



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Lighting in Architecture and Urban Planning [S2Arch1>OwAiU]

### Course

Field of study  
Architecture

Year/Semester  
1/1

Area of study (specialization)  
–

Profile of study  
general academic

Level of study  
second-cycle

Course offered in  
Polish

Form of study  
full-time

Requirements  
compulsory

### Number of hours

Lecture  
15

Laboratory classes  
0

Other (e.g. online)  
0

Tutorials  
0

Projects/seminars  
15

### Number of credit points

2,00

### Coordinators

dr inż. Artur Nawrowski  
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### Lecturers

### Prerequisites

1 Knowledge: • the student has an orderly, theoretically founded general knowledge covering key issues in the field of lighting technology, • the student has a basic knowledge of the role and importance of artificial light in architectural and urban design, • the student has basic knowledge necessary to understand the social, economic, legal and non- technical conditions of the implementation of artificial light systems in the zones of human life and functioning. 2 Skills: • the student is able to obtain information from literature, databases and other, properly selected sources in English, can integrate information, interpret it, as well as draw conclusions and formulate and justify opinions, • the student has basic architectural and urban design skills, • the student is able to make a critical analysis of the way of functioning and evaluate the existing solutions, systems and processes, • is able to communicate using various techniques in the professional environment and in other environments. 3 Social competences: • the student understands the need for lifelong learning, is able to inspire and organize the learning process of other people, • understanding the need to expand their competences, readiness to cooperate within the team.

## Course objective

The aim of the course is to provide knowledge in the field of: • standardization of light and its parameters, • standardization of architectural interiors and urban areas with electric (artificial) light, • issues of measurement and standardization as well as road lighting calculations, • modern lighting systems and their control systems, • the basis of renewable energy as applied to the energy needed for artificial lighting, • economics, ergonomics and ecology of lighting systems in relation to architectural interiors as well as outdoor areas with particular emphasis on roads and streets, • calculations, simulations and visualization of lighting for design purposes. LIGHTING DESIGN: Project: Development of a lighting concept for a selected public utility building, agreed with the operator, and a selected, predetermined street, meeting the formal criteria and normative requirements of PN-EN 12464 "Light and lighting. Lighting of workplaces" and PN-EN 13201 "Road lighting". Analytical part: • characteristics of the object, function and visual workplaces, as the basic analyzes necessary to define the standardization guidelines for a given interior or road class, • analysis of lighting equipment in the analyzed lighting concept, • analysis of the possibility of installing selected lighting equipment in a given interior and on the street. Design part: The design work is individual and includes the preparation of technical documentation for the lighting design of the selected architectural interior of the public utility facility and the lighting design of the selected public road based on calculations, simulation and visualization of the lighting of the facility in the DIALux EVO design environment. The design should include the following components: descriptive (analyzes, selection of the lighting method, characteristics of the illuminated detail) and technical (hardware solutions, placement and targeting of lighting equipment).

## Course-related learning outcomes

none

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Passing conditions and lecture evaluation method.

The criterion for evaluating the subject will be knowledge of the presented aim of the subject.

Summative assessment:

Written test after the lectures - in the form of a one-choice test or essay questions (possible variant: test in the eKursy system). Completing an item for 50% points + 1.

Assessment scale: 2.0,3,0; 3.5; 4.0; 4.5; 5.0

Obtaining a positive grade from the module depends on the student achieving all the learning outcomes listed in the syllabus at the level of 50% + 1 points.

LIGHTING DESIGN:

Assessment criteria and project evaluation method. An important criterion for project evaluation will be the approach to the following issues:

1. Analysis of the interior of a public facility and road in terms of the initial lighting concept.
2. Initial concept of interior lighting of a public utility facility and road.
3. Technical conditions proposed in the concept - modification of the initial assumptions.
4. Lighting calculations - modification of the lighting concept and / or method, taking into account changes in lighting equipment.
5. Light color, illuminance and luminance as standardization measures in interior lighting and road lighting.
6. Testing the correctness of selected technical solutions (eg in terms of energy efficiency).
7. Examination and verification of lighting levels on work planes in architectural interiors of a public facility and road.

Assessment forming LIGHTING DESIGN:

partial reviews checking the advancement of the student's work - individual consultations, brainstorming, joint discussion; review of the student's work progress 5 times during the semester (every course), from which obtaining 3 positive grades is a condition for passing the course.

Assessment scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

Summary assessment LIGHTING DESIGN: final review after the last class - passing the design solutions presented in the forum of the group on the basis of the substantive content of the study according to the scheme and the board in the standardized format. Project documentation and the board are delivered in the form of PDF files. Digital records of projects, documentation and boards are sent to the final task in the eKursy system.

Assessment scale: 2,0; 3,0; 3,5; 4,0; 4,5; 5,0

## Programme content

1. basic photometric values as a tool for formulating lighting guidelines and recommendations and for controlling light parameters in lighting architectural interiors,
2. standardization of architectural interiors with electric (artificial) light,
3. issues of measurement and standardization as well as road lighting calculations,
4. energy efficiency and durability of lighting equipment - economy, ecology and environment,
5. elements of renewable energy in the lighting of architectural interiors and roads,
6. calculation, simulation and visualization of lighting for design purposes,
7. basic tools of IT implementation of numerical and visualization lighting calculations.

