



Subject card

Subject name and code	Problems of recuperating heat in low and medium power machines, PG_00040114						
Field of study	Mechanical 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	Part-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	6	ECTS credits			2.0		
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 inż. Waldemar Targański					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		5.0		30.0	50
Subject objectives	Knowledge of question related with heat recovery in different systems						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W09] possesses basic knowledge within the range of thermodynamics and fluid mechanics, construction and operation of heat generating devices, process equipment, including renewable energy sources, cooling and air conditioning		The student has basic knowledge in the field of construction and operation of heat recovery equipment in power, refrigeration and air conditioning systems.		[SW1] Assessment of factual knowledge		
	[K6_U11] is able to analyse the operation of devices and compare the construction solutions applying usage, safety, environmental, economic and legal criteria		The student is able to analyze heat recovery equipment using safety, environmental, economic and legal performance criteria.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
Subject contents	Widen knowledge is included about themes purpose of lecture rate of specialistic object not. Winning of ability to solving of question concerning process conversion energy optymalizacyjnych. From installation warm < warmth > odpadowe grzejnych, cooling, wentylacyjnych and air-conditioner. Methods of recycling warm < warmth >. Conversions carrier warm < warmth > termodynamiczne odpadowego. Efficiency of recycling warm < warmth >. Solutions of installations for recycling from cooling matches warm < warmth > and heating and wentylacyjnych, for recycling warm < warmth > wymienniki. Economic applications of recycling warm < warmth >, economic aspect. Selection of match and for recycling fix-ups warm < warmth >. Exploitation for recycling warm < warmth > wymienników. Utilization for drive of cooling fix-up matches warm < warmth > odpadowego kogeneracyjne and trójgeneracyjne, small power stations, micropower stations ORC.						
Prerequisites and co-requisites	Physics, thermodynamics, heat transfer, heating, refrigerating and air conditioning technology.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Egzam		75.0%		100.0%		

Recommended reading	Basic literature	Ullrich H.-J.: Technika Chłodnicza - Poradnik. IPPU MASTA. Gdańsk 1998 (Tom I), 1999 (Tom II). Ullrich H.-J.: Technika Klimatyzacyjna - Poradnik. IPPU MASTA. Gdańsk 2001. Chmielniak T.: Technologie energetyczne. WNT. Warszawa 2008. Staniszewski D., Targański W.: Odzysk ciepła w instalacjach chłodniczych i klimatyzacyjnych. IPPU MASTA. Gdańsk 2007
	Supplementary literature	Articles from journals.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Methods of heat recovery from heating, cooling, ventilation and air conditioning systems.</p> <p>Typical thermodynamic transformations of waste heat carriers.</p> <p>Heat recovery efficiency.</p> <p>Practical applications of heat recovery, economic aspect.</p> <p>Selection of heat recovery systems and devices.</p> <p>Use of waste heat to drive refrigeration equipment.</p>	
Work placement	Not applicable	