# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Transmission and distribution energy systems and device diagnostics

## Course

Field of study
Power Engineering
Year/Semester
5/9
Area of study (specialization)
Sustainable Development of Power Engineering
Profile of study
general academic
Level of study
First-cycle studies
Course offered in
polish
Form of study
part-time
Requirements
elective

## Number of hours

Lecture
20
Laboratory classes
10
Other (e.g. online)
0
Tutorials
0
Projects/seminars
10

## Number of credit points

6

## Lecturers

Responsible for the course/lecturer:
Grzegorz Dombek, Ph. D., Eng.

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Responsible for the course/lecturer:
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## Prerequisites

Basic knowledge of electrical devices and their use as well as power stations. Knowledge of calculating single- and three-phase AC systems and the structure of an electricity distribution system. Ability to obtain information from subject literature and other sources as well as critically analyze them. Ability to use analytical, simulation and experimental tools. Understands the aspects and effects of engineer's responsibility for making decisions. Has the ability to work in a team.

## Course objective

Understanding the power supply and distribution systems for electricity to and in industrial plants and municipal consumers. Knows the structure and components of various systems. Has basic knowledge in

the field of life cycle, diagnostics and operation of power grids and devices. Knows the methods of measuring electrical quantities in power networks and devices, the scope of preventive and operational tests of basic electrical devices and installations, organization of works and safety principles.

## Course-related learning outcomes

### Knowledge

Knows the functioning of power systems and networks and criteria for the selection of installed devices. Has structured knowledge in the field of power equipment diagnostics, security techniques; knows and understands the methods of measuring basic quantities characterizing electrical devices and systems and is able to interpret the results of conducted operational tests. Knows the basic processes occurring in the life cycle of energy devices and systems.

### Skills

Able to plan and knows how to carry out measurements of the required electrical parameters of electrical devices and is able to analyze and interpret the obtained test results. Able to identify and formulate a specification of simple practical engineering tasks in the field of energy. Able to assess the usefulness of measuring methods and tools, and choose the right method and appropriate measuring tool.

### Social competences

He is aware of the importance and understands the effects of the power engineering engineer, including its impact on the environment and the associated responsibility for the decisions taken; is ready to fulfill social obligations, co-organize activities for the social environment and initiate activities for the public interest. He is ready to think and act in an entrepreneurial way.

## 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 laboratoy classes.

Projects:

- the preparation of materials for the project is evaluated,

- substantive preparation for the implementation of the assigned project is evaluationed,

- project and its defense are evaluated.

## Programme content

Lecture:

Requirements for the reliability of supplying industrial plants of various groups and municipal consumers of various categories. Construction, components, construction solutions and principles of designing distribution networks. Construction of HV and LV transmission networks. Transmission network work systems. Cross-border connections. Basics of power grid optimization. Determination of power flow and energy losses, and selection of overhead lines, lines and cables, electrical apparatus and overcurrent protections. Tests of electrical networks and devices including: measuring methods and systems; conditions, frequency of measurements and required parameters. Acceptance and operational measurements of: overhead and cable lines; transformers; power capacitors, LV electrical installations, operational, protective, additional and lightning grounding.

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 4 two-hour laboratory classes in the field of lecture.

Projects:

Assigned project to be implemented in the field of transmission and distribution energy systems and device diagnostics including output data, design diagrams, replacement diagrams and technical calculations.

## 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-orientedpresentations supported by illustrated examples presented on the board,

- presentations of selected experiments,

- initiating teamwork.

Projects:

- using dedicated or developed computer applications, graphic programs and catalogs of installation equipment manufacturers.

## Bibliography

Basic

1. Dołęga W. Stacje elektroenergetyczne. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, 2007.

2. Kujszczyk Sz. Elektroenergetyczne sieci rozdzielcze, tom 1 i 2, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2004.

3. Kujszczyk Sz. Elektroenergetyczne układy przesyłowe, WNT, Warszawa, 1997.

4. Markiewicz H. Urządzenia elektroenergetyczne, WNT, Warszawa, 2006.

5. Markiewicz, H. Instalacje elektryczne, WNT, Warszawa, 2000.

6. Ustawa Prawo Energetyczne.

7. Ustawa Prawo Budowlane.

8. Przepisy eksploatacji urządzeń elektroenergetycznych, WEMA, Warszawa, 1996.

Additional

1. Periodyki: Elektroinstalator, Elektroinfo, Wiadomości Elektrotechniczne.

2. Standards.

3. Catalogs.

4. Internet publications.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 162 | 6,0 |
| Classes requiring direct contact with the teacher | 60 | 2,0 |
| Student's own work (literature studies, preparation for laboratory classes, preparation of reports, preparation for tests/exam, project preparation) [1] | 102 | 4,0 |

[1] delete or add other activities as appropriate