architect. You will be expected to take a position on one of the topics covered in class and develop a unique narrative on how this topic positively intersects with and can influence design. Impactful narratives also take current events into account.

One or two students' final narratives will be selected to expand their topic further through a co-authored publication on Gensler's thought leadership blog on design after the conclusion of the course pending that student has received a minimum grade of B and does not miss any assignments or exams.

### 2010 Imperative Statement

The Architecture Faculty has voted to accept the 2010 Imperative-- to improvement of ecological literacy among the students and faculty and to achieve a carbon-neutral design school campus by 2010. To that end, this class will address issues of carbon neutrality and **supports** the following goal for all designs produced in the USC School of Architecture:

**"The design should engage the environment in a way that dramatically reduces or eliminates the need for fossil fuel."**

This does not mean that no other issues are to be addressed. Precisely to the contrary, all design issues are fair game, but in the background, all will be considered within the generalized goal of reducing or eliminating the need for fossil fuel.

### Grading Breakdown

The grade for the semester will be based on the following percentages

<b>40%</b>	<b>Pop Quizzes (5)</b> 8% each
<b>40%</b>	<b>Exams (2)</b> 20% Midterm 20% Final
<b>20%</b>	<b>Assignments</b> 10% Weekly Exercises (Homework) 10% Developing your unique Point of View

### Calculation Of Grade

Letter grades are converted from calculated numeric achievement using the following values:

<b>Letter</b>	<b>%</b>	<b>Definition</b> ( <i>Student learning and accomplishment...</i> )
<b>A</b>	95-100	... far exceeds published objectives for the course/test/assignment and student work is distinguished consistently by is high level of competency and/or innovation.
<b>A-</b>	90-94	
<b>B+</b>	87-89	... goes beyond what is expected in the published objectives for the course / test / assignment and student work is frequently characterized by its special depth of understanding, development, and/or innovative experimentation.
<b>B</b>	83-86	
<b>B-</b>	80-82	... meets all published objectives for the course/test/assignment and the student work demonstrates the expected level of understanding, and application of concepts introduced.
<b>C+</b>	77-79	
<b>C</b>	73-76	
<b>C-</b>	70-72	
<b>D+</b>	67-69	... based on the published objectives for the course/test/assignment were met with minimum passing achievement.
<b>D</b>	63-66	
<b>D-</b>	60-62	
<b>F</b>	< 59	... based on the published objectives for the course/test/assignment were not sufficiently addressed nor met.

### **Critical Dates and Religious Observances:**

The university recognizes the diversity of our community and the potential for conflicts involving academic activities and personal religious observation. The university provides a guide to such observances for reference and suggests that any concerns about lack of attendance or inability to participate fully in the course activity be fully aired at the start of the term. As a general principle students should be excused from class for these events if properly documented and if provisions can be made to accommodate the absence and make up the lost work. Constraints on participation that conflict with adequate participation in the course and cannot be resolved to the satisfaction of the faculty and the student need to be identified prior to the drop add date for registration. After the drop add date the University and the School of Architecture shall be the sole arbiter of what constitutes appropriate attendance and participation in a given course.

### **Disruptive Behavior**

Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Judicial Affairs for disciplinary action.

### **Statement on 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](#).

### **Plagiarism**

Since creating, analytical, and critical thinking skills are part of the learning outcomes of this course, all assignments should be prepared by the student working individually or in groups. Students may not have another person or entity complete any substantive portion of the assignment. Developing strong competencies in these areas will prepare you for a competitive workplace. Therefore, using AI-generated tools is prohibited in this course, will be identified as plagiarism, and will be reported to the Office of Academic Integrity.

## Professional Degree

The USC School of Architecture's five-year BARCH degree is an accredited professional architectural degree program. All students can access and review the NAAB Conditions of Accreditation (including the Student Performance Criteria) on the NAAB Website, [http://www.naab.org/accreditation/2004\\_Conditions.aspx](http://www.naab.org/accreditation/2004_Conditions.aspx).

## Attendance

Attending classes is a basic responsibility of every USC student who is enrolled in courses at the School of Architecture. Regular and punctual class attendance is considered an essential part of satisfying the NAAB accreditation requirements therefore attendance will be taken at every class session.

Students who are not in class at the time a quiz is given will not be given an opportunity to make up the test (without exception) and will be given a grade of "0" for the quiz. Students who take a test or quiz and disturb others when leaving will have their quiz or test disqualified (and graded as "0"). Students who arrive late for class will not be given any extension of time to take a quiz or test; the quiz end time will be the same for all students. If arriving late, a student must be respectful of a class in session and do everything possible to minimize the disruption caused by a late arrival. It is always the student's responsibility to seek means to make up work missed due to absences. Excessive absences or lateness, at the instructors discretion, is a basis for lowering your final grade.

## 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](https://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto: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](mailto: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.