

Faculty:

Lauren Dandridge Gaines

Elizabeth Valmont

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Architects deal with a broad spectrum of constraints and opportunities when designing or thinking about design. Much of the way that a building is experienced relates to the Environment created by the building, both within and without. This is especially true in terms of light and sound. The interaction between occupant and building is almost entirely filtered through those two sensory media. This course deals with those channels, their perception, their effect, and how the designer controls or manipulates those experiences. It is necessary to understand the processes, the perceptions, and the materials and tools with which we work.

Certain similarities exist in the behavior of these systems and the behavior of thermal systems which we discussed last semester, simply because they are natural physical functions.

Near the end of the semester, we will also consider topics that have a less direct impact on perception, such as mechanical and plumbing systems, designing for fire safety, and building accessibility. These systems are also critical performance issues for the building. They can be less form determinate and normally set limits, they are still critical in the performance of each building, both for life safety reasons and as a necessary part of our professional responsibilities to the building users.

NAAB Student Performance Criteria Covered in this Course:

**A.11 Applied Research**

**B.2 Accessibility**

**B.3 Sustainability**

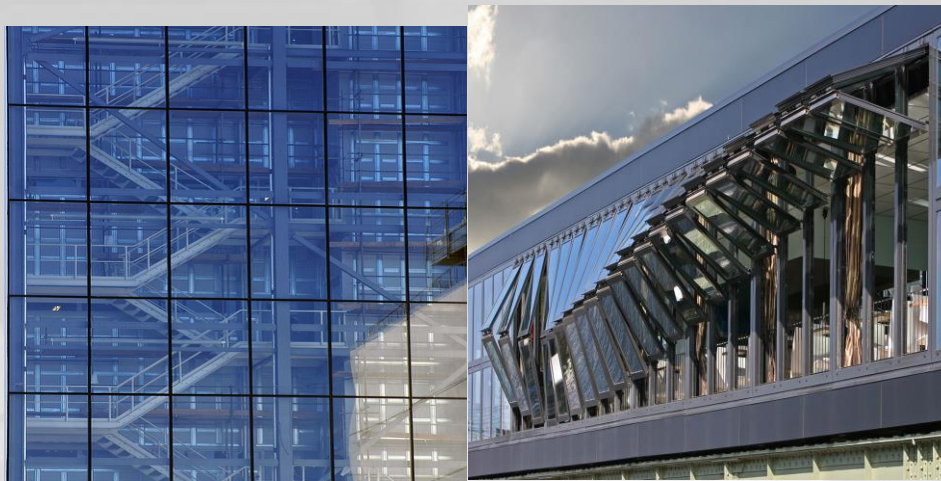
**B.5 Life Safety**

**B.8 Environmental Systems**

**B.10 Building Engineering Systems**

**B.11 Building Service Systems**

**C.2 Human Behavior**



The material will be divided into three basic segments:

- I. Acoustics
- II. Lighting
- III. Building Engineering Systems

The class will be primarily a series of lectures, guest lectures, demonstrations, assignments and quizzes or tests to determine what is being comprehended and what needs more work.

The homework assignments are graded. It is beneficial to have done the homework because the quizzes and prelims will be similar in content. Remember, doing and understanding the material will be much more beneficial than just having copied it into your notes.

Copies of the syllabus, homework, and other announcements may be found on the class blackboard website. We hope to be able to maintain this address throughout the semester.

There will be a quiz during the lighting and building system segments, the dates are listed in the syllabus. There will be a preliminary examination at the end of each of the first two segments. The dates will be announced in class. It is your responsibility to attend each class and to know what those dates are. There will be a comprehensive final at the end of the semester. All of these will be "open book." This means that books and notes may be brought into the exam, but ***copies of previous exams or quizzes are not allowed, nor are printouts of the web pages.*** You may bring a homework which you have done, but not an answer sheet from the web. 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! Your exam may be disqualified.

The grading will be based on the following percentages:

Homework and Attendance		10% subtotal
Quizzes (2)	10% each	20% subtotal
Prelim (2)	20% each	40% subtotal
Final	30% each	30% subtotal

There will be several guest lecturers throughout the semester, and you will be responsible for all of the information presented in all lectures, including the guests' materials. There are recommended texts, and one required handout. The handout will be made available in class; the texts should be available at the bookstore. Please keep an active notebook with all of the materials handed out, and all homework. Again, tests will be open book and open notes, and you should have that material available. Keep it when you go on to practice architecture. It is not our intention to have you memorize things which you will then forget, but rather to understand information and concepts which you can access at a future date.

If you are interested in material which you do not find on the course outline, please let us know, and we will attempt to include it.

