

Catalogue Code: ARCH 447

Course Title: Electrical Services - Lighting

Department: Architecture

Term: Fall 2007

Instructor: Conor Sampson
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Location: Room 212, Thursday 10:30-12:30
Credits: 2
Prerequisites: none

Office hours: By appointment
Date: September 6, 2007

Course Description:

The primary focus of this course will be the study of lighting in an architectural context. We will look at the integration of electric and natural light sources into the design process, with a primary emphasis being placed upon the role light can play in shaping architecture.

We will further discuss different modelling approaches of lighting phenomena at the fundamentals level and work through a series of computer-based simulation exercises. Students are encouraged to apply their acquired simulation skills in their ongoing studio projects.

Field trips of lighting installations and manufacturing facilities will add to the topics presented in the classroom.

Goals and Objectives:

The course presents an introduction to current lighting design theory and technology. Students complete the course with an understanding of basic lighting design principles, lighting simulation skills, and the ability to apply them to architectural projects.

Session

Topic

1 Sept 6

Introduction

- General course topics
- Pedagogical approach
- Introduction of course projects and formation of groups
- Assignment introduction
- IALD conference overview

History of Light

2 Sept 13

Readings: "Dynamic Daylight Metrics" (to p.13)

Light and Health

Introduction to Daylighting

- daylighting and sustainable design (lighting & solar gains)
- green building rating systems (LEED, Green Globe)
- benefits & challenges of daylighting
- rules of thumb & design guides
- performance metrics (daylight factor, view, glare, uniformity)
- climatic considerations

Building Simulation

- context (the role of simulations in design)
- time and resource management
- examples (lighting, energy, CFD)

	<p>Ecotect weather module</p> <ul style="list-style-type: none"> - sun path diagrams - shadow analysis
3 Sept 20	<p>Readings: "Waiting for Godot" + "Speed of Light"</p> <p>Ecotect tutorial</p> <p>Introduction to lamps and types of sources</p> <ul style="list-style-type: none"> - CRI - Correlated colour temperature - Energy efficiency - Specific lamp characteristics - Incandescent, halogen, fluorescent, HID/Metal Halide, LED
4 Sept 27	<p>Readings: "Darksky"</p> <p>Fixture design and utilization</p> <ul style="list-style-type: none"> - downlights - track - decorative - custom design <p>Guest lecture on use of Radiosity to model light</p>
5 Oct 4	<p>Readings: "LD&Abridge" + "OttawaMasterplan"</p> <p>Integrating lighting into the architectural design process</p> <ul style="list-style-type: none"> - lighting layouts - lighting specifications - drawing documentation - interaction with other trades in construction process <p>Light distribution and calculations</p> <ul style="list-style-type: none"> - hand calculations - distribution curves - IES files <p>Lighting layouts and documentation</p> <p>Lighting Requirements (IESNA Handbook)</p> <p>Online resources</p>
6 Oct 11	<p>Electrical review</p> <ul style="list-style-type: none"> - Power creation and distribution - Physics of electricity - Electrical components involved in lighting <p>Guest lecture: "Lighting Museums for experiential narrative"</p>
7 Oct 18	<p>Quiz</p> <p>Presentation of Assignment</p>
8 Oct 22	<p>Tour of retail lighting installations</p> <p>To take place on Monday, October 22nd in the evening, time to be confirmed. Thursday course is cancelled.</p>
9 Nov 1	<p>Mini Crit of project proposals with feedback.</p> <p>Guest lecturer to present lighting of Quartier des Spectacles</p>
10 Nov 8	<p>Lighting Field Trip – Morning trip to Canlyte, Lachine. Meet in front of MacDonald Harrington at 8:30AM.</p>

Trip will include presentations on some of the following:

- LED technology and research
- New fixture development process
- Manufacturing methods and material approaches
- New green technology in lighting controls

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| 11 Nov 15 | Studio visit. This class is designed as a free studio period where I will work with groups in desk crits to help clarify and inform issues that have arisen during project development. Please sign up for appointments from 9am to noon. |
| 12 Nov 22 | Visiting International Association of Lighting Designers Guest lecturer. Topic to be determined. To be followed by desk crits or open format question period in lecture hall. |
| 13 Date to be confirmed | All day crit during exam period |

Requirements:

It is the foremost priority of this course to make lighting a relevant and preliminary source of design. In prior years, we have focused almost entirely upon using studio “buildings” as the basis of a computer simulation. The model has allowed us to critique approaches to daylighting and artificial lighting, enabling modifications of design in mid process to better attain the designer’s intentions.

This year a slightly modified approach will be adopted. Three project briefs may be adopted: mini, micro or macro. In mini, the project will focus on the development of a fixture, which implements energy efficient sources and forms a part of a studio building. In micro, the brief will be similar to past years, where a studio building is analysed in its entirety. In macro, the scope is widened to embrace an urban scale lighting approach, focusing on lighting of the campus and its constituent buildings from the exterior.

To facilitate the process, the project will be broken into two parts: an initial proposal, detailing the areas of investigation and approach to be taken, and a final presentation and report (or, in the case of micro, a prototype), which illustrates how your building conception was influenced by issues of natural and/or artificial lighting.

In addition, one class quiz will be given in week 7 and a survey assignment will be distributed for presentation also on week 7.

Methods of Assessment:

Grades will be determined based on:

- Quality of completed assignment and quiz.
- Demonstration of understanding of course material.
- Timely completion of assignments. All late work will be penalized ½ grade point per week submitted after the deadline. Work submitted two weeks after the deadline will not be accepted.
- Participation in class discussions and lectures.

The first proposal will be worth 20% of your grade, the final presentation and report will be worth 50% of your grade, Quiz 10%, Assignment 10%. and 10% for a post mortem analysis (one pager) of how your project went, for a total of 100%.

Bibliography:

Brandi, Ulrike	<u>Lightbook</u> . Birkhauser, Berlin, 2001
GZ Brown and Mark DeKay	<u>Sun, Wind and Light: Architectural Design Strategies</u> , 2001
Nye, David E.	<u>Electrifying America</u> . MIT Press, Cambridge, 2001.
Neumann, Dietrich	<u>Architecture of the Night</u> . Prestel, New York, 2002.
Park, David	<u>The Fire Within the Eye: A Historical Essay on the Nature and Meaning of Light</u> . Princeton University Press, 1997.
Gordon, Gary	<u>Interior Lighting for Designers</u> . John Wiley and Sons, New York 1995.
and Nuckolls, James	
IESNA	<u>IESNA Lighting Handbook</u> – Ninth Edition.
Schivelbusch, Wolfgang	<u>Disenchanted Night</u> . University of California Press, London, 1995.

Required Software Packages:

Ecotect and Desktop Radiance (add link)