



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Lighting equipment [N1Eltech2>PO5-SO]

Course

Field of study

Electrical Engineering

Year/Semester

4/8

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

elective

Number of hours

Lecture

10

Laboratory classes

20

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Students starting this course should have basic knowledge of physics, visible radiation, and lighting engineering. They should possess basic skills in measuring electrical and photometric quantities. They should also be able to engage in effective self-education in a field related to their chosen field of study.

Course objective

To provide students with information on the construction and operation of lighting equipment, including lamps and luminaires. To familiarize students with the practical aspects of photometric and colorimetric measurements in the field of lighting equipment testing. To develop students' skills in selecting measurement methods and appropriate measurement equipment for a given problem.

Course-related learning outcomes

Knowledge:

1. Demonstrates advanced knowledge and understanding of electrical and electronic metrology. Demonstrates understanding of the properties and operation of measurement equipment used in electrical engineering.
2. Demonstrates basic knowledge of lighting technology and optical radiation. Demonstrates

understanding of electrothermal processes and heat transfer mechanisms.

Skills:

1. Is able to critically analyze and evaluate the performance of existing electrical devices, systems, and circuits using appropriately selected methods and tools.
2. Is able to select sources and information derived from them (catalog cards, application notes) to evaluate, critically analyze, and synthesize the components of a proposed electrical circuit or system operating under typical or not entirely predictable conditions.
3. Is able to select equipment to measure and acquire basic measurable quantities characteristic of electrical engineering; is able to present obtained results numerically and graphically, as well as interpret them, estimate errors, and draw appropriate conclusions.

Social competences:

1. Is willing to develop professional, personal, and social competencies; is aware that knowledge and skills in the field of electrical engineering are rapidly evolving.
2. Is willing to fulfill professional roles, take responsibility for collaborative tasks, adhere to the principles of professional ethics, and uphold the legacy and traditions of the profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture will be verified in an exam. The exam consists of a written test consisting of approximately 20 questions (multiple and open-ended), with various scoring options. An oral exam is also permitted. Passing threshold: 50% of the points. Students are provided with assignment questions, based on which test questions are developed. Skills acquired during laboratory classes are verified through completed reports. Passing threshold: a passing grade for each report.

Programme content

Lecture: Properties of electric lamps and luminaires. Basics of colorimetry. EU regulations for lighting equipment. Laboratory: Measurements of photometric, electrical, and colorimetric quantities of lamps and luminaires.

Course topics

Lecture: Parameters and characteristics of electric lamps. Light-emitting diodes - construction and operation. The effect of temperature on the electrical and photometric parameters of light-emitting diodes. Binning of light-emitting diode parameters. Systematization of luminaires. Control in luminaire circuits. Basics of colorimetry. Description of colorimetric systems. Colorimetric measurements. Determining the correlated color temperature. Evaluation of color rendering of light sources: color rendering index, color fidelity index. Threshold color differences. The SDCM parameter used in assessing the color difference tolerance of light sources. Laboratory: Practical exercises in the study of photometric and electrical parameters of household lamps, lighting control systems, measurements of spectral distributions and colorimetric parameters of lamps, and studies of the effect of p-n junction temperature on the electrical and photometric parameters of light-emitting diodes (LEDs).

Teaching methods

Lecture: multimedia presentation (drawings, photos, graphs) supplemented by examples provided on the board. Laboratory exercises: performing measurements according to the instructor's instructions. Analysis of results. Discussion of the obtained results.

Bibliography

Basic:

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

5. EU Ecodesign Directives for lamps and luminaires.

Additional:

1. Subject standards
2. Laboratorium z techniki świetlnej. Praca zbiorowa. Wyd. Politechniki Poznańskiej nr 1792, 1994.
3. Praca zbiorowa: Laboratorium Podstaw techniki świetlnej. Ofic. Wyd. Politechniki Warszawskiej, 2023
4. Praca zbiorowa: Laboratorium pomiarów fotometrycznych i kolorymetrycznych. Ofic. Wyd. Politechniki Warszawskiej, 2024
5. Lighting Handbook, Reference & Application. IES of North America, New York 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	77	3,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50