### **Recommended Texts**

*Mechanical and Electrical Equipment in Buildings*; by Stein, Reynolds. Kwok, Grondzik- this is the same text as for ARCH 215.

*Simplified Design of Building Lighting*; by Marc Schiler - for advanced interest, also used in ARCH 515.

*Architectural Acoustics*; by M. David Egan - for advanced interest, not required.

### **NAAB Conditions for Accreditation**

The USC School of Architecture's five year BARCH degree and the two year M.ARCH degree are accredited professional architectural degree programs. 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).

### **Disabilities**

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to my GRS students) as early in the semester as possible. DSP is located in STU 301 and is open 8:30AM-5PM, Monday through Friday. The phone number for DSP is (213) 740-0776



## Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles.

*Scampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: <http://www.usc.edu/dept/publications/SCAMPUS/gov/>

Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>

## 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.

## 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.

## School of Architecture Policy on 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. A student may miss up to two class sessions without directly affecting their grade and ability to complete the course if they provide an excused absence for any confirmed personal illness/family emergency/religious observance. For each absence over that allowed number, the student's letter grade is in danger of being lowered up to one full letter grade. Any student not in class within the first 10 minutes is considered tardy, and any student absent for more than 1/3 of the class time can be considered fully absent. 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.

***Being absent on the day of a quiz or exam results in a 0 for that quiz or exam.***

### 2010 Imperative Statement:

The Architecture Faculty have 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.

### Instructor Contact Information

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Lauren Dandridge Gaines, [ldandrid@usc.edu](mailto:ldandrid@usc.edu)

Tony Cocea, [cocea@usc.edu](mailto:cocea@usc.edu)

## COURSE SCHEDULE

**ARCH 315**

**Section 11286D**

**Tues,Thurs 2:00PM-3:20PM**

**HAR 101**

### **Design for the Luminous and Sonic Environment**

Ideas, problems and computations related to the design of buildings in response to the luminous and the sonic Environment and other building engineering systems.

**Text : Mechanical and Electrical Equipment**

Eleventh Edition

by Grondzik, Kwok, Stein and Reynolds

**Recommended Text: Architectural Acoustics**

by M. David Egan

### **Section 1: Elizabeth Valmont**

- |   |  |   |
|---|--|---|
| 1 | <b>Acoustic Basic Theory and Perception</b><br><b>January 9, 2018</b><br><br>Lecture<br><br>Recommended Reading<br><br>Homework        | <b>Tuesday</b><br><br>Introduction<br><br>Egan- Chapter1, pp 1-11<br><br>Homework #1                    |
| 2 | <b>Acoustic Physics and Calculations</b><br><b>January 11, 2018</b><br><br>Lecture<br><br>Recommended Reading<br><br>Homework          | <b>Thursday</b><br><br>Sound Levels and Propagation<br><br>Egan- Chapter 1, pp 12-36<br><br>Homework #2 |
| 3 | <b>Architectural Acoustics – Sound Absorption</b><br><b>January 16, 2018</b><br><br>Lecture<br><br>Recommended Reading<br><br>Homework | <b>Tuesday</b><br><br>Sound Absorption and Calculations<br><br>Egan – Chapter 2<br><br>Homework #3      |

4	<b>Architectural Acoustics – Sound Isolation</b> <b>January 18, 2018</b>	<b>Thursday</b>
	Lecture	Sound Isolation and Calculations
	Recommended Reading	Egan – Chapter 4
	Homework	Homework #4
5	<b>Acoustics in Assembly Spaces</b> <b>January 23, 2018</b>	<b>Tuesday</b>
	Lecture	Principles of Performance Acoustics
	Recommended Reading	Egan – Chapter 3
	Homework	Homework #5
6	<b>Guest Lecture</b> <b>January 25, 2018</b>	<b>Thursday</b>
	Lecture	Acoustic Technology and Auralization
	Recommended Reading	None
	Homework	None
7	<b>Acoustic Applications / Prelim Review</b> <b>January 30, 2018</b>	<b>Tuesday</b>
	Lecture	None
	Recommended Reading	Section 2 Recap
	Homework	None
8	<b>Preliminary Exam #1</b> <b>February 1, 2018</b>	<b>Thursday</b>
	Lecture	None
	Recommended Reading	Section 2 Recap
	Homework	None



