COURSE DESCRIPTION CARD - SYLLABUS

Course name
Overvoltages and insulation coordination in transmission systems
Course

Field of study
Power engineering
Area of study (specialization)
Electrical power engineering
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
Summer
Profile of study
general academic
Course offered in
English
Requirements
elective

Number of hours

Lecture
15
Laboratory classes
15
Other (e.g. online)
0
Tutorials
0
Projects/seminars
0

Number of credit points

0

Lecturers

Responsible for the course/lecturer:
Krzysztof Walczak, D. Sc., Eng.

email: krzysztof.walczak@put.poznan.pl

tel. 61 665 2797

Faculty of Environmental Engineering and Energy

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Student has a basic knowledge of electrical engineering, power engineering and metrology. Student can assemble the measurement system, can carry out measurements of basic physical quantities and

elaborate obtained results. Student is able to work in a group and understands the importance of teamwork.

Course objective

Knowledge of both theoretical and practical problems associated with the occurrence of overvoltages in power networks. Understanding the causes and consequences of the overvoltage generations and ways for their limitation in electrical power systems. Knowledge of standards of conduct consistent with the principles and lightning surge protection and insulation coordination in power systems in terms of overvoltage disturbances.

Course-related learning outcomes

Knowledge

1. Student can name and describe basic types of overvoltage disturbances occurring in the power system.

2. Student is able to characterize and evaluate the resistance against overvoltage disturbance of typical devices operating in the power grid.

3. Student can describe the rules of procedure for reducing the impact of the overvoltages on devices operating in the power grid.

Skills

1. Student can examine and analyze the signals generated by different types of surges and assess the level of resistance to this type of distortion for selected electrical equipment.

2. Student can choose components and lightning surge protection for selected electrical equipment.

Social competences

1. Student is aware of the need to disseminate knowledge about the dangers of electric shock as a result of 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:

- assess the knowledge and skills demonstrated during written or oral tests.

Laboratory:

- tests and rewarding knowledge necessary for the accomplishment of problems in the area of laboratory tasks,

- continuous evaluation, on each course - rewarding skills gain in the range of use of the principles and methods have met during the course,

- assessment of knowledge and skills related to the implementation of the exercise, the assessment of the report from performed exercise.

Programme content

Lecture:

The lecture covers the following topics: classification, statistics and imitating overvoltages, waves surge in the lines: reflections on the nodes, multiple reflections, wave attenuation, waves in multi-wire systems, the surge waves in the windings of transformers and electrical machines, atmospheric surges, internal overvoltages: dynamic, resonance, ground fault and switching, equipment for protection against overvoltages: spark, surge arresters, feints and lightning conductors, the statistical and traditional concept of insulation coordination; principles of station and line surge protection, protection of buildings.

Laboratory:

Laboratory exercises include: measurements and evaluation of surge disturbances levels in the power system, ways to reduce the impacts of overvoltages on the power grid.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.

Laboratory: laboratory exercises, work in groups.

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 wyładowaniami 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. Charoy A.: Kompatybilność elektromagnetyczna. Zakłócenia w urządzeniach elektronicznych, t. I-IV,WNT, Warszawa, 1999.

Breakdown of average student's workload

	Hours	ECTS
Total workload	155	6,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorial, preparation for tests/exam) [1]	125	5,0

1 delete or add other activities as appropriate