



## Subject card

Subject name and code	Energy Supply Systems, PG_00044087						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		2.0		
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. Tomasz Minkiewicz				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	The aim of the course is to familiarize students with energy supply systems on the example of the electricity and heat sectors.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K7_U02		Students can orally present the assumptions and solution to a given technical problem.		[SU5] Assessment of ability to present the results of task		
	K7_U03		Appreciates the importance of self-expanding knowledge and skills in the field of studies in related fields		[SU3] Assessment of ability to use knowledge gained from the subject		
	K7_W02		Students have in-depth and structured knowledge of conventional electricity and heat generation systems.		[SW1] Assessment of factual knowledge		
	K7_W01		Students are able to determine the characteristic sizes of conventional power plants, in particular the efficiency, power and energy produced in the system.		[SW1] Assessment of factual knowledge		
Subject contents	Lecture: Basic data on the National Power System. Characteristics of the demand for thermal power. Centralized energy sources. Co-generation of electricity and heat. Tasks and requirements for centralized and regional energy supply systems. Heat carriers and their parameters. Formation of heating systems. Types and systems of heat networks. Ways of connecting recipients. Route selection and running of heating networks. Ways of laying the web. Thermal network equipment (pipes, fittings and accessories, supports, heating chambers). The process of generating electricity and heat.Laboratory: Electric load diagrams. Enthalpy and entropy. Thermal cycles in power plants and combined heat and power plants. Thermal-flow calculations of heat networks.						

Prerequisites and co-requisites	Basic knowledge of physics (basic physical laws, physical quantities, their units and titers, mechanics, electrical engineering, thermodynamics, heat flow). Knowledge of the properties of energy transformations: transformation efficiency, transformation cycle and thermodynamic cycles. Basic knowledge of mathematics: algebra, geometry and trigonometry, differential and integral calculus.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	laboratory	60.0%	40.0%
	lecture	60.0%	60.0%
Recommended reading	Basic literature	1. Dołęga W.: Stacje elektroenergetyczne. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2007  2.Górecki J.: Sieci ciepłne. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 1997  3.Kamler W.: Ciepłownictwo. Państwowe Wydawnictwo Naukowe, Warszawa 1976  4.Kanicki A., Kozłowski J.: Stacje elektroenergetyczne. Wydawnictwo Politechniki Łódzkiej, Łódź 2004  5.Krygier K.: Sieci ciepłownicze. Materiały pomocnicze do ćwiczeń. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2012	
	Supplementary literature	1.Marecki J. - Gospodarka skojarzona ciepłno-elektryczna. WNT, Warszawa 1980  2.Marecki J.: Podstawy przemian energetycznych. WNT, Warszawa 2014  3.Pawlik M., Strzelczyk F.: Elektrownie. WNT, Warszawa 2012  4.Praca zbiorowa: Poradnik Inżyniera Elektryka - Tom 3. WNT, Warszawa 2005  5.Szkarowski A., Łatowski L.: Ciepłownictwo. WNT, Warszawa 2012  6.Szuman W.: Elektrociepłownie i sieci ciepłne. Wydanie 2. PWN, Łódź Warszawa 1963	
	eResources addresses	Adresy na platformie eNauczanie: SYSTEMY ZAOPATRZENIA W ENERGIĘ [2023/24] - Moodle ID: 32203 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32203">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32203</a>	
Example issues/ example questions/ tasks being completed	Define the concept of primary and secondary energy.Draw and discuss graphs of basic thermodynamic transformations.Discuss what the so-called carnotization of circulation.		
Work placement	Not applicable		