COURSE DESCRIPTION CARD - SYLLABUS

Course name
Power plants and heat and power plants

Course

Field of study
Electric Power Engineering

Year/Semester
1/1

Area of study (specialization)

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	0
Tutorials	Projects/seminars	
15		

Number of credit points

5

Lecturers

Responsible for the course/lecturer:
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Faculty of Environmental Engineering and Energy

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Responsible for the course/lecturer:
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Prerequisites

The student has basic knowledge of the basics of energy transformations and the construction and principles of operation of energy machines and devices. He knows the basics of electrical engineering and energy. He understands the principles of operation of basic machine parts and knows the construction of basic conventional energy devices. The student is aware of the need to expand his competences and is ready to cooperate as part of the team.

Course objective

Acquiring the skills of mathematical modeling of technological systems of power plants and CHP plants and obtaining the ability to determine the values of operational indicators.

Course-related learning outcomes

Knowledge

Student knows the principles of constructing mathematical models intended for energy analysis of technological systems of power plants and heat and power plants.

Student has knowledge of the methods of improving the efficiency of the process of converting primary energy into electricity.

Skills

The student is able to model the technological system of power plants and combined heat and power plants with the use of appropriate tools.

The student is able to carry out technical and economic analyzes and make a comparison of selected technological systems

Social competences

The student is aware of the importance of the power industry for the country and society, and understands the need to reduce the negative impact of the manufacturing sector on the environment.

The student understands the need to make the society aware of the development of the power generation sector.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

- evaluation of the knowledge and skills listed on the written exam,

Tutorials

- credit on the basis of the current check messages and one written tests of the accounting tasks

Laboratory classes

- assessment of knowledge and skills related to the implementation of the tasks your practice, the assessment of report of performed exercise,

- obtaining additional points for the ability to work within a team practice performing the task detailed in the laboratory and developed aesthetic diligence reports.

Programme content

Lecture

Technological systems of steam power plants working on under and supercritical steam parameters. Technological systems of steam CHP plants. Technological systems of gas-fired and gas-steam power plants and combined heat and power plants. Basics of selecting parameters of a recovery boiler for a gas

turbine. Technological systems of nuclear power plants. Thermal insulation of a nuclear power plant block. Technological systems of biomass-fired CHP plants and CHP plants integrated with biomass gasification. Gas cogeneration systems. The electrical system of the power plant. Cooperation of the CHP plant with the heating network. Use of waste heat. Renewable energy sources used in heating systems.

Tutorials

Energy calculations of technological systems of power plants and combined heat and power plants

Laboratory classes

Modeling of technological systems with the use of specialized computer software.

Teaching methods

Lecture

Lecture with multimedia presentation supplemented with examples given on the board.

Tutorials

Tasks counted on the board.

Laboratory classes

Laboratory exercises performed with the help of engineering programs.

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.

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	130	5,0
Classes requiring direct contact with the teacher	77	3,0
Student's own work (literature studies, preparation for laboratory classes, preparation of reports, preparation for exam) [1]	53	2,0

[1] delete or add other activities as appropriate