



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of lightning and surge protection systems [S2ZE1E>PUOOiP]

Course

Field of study
Green Energy

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student has basic knowledge in the field of materials engineering, power engineering, high voltage techniques, construction of high voltage power devices.

Course objective

Getting to know the theoretical and practical problems related to the occurrence of overvoltages in power networks. Understanding the causes and effects of overvoltages and ways of limiting them in power systems. Getting to know the standards of conduct in accordance with the principles of overvoltage and lightning protection and coordination of the insulation of power systems in conditions of overvoltage disturbances. Acquiring the ability to design overvoltage and lightning protection systems.

Course-related learning outcomes

Knowledge:

1. The student is able to list and characterize the basic types of overvoltage disturbances occurring in power grids.
2. The student is able to characterize and evaluate the resistance to overvoltage exposures of typical devices operating in the power grid.

3. The student is able to list the rules of conduct allowing to limit the impact of overvoltages on devices operating in the power grid.

Skills:

1. The student is able to assess the level of resistance of selected power devices to overvoltage disturbances.
2. The student is able to design an effective overvoltage and lightning protection system for selected electric power devices.

Social competences:

1. The student is aware of the need to disseminate knowledge about the danger of electric shock as a result of a disruption or failure of the power system components.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures:

- assessment of knowledge and skills demonstrated during the written test.

Design:

- evaluation of the project task performance.

Programme content

The program content focuses on issues related to the generation of overvoltages and the assessment of the degree of threat to devices and people, risk assessment and methods of reducing this risk by using lightning and overvoltage protection measures.

Course topics

Lecture:

The following topics are discussed during the lectures: classification, statistics and overvoltage generation; assessment of overvoltage threats to the operation of power equipment, including devices based on renewable energy sources (wind turbines, photovoltaic installations); concept of protection of building structures; devices for protection against overvoltages: spark gaps, surge arresters, air terminals and lightning conductors; principles of designing surge and lightning protection systems, selection of protection measures and assessment of the risk of damage depending on the selected countermeasures.

Design:

As part of the project classes, general principles of surge protection will be presented lightning protection of power facilities. In the practical part, students will be given a task implementation of a project to provide lightning or surge protection for a selected facility.

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the blackboard

Project: multimedia presentation, consultations.

Bibliography

Basic:

1. Flisowski Z., Technika wysokich napięć, WNT, Warszawa, 2005.
2. Duda D., Gacek Z., Przepięcia w sieciach elektroenergetycznych i ochrona przed przepięciami, Wydawnictwo Politechniki Śląskiej, Gliwice 2015.
3. Hasse P., Wiesinger J., Ochrona aparatury elektrycznej przed wyladowaniami atmosferycznymi. Analiza ryzyka, projektowanie i wykonanie według najnowszych norm., Centralny Ośrodek Szkolenia i Wydawnictw SEP, Warszawa 2004.
4. Markowska R., Sowa A.W., Ochrona odgromowa obiektów budowlanych, Dom Wydawniczy MEDIUM, Warszawa 2009.
5. Norma PN-EN 62305, Ochrona odgromowa, Arkusz 1-4, Polski Komitet Normalizacyjny, Warszawa 2006.

Additional:

1. DEHN - poradnik ochrony odgromowej, ISBN 978-3-9813770-5-7, DEHN 2019.

2. pod. kier. E. Anderson, Ochrona sieci elektroenergetycznych od przepięć - wskazówki wykonawcze, PTPIREE, Poznań, 2005.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00