Arch 577:
Architectural Lighting Design

Fall Semester, Tuesday 5pm – 8:20pm
Lauren Dandridge Gaines, ldandrid@usc.edu

Office hours by appointment and available through the class slack channel

SYLLABUS

Course Content and Purpose

> "The real subject of every painting is light." - Claude Monet
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> "For the rest of my life I want to reflect on what light is." - Albert Einstein
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> "Architecture is the masterly correct and magnificent play of masses brought together in light. Our eyes are made to see forms in light; light and shade reveal these forms; cubes, cones, spheres, cylinders or pyramids are the great primary forms which light reveals to advantage." - Le Corbusier

The *artist*, the *scientist* and the *architect* who want to understand their world are fascinated by light. Light is the medium of perception in art and in architecture. Light is also one of the most fascinating aspects of physics. As far as we know, it is the only constant. Indeed time and space warps around the constant speed of light. Yet even in physics, light is complex. It behaves like a particle (photon) *and* like a wave (radiant energy.) Studying light gave rise to the Lorenz equation (the numerical formula by which you can calculate the space-time behaviors first described by Einstein.) We will examine the perceptual and physical aspects of light. We will learn how the design profession has used light, the tools with which it studies light, and the design principles and drawing conventions with which the profession manipulates light in buildings.

Architecture is revealed through light; good lighting design emphasizes good architectural design. Indeed, one can argue that they are not separate. Lighting is also typically the largest energy draw in a building, and good lighting design must also comply with code requirements and sustainability initiatives. Understanding state of the art daylighting, artificial lighting, and controls which allow for interaction between the two will provide for a better understanding of design and energy efficiency.

Objectives

- Familiarize students with lighting terminology, technology, and the key players in the industry.

- Review theories of physical and physiological factors of light and its relationship to human behavior and the interior environment.

- Discover how light intensity, relative contrast, reflectance, color, CRI, and direction of light impact materials, texture, function and mood of a space.

- Learn the primary types of lamps and fixtures used in interior applications and understand their applications and pros/cons.

- Cover lighting applications, techniques, codes, and sustainability as it relates to the lighting design field.

- Develop lighting layouts, switching, fixture schedules, fixture cuts and lighting power densities.

Students must demonstrate throughout the quarter an understanding of lighting design principles, methods, techniques and knowledge of fixtures and lamps. Course assignments will require students to develop concept statements, and prepare concept sketches, identify client/user needs and conduct research. Student work must show fundamental lighting design competence including:

- What lamp source to use and why.

- When to use focused lighting versus diffuse lighting and what choice of lamps are best suited for these applications.

- The relationship between light and materials.

- Documenting a lighting design concept including the appropriate selection of fixtures.

- Techniques used for creating different moods and atmospheres.

- Ability to justify a design solution relative to established objectives and goals.

The course will begin with lectures and assignments to provide the basic information necessary for lighting design. Once there is sufficient information, the course will shift to a design studio process, where student projects are the primary vehicle for integrating and applying the newly apprehended knowledge.

Required text:

Gordon, Garry.; Interior Lighting for Designers, Fifth Edition, 2015 John Wiley & Sons
ISBN Number: 978-0-470-11422-3

Recommended additional reading:

DiLaura, David; Houser, Kevin; Mistrick, R.; Steffy, G.; *The IESNA Lighting Handbook*, 10th Edition, ISBN # 978-0-87995-241-9 (Hardcopy $350 member, $595 non-member.)

Flynn, John; Seegil, Arthur; Steffy, Gary; *Architectural Interior Systems: Lighitng/Acoustic/Air Conditioning*; Van Nostrand Reinhold, ISBN 0-442-22765-5

Karlen, Mark; Benya, James; *Lighting Design Basics;* Wiley Publishing, 2004, ISBN: 978-0-471-38162-4

Russell, Sage; *The Architecture of Light*; ConceptNine, La Jolla, 2008. ISBN-13: 978-0-9800617-0-3

Schiler, Marc; *Simplified Design of Building Lighting*, Wiley, 1998, ISBN 9780471532132

Steffey, Gary; *Architectural Lighting Design*, Wiley, 2008, ISBN-13: 9780470112496, ISBN: 0470112492

Grading Criteria

Attendance is mandatory! More than two absences will result in a failure of the course. Any student not in class within the first 10 minutes is considered tardy, and any student absent (in any form including sleep, technological distractions, or by leaving mid-class for a long bathroom/water break) for more than 1/3 of the class 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 instructors, although such recourse is not always an option due to the nature of the material covered.
All written data, research results, drawings and presentations will be considered in the grading process. Being absent on the day of a project, quiz, paper or exam is due can lead to an "F" for the at project, quiz, paper or exam (unless faculty conceded the reason is due to an excusable absence for personal illness/family emergency/religious observance)

Evaluation of the student's work:
The standards for evaluating student performance are based upon the student's ability to demonstrate an understanding and competency of the course goals and lighting fundamentals. Evaluation is based upon a student's completion of assignments on schedule, correctly following directions, critical analysis and research of the assignments, including refinement and development of appropriate solutions with proposed alternatives, preparedness for class, and the quality of work.

