



Course Module Description

General module information

Title: Lighting Fundamentals
Type: Course module
Language of instruction: English
Location of the lecture: Campus Copenhagen

ECTS points: 5 ECTS

Period: 1 September 2022 — 31 January 2023

Placement

1st semester, MSc in Lighting Design

Module coordinator

[Nanet Mathiasen](#) (coordinator), [Lisbeth Nykjær](#) and [Christine Pedersen](#) (secretary)

Academic content and relationships to other modules/semesters

The formal study plan description of the module can be found here:

<https://moduler.aau.dk/course/2022-2023/MSNLIDM1203?lang=da-DK>

The intention of this module is that the student gain knowledge on light in order to make them comfortable in handling most important terms and formula in lighting. Students will be introduced to the basic photometric and colorimetric terms, luminous quantities and fundamental formulae. They will be taught the processes involved in the perception (human vision) and appreciation of the luminous environment. The course will propose to master the link between subjective assessment and objective measurements.

The course is introduced through a workshop where simple 1:1 light-situations (daylight and electric light) are experienced and linked to how light is described through fundamental terms, units and quantities. The workshop will furthermore introduce to measurements of illuminances and luminances with portable equipment.

Subsequently the course will introduce to detailed description of the way human eye perceive light through visual and non-visual channels. This will include fundamentals of colorimetry, colour vision, night/day vision, and glare assessment.

Students will be taught to use measuring equipment to measure quantities in real environments (luminances, illuminances, fluxes, spectral power distributions, colour coordinates, correlated colour temperature, photometry of materials)

The course includes demonstration of lamp technology in classes, as well as presentation of luminaires and various light sources. A session is devoted to presenting the various standards (international), which affect lighting design.

The course addresses material photometry and lighting calculations to handle properties of materials. Characterization of luminous environment will be conducted using analysis of luminances in the field of vision, with consequences in luminance-based design. Finally, issues in relation to simulating light for building environment will be briefly introduced.

Objectives and learning goals

The main objectives and learning goals are that the students are able to master terms, quantities, vocabulary, and basic formulae to evaluate lighting in all environments, indoor and outdoor, at night-time and daytime. The students will have achieved the ability to synthesize the knowledge on technical issues concerning light and lighting and apply it on concrete projects describing both the theoretical as well as the practical aspects.



Extent and expected workload

During the course, there will be 8 teaching sessions, and 4 assignments. The course will be introduced by a workshop and at the end of the course; a mini portfolio must be handed in, containing the 4 assignments. For each session, relevant literature and links are distributed through Moodle.

The assignments will be prepared either individual or by teams of 4 (-5) students. It will deal with an in-depth luminous analysis of a case selected by the students. Through the assignments, the students illustrate that they have acquired skills in order to use technical terms, units and calculation methods that have been presented to them throughout the course. The assignments will contain geometric, photometric and technical description of the chosen space. Together with an analysis of the luminous distribution, conducted in relation to both the daylight- and the electrical light situation. Finally, each student hand in the 4 assignments in a single mini portfolio.

It is expected that the workload during the course equals 150 hours of work, which is around 3.5 week, full time work, equally distributed between lectures, exercises and literature studies (2,5 ECTS) and the mini-portfolio assignments (2,5 ECTS).

Pre-requisites for participation

See the module description (find the link above) for any further detail on pre-requisites.

Examination

Modality and duration: individual oral exam. The duration will be 15 minutes, followed by 5 minutes deliberation

Assessment: In accordance with the 7-point grading scale

Pre-approved aids: Mini portfolio report and slides for presentation

Prerequisites for participation: none

Further detail on the exam: In the beginning of the exam the student will do an approximately 5 minutes presentation with reference to the mini portfolio, after which the examiner will ask follow-up questions within the topic of the mini portfolio and the entire curriculum. *The mini portfolio is used solely as a foundation for the discussion and the quality of the mini portfolio does not count towards the grade.*

Information concerning the mini-portfolio:

The mini portfolio is a collection of the assignments from the teaching sessions. The mini-portfolio cannot be group-based (should be individual for each student), but the students can include group work, and may help each other, work together and share ideas. The mini portfolio must be handed in on Moodle two months before the examination.

The oral presentation should respond on how the input from the course can be combined and used to demonstrate the students' ability to make analysis of daylight and electrical lighting. The student must demonstrate an understanding of applying knowledge referring to a scientific, experienced, and methodological approach through a reference to the exercises from the course.