



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

High voltage measurements

### Course

Field of study

Year/Semester

Electrical Engineering

1/1

Area of study (specialization)

Profile of study

High Voltage Engineering

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

0

0

Tutorials

Projects/seminars

0

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr hab. inż. Krzysztof Siodła, prof. PUT

e-mail: krzysztof.siodla@put.poznan.pl

tel. 61-6652279

Faculty of Environmental Engineering and  
Energy

Institute of Electric Power Engineering

3A Piotrowo Str.; 60-965 Poznań

### 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

#### 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, 2014
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 niezupełnych w diagnostyce układów izolacyjnych wysokiego napięcia, Uczelniane Wydawnictwo Naukowo-Dydaktyczne AGH, Kraków, 2010

### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for the exam) <sup>1</sup>	30	1,0

<sup>1</sup> delete or add other activities as appropriate