GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Conventional Power Plants, PG_00051407		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marcin Jaskólski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	15.0	60

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=481

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	5.0	35.0	100

Subject objectives

The aim of the course is to familiarize with the technological sequence in conventional power plants and combined heat and power plants, and to acquire the ability to perform calculations of thermodynamic cycles for these objects, as well as calculating the power and energy produced in coal, gas, nuclear and hydro power plants.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K01	Students understand the need to explore knowledge in the field of conventional power plants.	[SK2] Assessment of progress of work [SK4] Assessment of communication skills, including language correctness [SK3] Assessment of ability to organize work
K6_K05	Students know the basic risk factors occurring in various types of energy sources.	[SK4] Assessment of communication skills, including language correctness
K6_W10	Students know the basics of energy transformations.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
K6_U09	Students are able to determine the electrical power of a conventional power plant based on given parameters.	[SU1] Assessment of task fulfilment

Subject contents	Energy forms and carriers as well as energy transformations. Basic physical quantities characterizing steam and water as a working factor in thermal circuits of conventional power plants. Thermodynamic changes. Enthalpy-entropy (i-s) and temperature-entropy (T-s) plots for steam and water. Theoretical Carnot circulation - circulation efficiency. Steam thermal power plants. Rankine cycle. Theoretical and real efficiency of the Rankine cycle. Determining the operational indicators of the power plant block. Means used to improve the efficiency of the Rankine cycle. Associated thermo-electric economy. Energy balance of the combined heat and power plant block. Gas and gas-steam power plants. Brayton-Joule cycle. Theoretical and real efficiency of the Brayton-Joule cycle. Measures to improve the efficiency of the Brayton-Joule cycle. Calculation of gross and net power of gas and gas-steam power unit. Nuclear power plants. Attitudes of energy transformations in nuclear power plants. Criticality of the nuclear reactor. Calculation of gross and net nuclear power. Comparison of thermal circuits in coal and nuclear power plants. Large hydropower plants. Calculation of power and energy in hydropower plants.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	60.0%	40.0%
Seminar presentation	60.0%	20.0%
Test	60.0%	40.0%

Recommended reading

Basic literature	Marecki J.: Podstawy przemian energetycznych, WNT, Warszawa 2007 Chmielniak T.: Technologie energetyczne, WNT, Warszawa 2008, Bartnik R.: Elektrownie i elektrociepłownie gazowe, WNT, Warszawa 2009, Pawlik M., Strzelczyk P.: Elektrownie, WNT, Warszawa 2012
Supplementary literature	Cieśliński J., Grudziński D., Jasiński W., Pudlik W.: Termodynamika. Zadania i przykłady obliczeniowe, Wyd. Politechniki Gdańskiej, Gdańsk 2008 Góra S., Kopecki K., Marecki J., Pochyluk R.: Zbiór zadań z gospodarki energetycznej, WNT, Poznań 1976 Kijewski J., Miller A., Pawlicki K., Szolc T.: Maszynoznawstwo. Podręcznik dla Technikum, WSiP, Warszawa 2012 Marecki J.: Gospodarka skojarzona cieplno-elektryczna, WNT, Warszawa 1980 Szuman W.: Elektrownie i sieci cieplne, PWN, Warszawa 1963
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	1. Draw a simplified diagram of the steam power plant working in the Hirna cycle. Present the circuit in the T-s and i-s system. 2. Describe the specific steam consumption, specific heat consumption and specific conventional fuel consumption by mathematical relationships. 3. Show the regenerative heating of the feed water on the diagram and on the i-s chart. 4. Impact of steam parameters on the circulation efficiency.
Work placement	Not applicable

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