COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electrical Power engineering

Course

Field of study

Power Engineering

Year/Semester

2/4

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

20

Laboratory classes

10

Other (e.g. online)

0

Tutorials

10

Projects/seminars

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Wydział Inżynierii Środowiska i Energetyki

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

The student has basic knowledge of mathematics, physics and theoretical electrotechnics.

Knows the rules of programming at the general level. 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 competences, readiness to cooperate within a team.

Course objective

Understanding the structure and characteristic features of the power system and the physical basics of electricity generation in various types of power plants. Understanding the issues related to fuel combustion. Learning about the construction and principles of operation of gas-fired and gas-steam

power plants and combined heat and power plants. The use of renewable sources for the production of electricity. Getting to know issues related to nuclear energy.

Course-related learning outcomes

Knowledge

1. Student has general knowledge about the construction of the power system and understands the processes of generation of electricity.

2. Student has basic knowledge in the field of energy conversion in various types of power plants, including in particular conventional and nuclear power plants.

3. Student has general knowledge of issues related to distributed and unconventional energy sources

Skills

1. Student can evaluate electricity generation technologies in terms of their efficiency and environmental impact. He can classify electricity generation technologies and analyze the efficiency of energy changes taking place in various types of generation sources

2. Student can test and diagnose simple energy systems and devices

Social competences

1. Is able to work in a group during laboratory tests and present the effects of work done.

2. Understands the need to promote rational energy management and reduce the harmful effects of the electricity sector on the environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: written exam, lecture activity bonus

Exercises: credit on the basis of current checking of messages and two written tests of accounting tasks

Laboratory: tests checking the knowledge necessary to implement the problems posed in a given area of laboratory tasks, assessment of knowledge and skills related to the implementation of the exercise task, evaluation of the report of the exercise, obtaining additional points for the ability to cooperate within a team that practically performs a specific task in the laboratory.

Programme content

Lecture: Characteristics of the power system. Operation of a power plant in the power system. Characteristics of the electricity generation process in various types of power plants. Combustion of solid fuels. Calculation of the efficiency of indirect energy transformations in conventional power plants. Thermal cycles of steam power plants. Thermal systems of steam CHP plants. Gas and gas-steam power plants. Fundamentals of energy transformation in nuclear power plants. Construction and operation of a nuclear reactor.

The content of the exercises is consistent with the topic of the lecture and includes: calculation of thermal circuits of steam power plants, calculations regarding combustion processes in the boiler.

Laboratory: Investigation of a photovoltaic module. Investigation of the energy characteristics of the windmill model, measurements of the energy characteristics of the hydroelectric power plant model, parameter measurements and quality control of the flow in the system of pumps cooperating with pipelines, measurements of the parameters of fans cooperating in the ventilation system and quality control of air flow, pressure measurement and testing of manometers.

Teaching methods

Lecture: multimedia presentation

Exercises: calculating tasks at the board

Laboratories: performing tests on physical models

Bibliography

Basic

1.Pawlik M., Strzelczyk F.: Elektrownie, Wydawnictwo Naukowe PWN, Warszawa 2017.

2. Marecki J.: Podstawy przemian energetycznych, Wydawnictwo Naukowo - Techniczne, Warszawa 2014.

3. Kubowski J.: Elektrownie jądrowe, Wydawnictwo WNT, Warszawa 2017

4. Skorek J., Kalina J.: Gazowe układy kogeneracyjne, Wydawnictwo WNT, Warszawa 2005

Additional

1. Chmielniak T.: Technologie energetyczne, Wydawnictwo WNT, Warszawa 2014

2. Lewandowski W. M.: Proekologiczne źródła energii odnawialnej, Wydawnictwo WNT, Warszawa 2012

3. Wróblewski R., Michalak J., Szczerbowski R., The computer programme for computing the energy efficiency of the systems of gas – steam heat and power small-power plants, ss. 141-144, Electrical Engineering, Poznan University of Technology, Academic Journals, Poznań 2009.

4. Michalak J., Szczerbowski R., Wróblewski R.: Modelowanie i badanie układów energetycznych elektrowni i elektrociepłowni z wykorzystaniem programu Cycle-Tempo®, Konferencja Naukowo-Techniczna Zastosowania Komputerów w Elektrotechnice, XIII ZKwE Poznań 2008.

5. Spliethoff, Hartmut: Power Generation from Solid Fuels, Heidelberg: Springer-Verlag, Berlin 2010.

Breakdown of average student's workload

	Hours	ECTS
Total workload	123	5
Classes requiring direct contact with the teacher	47	2
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam) [1]	76	3

[1] delete or add other activities as appropriate