

Course guide

310743 - 310743 - Architectural Lighting

Last modified: 06/06/2024

Unit in charge: Barcelona School of Building Construction
Teaching unit: 748 - FIS - Department of Physics.

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019).
(Optional subject).

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Rodriguez Cantalapiedra, Inmaculada

Others: Alvarez Chaia, Julian

TEACHING METHODOLOGY

Different learning methods will be combined:

- Theoretical and practical classes
- Auto-learning
- Laboratory practice.
- Practical work with DIALux Evo.
- Carrying out an individual project.

LEARNING OBJECTIVES OF THE SUBJECT

Acquisition of the knowledge and techniques necessary for the measurement and evaluation of the lighting of an interior or exterior space of an architecture project or public space, for the optimization of the detected problems and the realization of a lighting project, with DIALux Evo.

STUDY LOAD

Type	Hours	Percentage
Self study	45,0	60.00
Hours large group	30,0	40.00

Total learning time: 75 h

CONTENTS

The beauty of light and vision

Description:

Electromagnetic radiation, solar radiation, radiation emitted by other light sources. Visible spectrum. Vision: eye and function parts, pupil as a diaphragm, lens to focus and retina with photosensitive cells, rods to clarity and movement and cones, sensitive to colors. Different sensitivity of the eye to light radiation. Photopic and scotopic vision.

The beauty of light in architecture and public spaces, various case studies where you can see how these spaces are intervened through natural and artificial light.

Related activities:

Analysis of existing cases, and subsequent calculation with DIALux Evo of some of the case studies

Full-or-part-time: 2h

Theory classes: 2h

Photometry and color

Description:

Luminous flux. Total power. Luminous performance. Light intensity: spatial distribution of light intensity, photometric solid and photometric curves. Illuminance. Illumination. Luminance. Fundamental law of illumination (law of the inverse of the square of the distance. Law of cosine.

Light comfort: Adaptation, accommodation and visual acuity, contrast. Glare. Color temperature of luminaires. Color rendering index.

Full-or-part-time: 3h

Theory classes: 2h

Practical classes: 1h

Light behavior of materials: reflected, absorbed and transmitted

Description:

Reflection, transmission and refraction. Polarization . Specular, diffuse and mixed reflection. Regular, diffuse and mixed transmission.

Full-or-part-time: 1h

Theory classes: 1h

Interior lighting

Description:

Knowledge for good lighting: Location. Orientation, architectural data, activity data, lighting data that are required, color textures that influence reflection. Types of collection and distribution of natural light. Luminaries.

Natural lighting: solar radiation, daylight factor. Collection, distribution and protection elements.

Solar radiation according to location, seasonality, orientation. Collection elements: windows, skylights,... distribution: patios, galleries, tunnels of light. Daylight factor and its evaluation. Effect of the geometry of the premises, the depth. The location and shape of the collector. elements of control, protection and redistribution of natural light.

Full-or-part-time: 12h

Theory classes: 5h

Practical classes: 5h

Laboratory classes: 2h

Artificial lighting

Description:

Luminaries. Types, yields, consumption. Photometric curves. CTE: requirements, previous data, verification, use of natural light. Justification and verification, maintenance.

Full-or-part-time: 5h

Theory classes: 1h

Laboratory classes: 4h

GRADING SYSTEM

The qualification system will consist of several deliverables that will be uploaded to Atenea.

Problems - 15%

Light measurement practice - 15%

Dialux class exercises - 15%

Project 1 - Catalog of lighting solutions - 25%

Project 2 - Lighting Project - 30%

BIBLIOGRAPHY

Basic:

- Yáñez Parareda, Guillermo. Arquitectura solar e iluminación natural : conceptos, métodos y ejemplos . Madrid : Munilla-Lería, 2008. ISBN 978-84-89150-81-2.
- El Libro blanco de la iluminación. [Madrid] : Comité Español de Iluminación, 2011. ISBN 9788494027321.
- Martín, Franco. Manual práctico de iluminación . Madrid : A. Madrid Vicente, Ediciones, 2005. ISBN 9788487440106.
- Código Técnico de la Edificación, Documento Básico HE 3 Condiciones de las instalaciones de iluminación. (2019)..
- Fontoynt, Marc. Daylight performance of buildings . London : James & James, cop. 1999. ISBN 978-1873936870.
- Martín Monroy, Manuel. Calidad ambiental en la edificación para Las Palmas de Gran Canaria, Islas Canarias [Fitxer d'ordinador] . Las Palmas de Gran Canaria : Ayuntamiento, 2006. ISBN 978-8469006584.
- Guía técnica para el aprovechamiento de la luz natural en la iluminación de edificios. [on line]. Madrid : IDAE Madrid 2005., 2005Available on: https://www.idae.es/uploads/documentos/documentos_10055_GT_aprovechamiento_luz_natural_05_ff12ae5a.pdf.

RESOURCES

Computer material:

- DIALUX. Resource

Other resources:

Manual DIALux Evo https://www.dial.de/fileadmin/documents/dialux/DIALux_downloads/DIALux%20evo%20manual.pdf />Tutorials for Beginners https://www.youtube.com/watch?v=07YBwuBVPso&list=PLKzUB7xP_t4_Yi3qIDWDy5oCZn1R_6z5z />Open Channel <https://www.youtube.com/user/TheDIALux/videos>