



COURSE DESCRIPTION CARD - SYLLABUS

Course name

High voltage measurements [N2Eltech2-IWN>MW1]

Course

Field of study

Electrical Engineering

Year/Semester

1/1

Area of study (specialization)

High Voltage Engineering

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

20

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Has knowledge in the field of physics, electrical engineering, electrical power engineering, high voltage techniques, the basics of high voltage measurements. Has the ability to effectively self-study in a field related to the chosen field of study. Is aware of the need to expand their knowledge, skills, competences, readiness to cooperate within a team

Course objective

Understanding how to measure high alternating, direct and surge voltages and surge currents. Getting to know modern research techniques of devices working in the electric power system

Course-related learning outcomes

Knowledge:

1. Has expanded knowledge in the field of measuring electrical quantities and selected non-electrical quantities; has in-depth knowledge of how to work out the results of the experiment
2. Has in-depth theoretical and practical knowledge in the field of interference sources as well as effects and ways of limiting their impact on the power grid
3. Knows the general principles of creating and developing forms of individual entrepreneurship as well

as the principles of industrial property and copyright protection

Skills:

1. Is able to plan and carry out simulation and measurements of basic electrical and non-electrical quantities, as well as extraction of quantities characterizing materials, components and electrical systems
2. Is able to plan the testing process of complex electrical devices and systems
3. Is able to proper use of electrical equipment and perform electrical measurements at high voltages

Social competences:

1. Recognizes the importance of knowledge in solving cognitive and practical problems and understands that in technology knowledge and skills are quickly becoming obsolete and therefore require continuous replenishment

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

Assessment of knowledge and skills demonstrated during the written exam of a problem nature

Programme content

Classification of technical terms connected with high-voltage measurement technique characterizing voltages and currents

Course topics

Lecture

Classification of technical terms connected with high-voltage measurement technique characterizing alternating voltage, direct voltage, lightning impulse, switching impulse, current surges. High voltage alternating, direct and surge voltage test sets. High voltage measurement methods: sphere-to-sphere spark gap, electrostatic voltmeter, voltage transformer, resistance and capacitive divider, rectifier system, peak voltage voltmeter. Current transformer, current shunt, Rogowski transformer. Optoelectronic methods for measuring high voltages and high currents. Systems for investigation of partial discharges by the electric, chemical and acoustic method. Methodology for performing voltage tests. Generation of combined and associated test voltages. Study of the distribution of the electric field strength.

Teaching methods

Lecture

Lecture with multimedia presentation supplemented with examples given on the blackboard. The lecture is conducted in an interactive way with the formulation of questions addressed to the students

Bibliography

Basic:

1. Flisowski Z., Technika wysokich napięć, WNT, Warszawa, 2023
2. Wodziński J., Wysokonapięciowa technika prób i pomiarów, PWN Warszawa, 1997
3. Mościcka-Grzesiak H., Inżynieria wysokich napięć w elektroenergetyce, tom I/II, Wydawnictwo Politechniki Poznańskiej 1996/99

Additional:

1. Florkowska B., Diagnostyka wysokonapięciowych układów izolacyjnych urządzeń elektroenergetycznych, Wydawnictwa AGH, Kraków, 2016
2. Kuffel E., Zaengl W., Kuffel J., High Voltage Engineering. Fundamentals, Butterworth-Heinemann, 2001
3. Florkowska B. i inni, Mechanizmy, pomiary i analiza wyładowań niepełnych w diagnostyce układów izolacyjnych wysokiego napięcia, Uczelniane Wydawnictwo Naukowo-Dydaktyczne AGH, Kraków, 2010

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00