COURSE DESCRIPTION CARD - SYLLABUS

Course name

Transmission and distribution of electric power energy

Course

Field of study

Power Engineering

Year/Semester

4/7

Area of study (specialization)

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

10

Other (e.g. online)

0

Tutorials

10

Projects/seminars

0

Number of credit points

7

Lecturers

Responsible for the course/lecturer:

dr inż. Krzysztof Szubert

email: Krzysztof.Szubert@put.poznan.pl

tel. 616652282

Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge: Has basic knowledge of the theory of electrical circuits, electromagnetic field, electric machines, high voltage techniques, power engineering and electricity generation

Skills: Has the ability to effectively self-study in a field related to the chosen field of study, combining knowledge acquired in the course of previously completed subjects

Competences: Is aware of the need to expand their knowledge and competences, readiness to cooperate and cooperate in a group

Course objective

Acquaintance with the parameters and tasks of modern power systems, electricity transmission and

distribution subsystems. Construction of AC transmission systems. Transmission of electricity over short and long distances. Control of power transmission in AC transmission systems. Application of direct current transmission systems.

Distribution network operation characteristics. Voltage and reactive power regulation, short-circuit threats, reliability of distribution network operation

Course-related learning outcomes

Knowledge

Has structured and theoretically founded knowledge of the theory of electrical circuits, knows the basic laws of electrical engineering, knows the basic properties of electrical circuit elements, has knowledge of steady and transient states, knows the basics of long line theory.

Has knowledge in the field of design, construction and operation principles of power equipment.

Skills

Is able to use known mathematical methods and models as well as computer simulations to analyze and evaluate the operation of electrical components and systems.

Is able to identify their non-technical aspects, including environmental, economic and legal, when formulating and solving problems regarding electrical power systems.

Social competences

Understands the need for and knows the possibilities of lifelong learning (second and third cycle studies and postgraduate studies) as well as raising professional, personal and social competences

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Assessment of knowledge and skills demonstrated in the written and oral exam

Auditorium exercises: Continuous assessment of classes - rewarding the increase in the ability to use known principles and methods, periodic assessment of knowledge and skills in the form of written tests.

Laboratory: Tests checking the knowledge necessary to implement the problems posed in the area of laboratory tasks, assessment of knowledge and skills related to the implementation of the exercise task, evaluation of the report of the exercise.

Programme content

Lectures: Tasks and parameters of the power system. Electricity transmission and distribution subsystems. Hierarchical structure of the power network. Construction of HV and LV AC transmission systems, contemporary development trends. Power transmission over long distances, wave phenomena, natural power. Measures to increase LV transmission capacity. Power flow control in HV and LV transmission networks. Direct current energy transmission.

Distribution network characteristics, network neutral point operation. Calculation of current flow, voltage drops and power losses in simple network systems. Basic rules for calculating closed and node

networks. Voltage regulation and reactive power compensation. Calculation of short-circuit quantities based on normative recommendations. Ground faults in medium voltage networks. Criteria for choosing the cable cross section. Quality of electricity and reliability of the network and its components.

Problems occurring in steady and transient states in the power system, solutions in electromechanical systems: FACTS.

Auditorium exercises include calculations on examples illustrating the material presented in lectures. Solving tasks on the board.

The laboratory includes exercises in the field of analyzing phenomena occurring in transmission and distribution networks under normal and interference conditions using physical and digital models. Team work, editing reports, using IT tools.

Teaching methods

Lecture: multimedia presentation supplemented with examples given on the board

Exercises: calculating tasks at the board

Laboratories: performing tests on physical or digital models

Bibliography

Basic

Sz. Kujszczyk (pod red.): Elektroenergetyczne układy przesyłowe, WNT, Warszawa 1997.

Sz. Kujszczyk (pod red.): Elektroenergetyczne sieci rozdzielcze, tom 1 i 2, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2004 r.

P. Kacejko, J. Machowski: Zwarcia w systemach elektroenergetycznych, WN-T, Warszawa 2013

Poradnik Inżyniera Elektryka . t.3. WN-T, Warszawa 2011

Additional

T. Kahl: Sieci elektroenergetyczne. WNT, Warszawa 1984

J. Popczyk: Elektroenergetyczne układy przesyłowe, WPŚ, Gliwice 1984

S. Kończykowski: Obliczanie sieci elektroenergetycznych, t.II, PWN, Warszawa 1958

Jakość energii elektrycznej w aspekcie wytwarzania, dystrybucji i użytkowania, Zeszyty Naukowe WEiA Politechniki Gdańskiej nr 50, 2016

Breakdown of average student's workload

	Hours	ECTS
Total workload	180	7
Classes requiring direct contact with the teacher	95	4
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam) [1]	85	3

[1] delete or add other activities as appropriate