### LIGHTING DESIGN:

Development of a lighting concept for selected, agreed with the leader, architectural objects: architectural interiors and the street, meeting the formal criteria and the requirements of PN-EN 12464 "Light and lighting. Lighting of workplaces "and PN-EN 13201" Road lighting ".

#### Analytical part (individual):

- analysis of visual workplaces,
- analysis of functions in interiors and the definition of the road category,
- analysis of lighting equipment pre-selected for interior lighting design and road lighting,
- analysis of the possibility of installing selected lighting equipment in a given interior and selected road, in terms of ensuring the required parameters and reducing unfavorable lighting phenomena.

#### Design part:

The design work is individual and includes the implementation (based on calculations, simulation and visualization of lighting facilities in the DIALux environment) of projects and their technical documentation: selected, agreed with the architectural interior of the public facility and the selected road.

The design should include the following components:

- descriptive (analysis of functions and visual workplaces and road category, analysis of lighting equipment);
- technical (equipment, achieved levels of illuminance, luminance and uniformity in relation to standards).

## Course topics

1. basic photometric values as a tool for formulating lighting guidelines and recommendations and for controlling light parameters in lighting architectural interiors,
2. standardization of architectural interiors with electric (artificial) light,
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## Teaching methods

1. lecture;
2. lecture with multimedia presentation;
3. eKursy (a system supporting the teaching process and distance learning).
4. Design.
5. Case study.
6. Working in groups.
7. Discussion.
8. Computer programs.

## Bibliography

### Basic:

1. Bąk Jerzy, Pabjańczyk Wiesława, Podstawy techniki świetlnej, Nakład Politechniki Łódzkiej, Łódź 1994.
2. Hauser Jacek, Elektrotechnika. Podstawy elektrotermii i techniki świetlnej, Wydawnictwo Politechniki Poznańskiej 2006.
3. Mielicki Józef, Zarys wiadomości o barwie, Fundacja Rozwoju Polskiej Kolorystyki, Łódź 1997.
4. Technika Świetlna '96 Poradnik-Informator, Praca zbiorowa członków Polskiego Komitetu Oświetleniowego Stowarzyszenia Elektryków Polskich, Warszawa 1996.
5. Żagan Wojciech, Podstawy techniki świetlnej, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005.
6. Żagan Wojciech, Iluminacja obiektów, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2003.
7. PN-EN 12193:2002 (U) Oświetlenie stosowane w obiektach sportowych.
8. PN-EN 1838:2005 Zastosowanie oświetlenia. Oświetlenie awaryjne.
9. PN-EN 12665:2003 (U) Światło i oświetlenie. Podstawowe terminy oraz kryteria określania wymagań dotyczących oświetlenia.
10. PN-EN 13032-1:2005 (U) Światło i oświetlenie. Pomiar i prezentacja danych fotometrycznych lamp i opraw oświetleniowych. Część 1: Pomiar i format pliku.
11. PN-EN 13032-2:2005 (U) Światło i oświetlenie. Pomiar i prezentacja danych fotometrycznych lamp i opraw oświetleniowych. Część 2: Prezentacja danych dla miejsc pracy wewnątrz i na zewnątrz budynków.
12. PN-CEN/TR 13201-1:2005 (U) Oświetlenie dróg. Część 1: Wybór klas oświetlenia.
13. PN-EN 13201-2:2005 (U) Oświetlenie dróg. Część 2: Wymagania oświetleniowe.
14. PN-EN 13201-3:2005 (U) Oświetlenie dróg. Część 3: Obliczenia oświetleniowe.
15. PN-EN 13201-4:2005 (U) Oświetlenie dróg. Część 4: Metody pomiarów parametrów oświetlenia.
16. PN-EN 12464-1:2012 „Light and lighting - Lighting of work places - Part 1: Indoor work places”.
17. PN-EN 12464-2:2014 „Light and lighting -- Lighting of work places -- Part 2: Outdoor work places”.
18. PN-IEC 60364 Instalacje elektryczne w obiektach budowlanych (norma wieloarkuszowa).
19. Ustawa Prawo Energetyczne z dnia 10 kwietnia 1997 r. (Dz. U. z 1997 r. Nr 54, poz. 348 z późniejszymi zmianami).
20. Zalecenia i wytyczne projektowe w zakresie luminancji i barwy w iluminacji (Design recommendations and guidelines for luminance and color in illumination).

### Additional:

1. Majkowski Konstanty, Podstawy teoretycznej techniki oświetleniowej, Państwowe Wydawnictwo Naukowe, Warszawa 1953.
2. Nawrowski A., Dominanty świetlne w iluminacji wybranych obiektów architektonicznych, Rozprawa Doktorska, Poznań: Politechnika Poznańska, 2010.
3. Oleszyński T., Miernictwo techniki świetlnej, PWN, Warszawa 1957.
4. Tomczewski Andrzej, Rozprawa doktorska „Analiza rozkładu strumienia świetlnego we wnętrzach z uwzględnieniem wielokrotnych odbić”, Poznań, grudzień 1998.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	0	0,00
Classes requiring direct contact with the teacher	0	0,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	0	0,00