



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Light and Lighting [S1Eltech1>C-SiO]

### Course

Field of study

Electrical Engineering

Year/Semester

3/6

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

30

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

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### Lecturers

### Prerequisites

The student starting this course should have a basic knowledge of physics, visible radiation and lighting engineering. Basic skills in measuring electrical and photometric parameters. The ability to effectively self-study in a field related to the chosen field of study.

### Course objective

Providing students with in-depth information on visible radiation, photometric and colorimetric parameters, and the construction and operation of lighting equipment. To acquaint students with the practical aspects of photometric and colorimetric measurements and testing of lighting equipment. Developing students' ability to choose the measuring method and appropriate measuring equipment for the problem.

### Course-related learning outcomes

Knowledge:

1. Knows the spectrum of solar radiation and the differences in spectral distributions between the sun

and electric lamps.

2. Has knowledge in the field of photometry, colorimetry and lighting equipment, knows and understands the laws associated with optical radiation.

Skills:

1. Is able to use his knowledge in the selection of equipment and measurement methods for photometric and colorimetric parameters in order to perform the measurement and acquisition of basic measurable quantities characteristic of lighting engineering in typical and atypical conditions.
2. Is able to properly use luxmeters, colorimeters, photometers and spectrophotometers in accordance with general requirements and technical documentation.

Social competences:

1. Is aware of the contribution of their own work for the good of the team and the workplace and the need to comply with professional ethics. Is able to cooperate in a team and take over various functions during the implementation of a given task.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Knowledge acquired as part of the lecture will be verified by the colloquium passed on the last lecture. The test consists of 15-25 questions (test and open), variously scored. Pass threshold: 51% points. Final issues, based on which questions sent to students by e-mail are developed using the university e-mail system or placed on the eKursy platform.

Skills acquired as part of the laboratory are verified on the basis of at least one presentation containing the analysis of the results obtained, the conclusions of the measurements and a discussion regarding the results obtained. Assessment threshold: positive evaluation of the presentation.

### Programme content

Lecture: Methods and principles of measurement of photometric quantities. Construction and principle of measuring apparatus of measuring apparatus used to measure luminous quantities. Basics of colorimetry. Properties of lamps and luminaires.

Laboratory: Practical application of the knowledge acquired in the course of the lectures on the measurement of photometric, electric and colorimetric quantities.

### Course topics

Lecture: Guide and principles of photometric measurements. Photometers - construction of the operating principle, basic parameters and characteristics. Methods and principles of measurement of luminous flux, luminous intensity, illuminance, luminance. Photometric standards, estimation of measurement uncertainty budget. Construction and principle of operation of lux meters and luminance meters. Classification of meters, errors of meters.

Geometric systems for the presentation of photometric properties of lamps and luminaires. Measurement of luminous intensity distribution.

Basics of colorimetry. Additive and subtractive color mixing. Description of colorimetric systems.

Colorimetric measurements. Color management systems. Parameters i characteristics of electric lamps. Light-emitting diodes – structure and operation. The influence of temperature on the electrical and photometric parameters of light-emitting diodes.

Systematics of lighting fixtures. Control in lighting fixture circuits.

EU regulations on lighting equipment.

Laboratory: Practical exercises on the study of photometric properties of the photometric sphere, measurement of luminous flux, measurement of luminous intensity, measurement of spectral sensitivity of light sensors.

Laboratory: Practical exercises in the field of, testing the photometric and electrical parameters of household lamps, lighting control systems, measurements of spectral distributions and colorimetric parameters of lamps, testing the influence of the p-n junction temperature on the electrical and photometric parameters of light-emitting diodes (LEDs).

## Teaching methods

Lecture: multimedia presentation (drawings, photos, charts) supplemented with examples given on the board.

Laboratory: Performing practical tasks under the supervision of the lecturer. Discussion related to results obtained during measurements.

## Bibliography

### Basic

1. Żagan W.: Podstawy technik świetlnej. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2014.
2. Wiśniewski A.: Elektryczne źródła światła. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2010.
3. Żagan W.: Oprawy oświetleniowe : kształtowanie rozsyłu strumienia świetlnego i rozkładu luminancji , Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012
4. Dybczyński W.,: Miernictwo promieniowania optycznego, Wydawnictwa Politechniki Białostockiej, Białystok 1996.

### Additional

1. Lighting Handbook, Reference & Application. IES of North America, New York 2010
2. Bąk J., Pabjańczyk W.: Podstawy techniki świetlnej. Wydawnictwo Politechniki Łódzkiej, Łódź 1994.
3. Materiały dydaktyczne dostępne na stronie: <http://lumen.iee.put.poznan.pl>

## Breakdown of average student's workload

	Hours	ECTS
Total workload	80	3,00
Classes requiring direct contact with the teacher	55	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00