

**GRADUATE SEMINAR  
VICENZA INSTITUTE OF ARCHITECTURE, UNIVERSITY OF FLORIDA**

**Title: The Project of Natural and Artificial Light**

An integral methodology based in contemporary Veneto experiments

Course: Environmental Technology Elective Graduate Seminar

Credits: 3

Class meets once a week for three hours, 11 times along the semester.

Instructor: Giovanni Traverso, Coordination: Alfonso Perez-Mendez

Maximum enrolment: 15 students

**GOALS**

Building on top of the knowledge presented to students in the undergraduate Environmental Technology II course, this seminar aims to develop expertise regarding the integration of natural and artificial light as an integral part of the design of the built environment. In order to introduce the students to current design techniques, photometric principles and technical information are complemented with design project work and visits to buildings to study examples of advanced lighting techniques.

**COURSE CONTENT**

The course presents lighting both as an integrative effort between natural and artificial sources, and as a tool for the perception of space in architecture. Lighting concepts are both revised and expanded to relate to the quantity and various quality features of light. We will study the human response specifically by considering how the hard data figures are influenced and modified by the rhythms of the day, the cycles of light and darkness throughout the year. We will consider how to analyze calculate and measure different artificial lighting sources for their possible incorporation into the lighting design project, and we will consider such critical issues such of the color of lighting.

Hands on modules will introduce the students to a methodology for lighting design that includes scale models both daylight and sunlight prediction and for the use of fiber optics to simulate artificial lighting.

This methodology of lighting will be the basis for two seminar projects, each with a specific set of site requirements and limitations. Both projects will be developed by all students in groups of two. These projects will be tested the first through design models and the last through a model and in a final meeting conducted at night in the building of the school courtyard by using equipment supplied by a local lighting equipment rental to have the experience of an interactive lighting project. Both of these projects, properly documented in two design papers/portfolios will be the main basis for the seminar grades.

**SYLLABUS**

Week 1 10.15-13.15 AM

**INTRODUCTION**

This module introduces the culture of light both as an expressive tool and as a technical design tool for the architectural project. Artificial light is presented not as an independent subject, but both in its integration to daylight and as a tool for the perception of space in architecture.

Week 2 10.15-13.15 AM

**LIGHTING CONCEPTS AND DEFINITIONS**

Lighting concepts that students know from ET II are both revised and expanded to relate to the quantity and various quality features of light. This module deals with the human response to lighting, from definitions to current standards regarding illuminance levels, degree of glare limitation, luminous color and color rendering among others.

Week 3 10.15-13.15 AM

#### **NATURAL LIGHTING**

This module deals with issues of human perception of natural light, and how the hard data figures are influenced and modified by the rhythms of the day, the cycles of light and darkness throughout the year. These principles of daylight design are illustrated through traverso-vighy architectural projects:

- Jerusalem Manfrotto Bags Headquarters 2014
- TVZEB Studio, Vicenza 2012
- Bosco Retreat, Vicenza 2012
- Spidi Showroom, Sarego, 2005-2006
- Designer's Studio; Vicenza, 1998-2007

Week 4 10.15-13.15 AM

#### **PRESENTING A DESIGN METHODOLOGY FOR NATURAL LIGHTING**

This module introduces a methodological process to study natural lighting criteria by working on a scale model for daylight and sunlight prediction learning. Students can improve their knowledge of natural lighting criteria by hands on involvement with scale models previously developed by traverso-vighy. This week the students, in groups of two, are requested to conceive the first lighting project within the environment of VIA premises. This project will be developed along the following 4 weeks and tested in a simulation exercise in the week 8 meeting of the seminar. The following 3 weeks introduce concepts that will be integrated into the student projects.

Week 5 10.15-13.15 AM

#### **ARTIFICIAL LIGHTING SOURCES**

Good lighting design aims to create perceptual conditions for a feeling of well-being and at the same time it enhances the environment in an aesthetic sense. The physical qualities of a lighting situation can be calculated and measured, starting from a knowledge of lighting sources. Test of different lighting sources performance.

Week 6 10.15-13.15 AM

#### **COLOR AND LIGHTING**

Color is a significant component of visual perception. The term "colour of light" covers both white and coloured light. Warm white, neutral white and daylight white are different color temperature derived from the white colour of light.

These principles are examined through the experiences of several traverso-vighy projects:

- Alingsas Skatepark, 2009
- Illy polymorphous lighting system, 2004

Week 7 10.15-13.15 AM

#### **INTEGRATION OF DAYLIGHT AND ARTIFICIAL LIGHTING IN A NEW BUILDING**

These issues will be examined in a visit to Tvzeb, a traverso-vighy design near Vicenza that exemplifies the integration of daylight and artificial lighting in a new building.

Week 8 10.15-13.15 AM

#### **SMART LIGHTING**

Solid State lighting and Control Systems.

The module introduces a new prospective on lighting: new technologies are pushing lighting in the digital era, where dynamic systems goal sustainability and human well-being. Students are asked to define a mutable lighting concept, using LED and simplified control systems, such as Arduino controllers.

Papers/Portfolios for this exercise are due one week after this simulation.

This week the students, in groups of two, are requested to conceive the second lighting project with another set of requirements but also defined within the environment of VIA premises. This project will be developed along the following 4 weeks and tested in a simulation exercise in the week 11 meeting of the seminar.

Week 9 10.15-13.15 AM

#### **CONSIDERING THE LIGHTING DESIGN PROJECT**

The challenge of a qualitative lighting design is to develop a design concept that combines the technical and aesthetic requirements.

