

Architectural Lighting Design
Prof. Caroline Hachem Fall 2013
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Introduction

Lighting design can significantly affect the architectural perception of a space. Understanding the principles of architectural lighting is a basic step towards achieving comfortable, healthy, and environmentally responsible designs. In this course, lighting design will be addressed as part of the broader process of designing the visual experience in architecture. Both daylighting and electric lighting will be covered.

Objectives

The main objectives of the course are as follows:

1. To develop illumination schemes that enhance an architectural design.
2. To model and analyze designs quantitatively.
3. To understand daylighting and electric illumination systems and design techniques.
4. To recognize light as a physical phenomenon.
5. To understand the physical modeling procedures for electric and daylighting design.
6. To acquire awareness of sustainable lighting design.

Teaching Approach

The course will be presented in lecture and workshop mode. The workshops will cover development of lighting designs using Thea Render in conjunction with Rhino. The project is a lighting design exercise.

Content: Topic Areas & Detailed Class Schedule

The functions and characteristics of lighting systems will be reviewed, together with their place in the development of design concepts. Components and terminology will be discussed, as well as quantitative design methods. Factors in systems selection will be examined, including:

1. Visual perception and the illumination of interiors,
2. Terminology and measurement units in illumination,
3. Electric light sources,
4. Daylighting,
5. Basic calculations for lighting, and
6. Computer modeling of lighting designs.

Sept. 12	Introduction to Lighting Design; Physical characteristics of light, Eye and vision, Lighting metrics. Introducing the Lighting project.
Sept.19	Design process (Task illuminance; Luminous hierarchy; Spatial

	impressions; Lighting layers), Sustainable lighting (ASHRAE and LEED)
Sept. 26	IEA Task 51 Meeting, class postponed
Oct. 3	Daylighting (Definition and benefits, Daylighting surfaces, Daylighting design); Simulation tutorial: Daylighting
Oct. 10	Lighting equipment (1) Lamps and Luminaires, Overview of various types of lamps, advantages and disadvantages; Simulation tutorial: Artificial lighting
Oct. 17	Block week
Oct. 24	Lighting Equipment (2) Documentation, Lighting calculations (lumen method and point by point method); Case studies.
Oct. 31	Project Tutorial
Nov. 7	Project Tutorial
Nov. 14	Exam

Means of Evaluation

Evaluation will be based on:

Lighting Design Project	75%
Test	25%
Total	100%

The test will be closed book. Writing and the grading thereof is a factor in the evaluation of the project.

Grading

Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range. Grading will be based on the following scale:

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	92.5-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	85-92.49	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	80-84.99	Very good performance
B+	3.30	3.15-3.49	76-79.99	Good performance
B	3.00	2.85-3.14	73-75.99	Satisfactory performance
B-	2.70	2.50-2.84	70-72.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	66-69.99	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course

				requirements.
C	2.00	1.85-2.14	63-65.99	
C-	1.70	1.50-1.84	60-62.99	
D+	1.30	1.15-1.49	56-59.99	
D	1.00	0.50-1.14	50-55.99	
F	0.00	0-0.49	0-49.99	

Notes:

A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

Readings

The course texts are

- Russell, S., *The Architecture of Light*, 2012, Conceptnine, ISBN 978-0-9800617-1-0
- Lawrence Berkeley Laboratory, *Tips for Daylighting with Windows* windows.lbl.gov/daylighting/designguide/dlg.pdf (free download)
- Additional material will be posted on the course website.

Canadian Architectural Certification Board - Performance Criteria Met by Course

The following CACB Student Performance Criteria will be covered in this course at a primary level: B8 Environmental Systems, C2 Building Systems Integration

The following CACB Student Performance Criteria will be covered in this course at a secondary level: B4 Sustainable Design, B10 Building Service Systems, C1 Detailed Design Development, C3 Technical Documentation, C4 Comprehensive Design.

Notes:

As a quarter course, the class will run about 50% of the weeks of the term, plus time for the test.

1. Written work, term assignments and other course related work may only be submitted by e-mail if prior permission to do so has been obtained from the course instructor. Submissions must come from an official University of Calgary (ucalgary) email account.
2. Academic Accommodations. The Academic Accommodations Policy can be found at: <http://www.ucalgary.ca/access/accommodations/policy>. It is the students' responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodations and have not registered with Student Accessibility Services, please contact them at 403.220.6019. Students who have not registered with Student Accessibility Services are not eligible for formal academic accommodations. More information about academic accommodations can be found at www.ucalgary.ca/access. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.

3. The instructor may reduce grades for assignments and components thereof when submitted after deadlines.
4. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.
5. Information regarding the Freedom of Information and Protection of Privacy Act (<http://www.ucalgary.ca/secretariat/privacy>) and how this impacts the receipt and delivery of course material
6. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>)
7. Safewalk information (<http://www.ucalgary.ca/security/safewalk>)
8. Contact Info for: Student Union (<http://www.su.ucalgary.ca/page/affordability-accessibility/contact>); Graduate Student representative(<http://www.ucalgary.ca/gsa/>) and Student Ombudsman's Office (<http://www.su.ucalgary.ca/page/quality-education/academic-services/student-rights>).