COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modern technologies in the transmission and distribution of electricity [S2ZE1E>NTwP]

Course

Field of study
Green Energy

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
30

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of electrical power engineering as well as transmission and distribution of electricity. Student has ability to effectively self-educate in a field related to the chosen field of study. Student is aware of the need to expand his competences.

Course objective

Getting to know power lines and devices used for the transmission of electricity. Understanding the tools and algorithms used to optimize energy transmission, improve energy efficiency and maintain optimal parameters of energy quality.

Course-related learning outcomes

Knowledge:
Student has knowledge of the operation and control of the power system and power devices in the context of improving the efficiency of the power grid operation. Student can use the available information and communication technologies.

Skills:

Student can use IT tools to design and analyze the operation of power grids and is able to optimize the work of the power grid with the use of modern technologies. Student can participate in working gorups focused on solving an engineering problems, as well as perform managerial functions in these teams

Social competences:
Student correctly identifies and resolves dilemmas related to broadly understood energy security. Student can think and act creatively and enterprisingly. Student understands the need for actions to make the society aware of the development of the power industry, but also to reduce the risks it carries.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
1. Rewarding activity during classes in the form of a discussion.
2. Assessment of knowledge and skills demonstrated in the written exam.
Laboratory:
1. Checking theoretical knowledge related to the performed exercises.
2. Rewarding activity during the exercise.
3. Evaluation of reports prepared by student
Design activities:
1. Assessment of activities during the implementation of the project.
2. Assessment of the completed project

Programme content

Lecture:
Structure of a classic and modern power system. Modern devices, loads and sources used in power grids and integration of devices, loads and sources with the power grid. Coordination of the work of various control systems in power networks. Measuring instruments used in modern power networks and their integration with computer systems. Computer tools supporting operations, network development planning and selected issues related to diagnostics. Algorithms for controlling the operation of power grids in synchronous, asynchronous and island operation conditions.
Laboratory:
Modeling of the transmission and distribution network and simulation studies with the use of RMS/ EMT, QD simulations, harmonic flows and tools supporting the planning and operation of power grids. Modeling of control systems in the context of improving energy quality, reliability and energy efficiency. Testing the control algorithms of electrical power devices. Development of new control algorithms using the principles of programmable logic. Verification of the correct operation of electrical power devices control algorithms. Integration of devices with computer networks supporting the work of the network.
Projects activities:
Development of control algorithms for modern el-en devices. Programming the algorithms with the use of computer tools and testing the developed control algorithms.

Teaching methods

Lecture:
Multimedia presentations, problem discussions
Laboratory:
Classes on research stands with the use of measuring equipment and physical models, elements of the power system and with the use of simulation environments. Demonstrations. Working in teams.
Projects:
Regular group and individual consultations with the use of literature, computer tools and physical models, and devices. Theory presented in close connection with practice.

Bibliography

Basic:
Jan Machowski: Regulacja i stabilność systemu elektroenergetycznego. OW Politechnik Warszawskiej, Warszawa 2017

Additional:

Z. Lubośny: Farmy Wiatrowe w Systemie Elektroenergetycznym. WNT, 2013.
Instructions for the Operation of the Distribution Networks eg. Enea, Energa, Tauron, PGE

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	75	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00