These challenges will be examined through various examples of traverso-vighy indoor and outdoor lighting projects:

- Alingsas lighting festival: the skatepark lighting, 2009
- Palermo airport retail, 2009

Week 10 10.15-13.15 AM

#### **MUSEUM LIGHTING AND HISTORICAL PRESERVATION**

Taking advantage of the VIA environment and traverso-vighy expertise, this module introduces the students to the issue of lighting for art with an emphasis in preservation problems arising from working in historically charged environments.

These principles are examined through examples of traverso-vighy design projects:

- Lighting of the chapel frescoed by Piero della Francesca, Arezzo, 2000
- Analysis of natural light in Palazzo della Ragione in Padua, 1998
- Lighting project for the Cathedral Baptistery frescoes, Padua, 2006

Week 11 10.15-13.15 AM

#### **URBAN LIGHTING**

This Module will introduce light on a global scale. The lighting pollution is one of the major sustainability issue of modern life, affecting sky perception, animal life and human wellbeing.

Light Master Plans are controlling lighting output and qualities on urban scale.

These principles are examined through examples of traverso-vighy design projects:

- Verona City walls Lighting Masterplan, 2013
- Vicenza light fest, 2013

#### **REQUIRED TEXTS**

The class will not have a required text. Readings will be assigned on a weekly basis from different sources.

#### **BIBLIOGRAPHY**

The following bibliography will be available at VIA library

##### **Regarding perception:**

- Eye and Brain, The Psychology of Seeing  
by Richard L. Gregory  
Princeton University Press, 1997

##### **Regarding lighting fundamentals:**

- Lighting for interior design, Malcolm Innes, Portfolio Skills 2012
- Code for Lighting (CD-ROM and/or printed extracts)  
CIBSE, 2009  
The Society of Light and Lighting (SLL) Code for Lighting is regarded as the definitive reference source for lighting design in the UK.
- SLL Lighting Handbook  
CIBSE, 2009  
The Handbook is intended to be the first-stop for anyone seeking information on lighting

#### Regarding daylight:

- Modelling Daylight\_ A Manual for Natural Light Experimentation  
by Giovanni Traverso  
VIA-Verlag, 2015
- Architectural Lighting Design  
by Gary Steffy  
Wiley-Blackwell, 2008
- Di quanta luce ha bisogno l'uomo per vivere e di quanta oscurità?  
Wieviel licht braucht der mensch, um leben zu konnen, und wieviel dunkelheit?  
by Peter Zumthor; Ivan Beer; Jon Mathieu; Marco Marcacci; Ruth Hungerbühler; Luca Morici; Stefan Wunderle; Katja Maus.  
Univ. della Svizzera Italiana, Istituto di Storia delle Alpi -ISAlp-, Lugano (Herausgeber);  
Univ. della Svizzera Italiana, Accademia di Architettura, Mendrisio (Herausgeber) 2006
- Lighting Design: Principles, Implementation, Case Studies  
by Ulrike Brandt Licht  
Birkhauser Edition Detail, 2006
- Dynamic Daylight Architecture: Basics, Systems, Projects  
by Helmut Köster  
Birkhauser – publisher for architecture, 2004
- Daylighting in architecture,  
Baker N., Fanchiotti A., Steemers K.,  
Commision of European Communities, James&James, London, 1993

#### Regarding materials for architecture:

- In Detail: Building Skins  
by Christian Schittich (Ed.)  
Birkhauser Edition Detail, 2006
- Detail Praxis: Translucent materials, glass Plastic, metals  
by Frank Kaltenbach (Ed.)  
Birkhauser Edition Detail, 2004

#### More about lighting designer experiences:

- Space Made Light  
traverso-vighy 1994-2009  
Umberto Allemandi Editore, Torino 2009
- Made of Light The Art of Light and Architecture  
Mark Major, Jonathan Speirs, AnthonyTischhauser  
Birkhauser, 2005
- The passion for light  
Inigo Maurer  
Actar, 2002
- Lighting Horizons  
Motoko Ishii  
Rikuyosha Co., Ltd., TOKYO, 2001

#### CLASS REQUIREMENTS

- 1) Attend class regularly
- 2) Read all the readings
- 3) The students, in groups of two, are requested to conceive a lighting project within the environment of VIA premises. The project will be developed along the semester, tested in a night exercise in the final meeting of the seminar, and documented on a final research paper/portfolio.

## GRADING

The final documented project, in combination with class participation will be the basis for grading.

### EVALUATION OUT 1000

Weekly class participation: 200 points (20%)

First Project proposal: 100 points (10%)

First Final documented project: 300 points (30%)

Second Project proposal: 100 points (10%)

Second Final documented project: 300 points (30%)

### NUMERICAL TO LETTER GRADE CONVERSION

900 and above = A

870 to 899 = A-

830 to 869 = B+

800 to 829 = B

770 to 799 = B-

730 to 769 = C+

700 to 729 = C

670 to 699 = C-

630 to 669 = D+

600 to 629 = D

Below = E

**E-MAIL POLICY:** E-mail is appropriate only for quick messages and replies. You are welcome to e-mail me only with *brief* questions or comments (e.g., a request for an appointment, a question that can be answered in a sentence or two). I will answer your messages as I have the opportunity, but cannot guarantee immediate responses.

**GENERAL INFORMATION:** The instructor will follow the topics outlined above but these topics are by no means binding as a topic may be changed at any time according to the discretion of the instructor.

**ATTENDANCE POLICY:** Students are expected to attend all classes. For special circumstances, class notes will "not" be provided and students who miss class may acquire notes only from their colleagues.

**LATE WORK POLICY:** If have you a documented reason to turn in late work, this should be discussed with me before the deadline.

**STUDENTS WITH DISABILITIES:** Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation

**HONOR CODE:** The website <http://regulations.ufl.edu/chapter4/4017.pdf> provides information about University of Florida policy on academic integrity for students. Students are advised to read this document carefully.