



Subject card

Subject name and code	Power Plants and Combined Heat and Power Plants, PG_00055959						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject				2023/2024	
Education level	first-cycle studies	Subject group				Optional subject group Subject group related to scientific research in the field of study	
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				exam	
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Tomasz Minkiewicz				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	15.0	0.0	45
	E-learning hours included: 0.0						
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	45		6.0		49.0	100
Subject objectives	The purpose of this course is to familiarize students with general characteristics of the Polish Power System energy sources with particular emphasis on the role of CHP plants. Students become familiar with basic equipment and technological systems on example of CHP plant "Elektrociepłownia Gdanska".						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W08] has basic knowledge in the field of intellectual property protection and patent law, knows and understands the basic processes of energy production and use, knows and understands the principles of modern heating and power systems		The student knows and is able to discuss the construction, operating principle and functions of power plants and combined heat and power plants.			[SW1] Assessment of factual knowledge	
	[K6_U02] is able to apply the learned mathematical methods to the analysis and design of elements, systems and energy systems		Student knows the principles of design and balancing various heat and fluid flow elements of thermal cycles in power plant nad CHP plant.			[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment	
	[K6_W12] has basic knowledge of the life cycle and repairs of energy equipment in the field of thermal power stations, thermal and energy systems and heating systems, internal combustion engines and compressors as well as rotating machines		The student is familiar with the issues related to the operation of selected devices in a power plant / combined heat and power plant.			[SW1] Assessment of factual knowledge	
Subject contents	<p>Lecture: current operation data of the Polish Power System; electricity and heat generation processes; equipment of power units; impact of the power plant on the environment.</p> <p>Laboratory: characteristics of the consumption of fuels and energy carriers, characteristics of electricity and heat production in Poland, Thermal calculations of power units and calculations of heat networks using computer tools.</p> <p>Project: a preliminary design of a power source in district heating as a combined heat and power plant which contain heat units equipped with boilers and steam turbines as well as water boilers working as a peak-load source.</p>						

Prerequisites and co-requisites	Good knowledge of elements of physics (basic laws, physical quantities and their units and measures, mechanics, electrical engineering, thermodynamics, heat transfer). Knowledge of electrical energy generation technologies: energy conversions, efficiency of single conversion, efficiency of conversion cycle and thermodynamic cycle efficiency. Basic knowledge of mathematics: algebra, geometry, trigonometry, differential and integral calculus.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project work	60.0%	35.0%
	Laboratory reports	60.0%	15.0%
	Exam	60.0%	50.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Marecki J., <i>Podstawy przemian energetycznych</i>, WNT, Warszawa 2022 2. Pawlik M., Strzelczyk F., <i>Elektrownie</i>, WNT, Warszawa 2023 3. Chmielniak T., <i>Technologie energetyczne</i>, WNT, Warszawa 2021 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Andrzejewski S., <i>Podstawy projektowania siłowni ciepłych</i>, WNT, Warszawa 1974 2. Pawlik M., Skierski J., <i>Układy i urządzenia potrzeb własnych elektrowni</i>, WNT, Warszawa 1986 3. Praca zbiorowa: <i>Poradnik inżyniera elektryka Tom III</i>, WNT, Warszawa 2007 4. Szargut J., Ziębik A., <i>Podstawy energetyki cieplnej</i>, Wydawnictwo Naukowe PWN, Warszawa 2000 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> • what is the role and significance of power engineering in country's economy, • discuss national energy resources size and methods of their use, • describe the principles of design and balancing various heat and fluid flow elements/ thermal cycles in CHP plant, • function and principle of operation of the steam drum. 		
Work placement	Not applicable		