## Section 2: Lighting

Lauren Dandridge Gaines

9	<b>Lighting Fundamentals and Basic Perception February 6, 2018</b>	<b>Tuesday</b>
	Lecture	Introduction
	Recommended Reading	Chapter 11.15-11.29
	Homework	None
10	<b>Physics of Light and Color February 8, 2018</b>	<b>Thursday</b>
	Lecture	Physics of Light and Color
	Recommended Reading	Chapter 11.34-11.39
	Homework	Homework #6
11	<b>Lighting Sources February 13, 2018</b>	<b>Tuesday</b>
	Lecture	Lamps and Artificial Light Sources
	Recommended Reading	Chapter 12
	Homework	Homework #7
12	<b>Designing with Artificial Light, Equipment, Point Grid February 15, 2018</b>	<b>Thursday</b>
	Lecture	Artificial Light and Equipment
	Recommended Reading	Chapter 15.1-15.12 and 16.1-16.30
	Homework	Homework #8
13	<b>Calculating Light-Lumen Method/ Applications February 20, 2018</b>	<b>Tuesday</b>
	Lecture	Lighting Calculations
	Recommended Reading	Chapter 15.18-15.32
	Homework	Homework #9



14	<b>Quiz #1 February 22, 2018</b>	<b>Thursday</b>
	Lecture	None
	Recommended Reading	TBD
	Homework	None
15	<b>Basic Electricity and Dimming February 27, 2018</b>	<b>Tuesday</b>
	Lecture	Electricity and Dimming
	Recommended Reading	TBD
	Homework	None
16	<b>Designing with Daylight March 1, 2018</b>	<b>Thursday</b>
	Lecture	Designing with Daylight
	Recommended Reading	Chapter 14
	Homework	Homework #10
17	<b>Lighting Applications March 6, 2018</b>	<b>Tuesday</b>
	Lecture	Guest Lecture
	Recommended Reading	TBD
	Homework	Prepare for prelim exam
18	<b>Preliminary Exam #2 March 8, 2018</b>	<b>Thursday</b>
	Lecture	None
	Recommended Reading	Section 1 Recap
	Homework	None

**SPRING RECESS (March 11-18)**

19	<b>Field Trip to Music Center March 20, 2018</b>	<b>Tuesday</b>
	Lecture	Performing Arts Field Trip
	Recommended Reading	Review Light & Sound
	Homework	None
20	<b>No Class - Homework / Assignments Return March 22, 2017</b>	<b>Thursday</b>
	Lecture	None
	Recommended Reading	None
	Homework	None
<b>Section 3: Building Systems (Mechanical, Electrical, Plumbing) Tony Cocea</b>		
21	<b>Building Systems: Introduction to HVAC March 27, 2017</b>	<b>Tuesday</b>
	Lecture	HVAC (Heating, Ventilation, Air Cooling)
	Recommended Reading	Stein, Reynolds - Chapter 4
	Homework	None
22	<b>Building Systems: Introduction to Electrical Engineering March 29, 2017</b>	<b>Thursday</b>
	Lecture	Electrical Engineering
	Recommended Reading	Stein, Reynolds Chapter 14
	Homework	Homework #11
23	<b>Building Systems: Introduction to Plumbing Engineering April 3, 2017</b>	<b>Tuesday</b>
	Lecture	Gravity and Pressurized Piping Systems
	Recommended Reading	Stein, Reynolds – Chapter 10
	Homework	Homework #12

24	<b>Building Systems: Rainwater Harvesting Systems April 5, 2017</b>	<b>Thursday</b>
	Lecture	Rainwater Harvesting/ Graywater
	Recommended Reading	Stein, Reynolds – Chapter 8, 9
	Homework	Homework #13
25	<b>Building Systems: Basic Water Systems Design April 10, 2017</b>	<b>Tuesday</b>
	Lecture	Water Piping Systems Design
	Recommended Reading	Stein, Reynolds – Chapter 13
	Homework	Homework #14
26	<b>Building Systems: Water Reclamation Systems April 12, 2017</b>	<b>Thursday</b>
	Lecture	Water reclamation design concepts
	Recommended Reading	Stein, Reynolds – Chapter 13
	Homework	Homework #15
27	<b>Building Systems: Building Codes and Fire Safety April 17, 2017</b>	<b>Tuesday</b>
	Lecture	Building Codes/ Life Safety
	Recommended Reading	TBD
	Homework	None
28	<b>Building Systems: Fire Protection Systems Design April 19, 2017</b>	<b>Thursday</b>
	Lecture	Automatic Sprinkler Systems
	Recommended Reading	Stein, Reynolds – Chapter 9
	Homework	Homework #16

29

**Quiz #2  
April 24, 2017**

**Tuesday**

Lecture

None

Recommended Reading

Session 3 Recap

Homework

None

30

**No Class- Homework/Assignments Return  
April 26, 2017**

**Thursday**

Lecture

None

Recommended Reading

Session 3 Recap

Homework

None

**FINAL EXAM  
May 1, 2018 TBC**

**Thursday**