All homework and assignments are to be turned in on Blackboard ½ hour before the beginning of class, at 3:30pm, on the due date. In the event Blackboard is down, assignments are to be emailed. Late assignments will receive a 5% deduction for each day it is late.

Percentages Assigned to Assignments and Projects

Assignments and quizzes: 30% of final grade
Project #1, Midterm Project: Complete Design - 20% of final grade
Project #2: Complete Design – 20% of final grade
Final Project: Complete Design (Current IESLA Competition) – 30% of final grade
Extra Credit Assignment – TBD
Students enrolled for credit may be awarded the grades of A, B, C, D, or Pass to earn credit, or be awarded the grades of F (fail) or NP (no pass) if credit was not earned.

A= Excellent
B= Good
C= Acceptable
D= Poor

Letter grades may be modified by either a "+" or a "-". The earned grade of "C" is required for this course to be counted towards the degree.

A+= 97-100%	B+= 87-89.9%	C+= 77-79.9%	D+= 67-69.9%	F= 59.9% and
A= 93-96.9%	B= 83-86.9%	C= 73-76.9%	D= 63-66.9%	below
A-= 90-92.9%	B-= 80-82.9%	C-= 70-72.9%	D-= 60-62.9%	

School of Architecture Accreditation Information
"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/2009_Conditions.aspx."

Statement for Students with 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 TA) as early in the semester as possible. DPS is located in STU 301 and is open 8:30AM-5PM, Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on 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/

Format of Class

This class meets for 1 session per week. The first half of the session is lecture based, the second half more lab based.

Week

1 Introduction and Models 8/25
- Topic 1: Course Logistics, Grading, Class Introductions
- Topic 2: Basic Perception and Terms (Gordon: 6-35)
- Topic 3: Daylighting Strategies, Plan and Section, Rules of Thumb (Gordon:73-83)
- Topic 4: Physical Models, Solar Gnomon, Photography (Class Handout)
- Assignment: Simple Daylit Models

2 How we perceive space through light (part a): 9/1
- Student Presentations (2 hours): Model Photos
- Topic 5: Daylighting Precedents (slides)
- Topic 6: Physics of Light and Color, K and CRI (Gordon: 36-64)
- Assignment: Good Light vs Bad Light

3 How we perceive space through light (part b): 9/8
- Topic 7: Mixing Finishes with light (Gordon: 36-55)
- Topic 8: Lamps and Sources (Gordon:86-143)
- Topic 9: Fixtures and Fixture Cuts (Gordon: 163-200)
- Topic 10: Artificial Lighting Precedents
- Assignment: download AGI and complete AGI Tutorials

4 How to convey Lighting Ideas 9/15
- Student Presentations of Good vs Bad Light
- Topic 11: Schematic Design (Gordon: Review 27-35)
- Topic 12: Lighting Design layers
- Topic 13: Presenting Lighting concepts
- Topic 14: AGI32
- Assignment: Project 1 assigned. Create Schematic designs

5 Schematic Design Presentation 9/22
- Presentation: Schematic Designs (Gordon 204-221)
- Topic 15: Lighting Layouts, RCP, FLP
- Topic 16: Fixture Schedules
- Assignment: Project 1 Design Development

6 Design Development Presentations 9/29
- Topic 17: IES recommendations for lighting
- Topic 18: Mounting
- Topic 19: Glare Issues
- Topic 20: Angles
- Presentation: DD Midterm Designs
- Assignment: Project #1 Final Presentation

7 Midterm Presentation (Project 1) 10/6
- Midterm presentations
- Assignment: Photos of built-in architectural lighting and finish materials

8 Built-in Architectural Lighting Techniques 10/13
Studio Review of photos
Topic 21: Slots, Coves, Niches, etc
Topics 21.5: Detailing
Programming for Project 2
Assignment: Integrated Lighting Models

9 Project #2 Assigned 10/20
Quiz
Studio Critique of Models
Programming for Project 2
Assignment: Project #2 Schematic Design

10 Project #2 10/27 (Possible Guest lecture)
Studio Critique of Student Schematic Projects
Design Development progress
Assignment: Project #2 DD

11 Project #2 11/3
Guest Lecture
Desk Crit of DD presentations
Assignment: Project #2 Final Presentation

12 Project #2 11/10
Final Presentation
Assignment: None

13 Guest Lecture: 11/17
Lighting Controls, Zoning, and intent
Guest Lecture: TBD
Assignment: Final Project: IES Competition

14 NO CLASS 11/24

15 Final Presentation: 12/1 4:30- 6:30pm
Guest Critics from local firms