



Subject card

Subject name and code	Conventional Power Plants, PG_00051407						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
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	dr inż. Wiktoria Stahl dr inż. Tomasz Minkiewicz					
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_U09	Students are able to determine the electrical power of a conventional power plant based on given parameters.			[SU1] Assessment of task fulfilment		
	K6_W10	Students know the basics of energy transformations.			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	K6_K05	Students know the basic risk factors occurring in various types of energy sources.			[SK4] Assessment of communication skills, including language correctness		
	K6_K01	Students understand the need to explore knowledge in the field of conventional power plants.			[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK2] Assessment of progress of work		

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		<p>Marecki J.: Podstawy przemian energetycznych, WNT, Warszawa 2007</p> <p>Chmielniak T.: Technologie energetyczne, WNT, Warszawa 2008,</p> <p>Bartnik R.: Elektrownie i elektrociepłownie gazowe, WNT, Warszawa 2009,</p> <p>Pawlik M., Strzelczyk P.: Elektrownie, WNT, Warszawa 2012</p>	
	Supplementary literature		<p>Cieśliński J., Grudziński D., Jasiński W., Pudlik W.: Termodynamika. Zadania i przykłady obliczeniowe, Wyd. Politechniki Gdańskiej, Gdańsk 2008</p> <p>Góra S., Kopecki K., Marecki J., Pochyluk R.: Zbiór zadań z gospodarki energetycznej, WNT, Poznań 1976</p> <p>Kijewski J., Miller A., Pawlicki K., Szolc T.: Maszynoznawstwo. Podręcznik dla Technikum, WSiP, Warszawa 2012</p> <p>Marecki J.: Gospodarka skojarzona ciepłno-elektryczna, WNT, Warszawa 1980</p> <p>Szuman W.: Elektrownie i sieci ciepłne, PWN, Warszawa 1963</p>	
	eResources addresses		<p>Adresy na platformie eNauczanie:</p> <p>ELEKTROWNIE KONWENCJONALNE [2023/24] - Moodle ID: 32423 https://enauzanie.pg.edu.pl/moodle/course/view.php?id=32423</p>	
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 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			