

## 於。GDAŃSK UNIVERSITY 奶 OF TECHNOLOGY

## Subject card

Subject name and code	, PG_00058646								
Field of study	Power Engineering, Power Engineering, Power 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			3.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Zakład Ogrzewnictwa, Wentylacji, Klimatyzacji i Chłodnictwa -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology								
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jerzy Głuch						
	Teachers dr hab. inż. Jerzy Głuch								
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project		Seminar	SUM	
	Number of study hours	30.0	0.0	0.0	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		8.0		22.0		75	
Subject objectives	The student describes the design and theoretical basis of operation of heat sources applied in local systems. Student designs heating systems with low efficiency. Student identifies selected problems occurring during their operation.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	[K7_W06] knows the extended issues of reliability of power equipment and diagnostics of defects in this equipment		The student knows the extended issues regarding the reliability of power equipment and fault diagnostics in these devices			[SW1] Assessment of factual knowledge			
	[K7_U05] is able to integrate technical and economic analysis of the use of various energy technologies, including technologies using renewable energy sources and conventional and nuclear energy		The student is able to integrate the technical and economic analysis of the use of various energy technologies, including technologies using renewable energy sources and conventional and nuclear energy			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject			
	[K7_W07] knows the environmental effects of energy technologies used; is familiar with the issues of effective energy management and use of renewable energy sources, has a broad and well-established knowledge of the processes of energy production and use		The student knows the environmental effects of the energy technologies used; knows the issues of energy efficiency and the use of renewable energy sources, has extended and well- established knowledge about the processes of energy production and use			[SW1] Assessment of factual knowledge			

Subject contents	Methods of heat transfer intensification in recuperators.							
	Waste energy - types, ways of development, media quality measures, resource assessment indicators.							
	Issues of physical recuperation. Recovery boilers.							
	Basic issues of regenerators.							
	Heat recovery from the cooling systems of structures. Chemical waste energy and technologies for its management. RDF fuel, utilization of polymer raw materials.							
	Methods of thermal energy storage. Heat recovery methods in ventilation and air-conditioning installations. Heat recovery from refrigeration systems.							
	Technical, legal and safety issues related to heat pumps.							
Prerequisites and co-requisites	Thermodynamics, heat transfer, heating and refrigerating technology.							
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade					
and criteria	Written test	56.0%	50.0%					
	Project	75.0%	50.0%					
Recommended reading	Pagig literature Articles in professional magazines							
Recommended reading	Supplementary literature Conference materials							
	eResources addresses	eResources addresses						
	Rozproszone źródła ciepła - Wykład - Moodle ID: 31485 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=31485							
Example issues/	Describe methods for intensifying of heat transfer in recuperators							
example questions/ tasks being completed								
	Waste energy - types, methods of use, measures of media quality, resource assessment indicators.							
	Discuss methods for heat recovery from structural cooling systems. Methods of heat storage. Define heat recovery efficiency in ventilation and air conditioning systems.							
	Describe the chosen method of heat recovery in ventilation and air conditioning systems. The idea and methods of heat recovery from refrigeration systems. Types and basic properties of working media in heat pumps.							
	Legal obligations of heat pump operators.							
Work placement	Not applicable							