



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electrical devices

### Course

Field of study

Electrical Engineering

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

practical

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Grzegorz Dombek, Ph. D., Eng.

Responsible for the course/lecturer:

Faculty of Environmental Engineering and Energy

Institute of Electric Power Engineering

e-mail: grzegorz.dombek@put.poznan.pl

tel. 61 665 2192

### Prerequisites

Basic knowledge on electrical engineering, electrical devices from semester 5 and electrical metrology. Able to carry out mathematical and physical analysis of phenomena occurring in power equipment and systems, knows how to read electrical diagrams. Aware of the need to expand their competences, readiness to cooperate within a team.

### Course objective

Understanding the principles of operation of power equipment, systems and the role of transformer distribution stations, methods of analyzing the reliability of station work. Student is able to design the power supply and transformer-distribution station system and select the equipment. Planning the



experiment, selection of measuring instruments and implementation of the testing system as well as carrying out tests and processing the results.

### Course-related learning outcomes

#### Knowledge

Student knows how to explain the principle of operation of power equipment. Knows the basic systems of distribution stations, the way they work, methods of analyzing the reliability of station work.

#### Skills

Student is able to design the power supply and distribution station system. Student is able to carry out calculations and analyzes necessary for the selection of devices in power distribution stations. Student is able to plan the experiment, select the system and testing devices, carry out tests and develop the results of measurements.

#### Social competences

Student is aware of the impact of the correct selection of the power distribution station system and devices on ensuring continuity of electricity supply to various consumers. Student is aware of the impact of phenomena and devices and distribution stations on the environment and people working on and using power equipment.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lecture:

- knowledge acquired as part of the lecture is verified by a written final exam consisting of open or test questions with different points. Passing threshold: 50% of points,
- current grading in each lecture (rewarding activities).

#### Laboratory classes:

- current check and rewarding knowledge necessary for the accomplishment of the problems in the area of laboratory tasks,
- evaluation of reports performed on laboratory classes,
- rewarding activities related to the implementation of laboratory classes.

### Programme content

#### Lecture:

High voltage switches: classification, circuit-breakers, disconnectors, switches, fuses, short-circuit current limiters. Current, voltage and combined transformers. Equipment and main circuits of distribution stations: station connection systems, transformers, autotransformers, station construction solutions. Auxiliary devices and devices managing station operation: station's own needs, limiting short-circuit currents, lightning and surge protection.



#### Laboratory classes:

Classes discussing the regulations of the laboratory, topics of laboratory classes and OHS training related to the operation of laboratory positions. To perform 6 two-hour laboratory classes in the field of lecture.

#### Teaching methods

##### Lecture:

- multimedia or object-oriented presentations supported by illustrated examples presented on the board,
- interactive lecture with questions and initiating discussions.

##### Laboratory classes:

- object-oriented presentations supported by illustrated examples presented on the board,
- presentations of selected experiments,
- initiating teamwork.

#### Bibliography

##### Basic

1. Markiewicz, H. Urządzenia elektroenergetyczne, WNT, Warszawa, 2006.
2. Markiewicz, H. Bezpieczeństwo w elektroenergetyce, WNT, Warszawa, 2017.
3. Kamińska, A. Urządzenia i stacje elektroenergetyczne, Wydawnictwo Politechniki Poznańskiej, 2000.
4. Maksymiuk, J., Nowicki, J. Aparaty elektryczne i rozdzielnice wysokich i średnich napięć, Wydawnictwo Politechniki Warszawskiej, Warszawa, 2014.
5. Żmuda, K. Elektroenergetyczne układy przesyłowe i rozdzielcze. Wybrane zagadnienia z przykładami, Wydawnictwo Politechniki Śląskiej, 2014.

##### Additional

1. Glover, J. D., Sarma, M.S., Overbye, T.J. Power System Analysis and Design, cengage Learning, Inc, Florence, KY, US, 2011
2. Wasiak, I. Elektroenergetyka w zakresie Przesył i rozdział energii elektrycznej, Politechnika Łódzka, 2010.
3. Królikowski, C., Boruta, Z., Kamińska, A. Technika łączenia obwodów elektroenergetycznych. Przykłady obliczeń, PWN, Warszawa, 1992.
4. Maksymiuk, J. Aparaty elektryczne. Podstawy doboru i eksploatacji. WNT, Warszawa, 1977.



5. Au, A., Maksymiuk, J., Pochanke, Z. Podstawy obliczeń aparatów elektroenergetycznych. WNT, Warszawa, 1982.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	59	2,0
Classes requiring direct contact with the teacher	44	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation of reports, preparation for exam) <sup>1</sup>	15	1,0

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