COURSE DESCRIPTION CARD - SYLLABUS

Course name
Power plants and heat and power plants [S2Elenerg1>EiE]

Course

Field of study
Electrical Power Engineering

Year/Semester
1/1

Area of study (specialization)
Smart Grids

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other (e.g. online)
0

Tutorials
15

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

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:

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

The module programme includes:
- technological systems of power plants and combined heat and power plants (CHPs),
- thermal systems and operating parameters of combined heat and power plants (CHPs)
- electrical systems of the power plants.

Course topics

The lecture programme includes:
- challenges for energy systems connected with European and national energy policy,
- technological systems of steam power plants working on subcritical and supercritical steam parameters,
- technological systems of steam CHPs,
- technological systems of gas-fired power plants and CHPs,
- technological systems of combined cycle gas turbine power plants and CHPs,
- basics of selecting parameters of a heat recovery steam generator,
- technological systems of nuclear power plants and CHPs,
- electrical systems of the power plants,
- cooperation of the CHP plant with the district heating network,
- heat recovery and renewable energy sources used in cogeneration,
- trigeneration.

The tutorials programme includes:
- energy calculations of technological systems of power plants and CHPs.

The laboratory classes programme includes:
- modeling of technological systems of steam power plants and combined heat and power plants (coal-fired and nuclear) in specialized engineering software,
- modeling of technological systems of gas and combined cycle power plants and combined heat and power plants in specialized engineering software,

- modeling of technological systems of power plants and combined heat and power plants powered by renewable primary energy sources (including engine cycles and ORC cycles) in specialized engineering 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
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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	5,00
Classes requiring direct contact with the teacher	77	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	53	2,00