COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical Power Engineering [S1Eltech1>ElEn1]

Course

Field of study
Electrical Engineering

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Radosław Szczerbowski
radoslaw.szczerbowski@put.poznan.pl

Lecturers

Prerequisites

Student has basic knowledge of mathematics, physics and theoretical electrical engineering. Student has the ability to effectively self-educate in a field related to the chosen field of study. Student is aware of the need to expand their competences, and is ready to cooperate as part of a team.

Course objective

Getting to know the physical basics of electricity generation in various types of power plants. Learning about issues related to the combustion of fossil fuels. Getting to know the construction and principles of operation of basic energy devices.

Course-related learning outcomes

Knowledge:
1. General knowledge on the construction of the power system and understanding of electricity generation processes.
2. Basic knowledge of energy conversion in various types of power plants, including in particular conventional power plants.

Skills:
1. Student is able to evaluate electricity generation technologies in terms of their efficiency and environmental impact.
2. Student is able to test and diagnose simple energy systems and devices.

Social competences:
1. Student is able to work in a group during laboratory tests and present the effects of the work done.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture
- credit in writing during the last lecture.
Tutorials
- credit on the basis of the current checking of knowledge and a written test on accounting tasks
Laboratory classes
-assessment of knowledge and skills related to the implementation of the exercise task, assessment of the report on the performed exercise

Programme content

Characteristics of the electricity generation process in a steam power plant. Stoichiometry of solid fuels. Power equipment - construction and principle of operation. Efficiency of power equipment. Basics of the theory of heat exchange - exchangers. Selected renewable sources - construction principle of operation.

Course topics

Lecture
Introduction to electric power generation - characteristics of the electric power system. Characteristics of the process of electricity generation in a steam power plant - the process of fuel combustion, the basics of stoichiometry.
Power equipment - construction and principle of operation of basic power equipment: boiler, turbine, generator, transformer). Determination of boiler efficiency, energy losses in the boiler and turbine. Heat exchangers used in conventional steam units. Fundamentals of heat transfer theory. Selected renewable sources - construction of the principle of operation of a heat pump and a fuel cell.

Exercises
Energy and stoichiometric calculations of technological systems of power plants.

Laboratory
Study of fossil fuels. Determination of characteristics of fuel cells. Study of a heat pump. Study of the heat exchange process.
The laboratory program includes:
• Measuring the quality of fossil fuels and biomass using a bomb calorimeter
• Technical analysis of coal
• Measuring the characteristics of the heat pump
• Electric water heater testing
• Measurement of the thermal conductivity coefficient using the pipe method
• Temperature measurement

Teaching methods

Lecture
Lecture with a multimedia presentation supplemented with examples given on the blackboard.
Tutorials
Accounting tasks counted on the blackboard.
Laboratory classes
Laboratory exercises performed on physical workstations.

Bibliography

Basic
1. M. Pawlik, F. Strzelczyk: Elektrownie, WNT W-wa 2012, 2017
2. T.Chmielniak: Technologie energetyczne, WNT W-wa 2014
3. J. Marecki: Podstawy przemian energetycznych, WNT W-wa 2014
4. Skorek J., Kalina J.: Gazowe układy kogeneracyjne. Wydawnictwa Naukowo-Techniczne 2005
5. Wójs K. Odzysk i zagospodarowanie niskotemperaturowego ciepła odpadowego ze spalin wylotowych PWN 2015.
Additional
1. Portacha J., Układy cieplne elektrowni i elektrociepłowni konwencjonalnych jądrowych i odnawialnych, Oficyna Wydawnicza Politechniki Warszawskiej, 2016.
2. Chmielniak, Tadeusz, Ziębik, Andrzej, Obiegi cieplne nadkrytycznych bloków węglowych, Wydawnictwo Politechniki Śląskiej, 2010
3. Anuszczyk J., Maszyny elektryczne w energetyce. WNT 2005
4.Tokarz. T.J. Kontrola procesów cieplnych w siłowniach parowych część I i część II, Wydawnictwo AGH 2015.
5. Ceran B. Wpływ pracy farm wiatrowych w systemie elektroenergetycznym na pracę konwencjonalnego bloku parowego. Przegląd Naukowo-Metodyczny, Edukacja dla Bezpieczeństwa - 2016, nr 1, s. 1161-1168
6. Szczerbowski R. Energetyka węglowa i jądrowa Wybrane aspekty. Wydawnictwo Fundacja na rzecz Czystej Energii. Rok wydania 2017

Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00