



## Subject card

Subject name and code	Refrigeration Technology, PG_00039897						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2022/2023		
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	5		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		exam		
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		dr inż. Waldemar Targański				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	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		24.0	75
Subject objectives	The student explains the design and theoretical basis of the operation of compressor refrigeration units and heat pumps as well as individual air conditioners. The student designs cooling devices and simple cooling systems. The student identifies selected problems occurring during their operation.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U03] is able to identify, formulate and develop the documentation of a simple design or technological task, including the description of the results of this task in Polish or in a foreign language and to present the results using computer software or other aiding tools		The student is able to identify, formulate and develop documentation of a simple design or technological task, including a description of the results of this task in Polish or a foreign language, and to present the results using computer programs or other supporting tools.		[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject		
	[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 thermodynamics and fluid mechanics, construction and operation of thermal energy equipment, process equipment, including renewable energy sources and refrigeration and air conditioning.		[SW1] Assessment of factual knowledge		
	[K6_U07] is able to design a typical construction of a mechanical device, component or a testing station using appropriate methods and tools, adhering to the set usage criteria		The student is able to design a typical structure, mechanical device, subassembly or test bench using appropriate methods and tools taking into account the given functional criteria.		[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools		

Subject contents	Physical rules for obtaining low temperatures. Single-stage and multi-stage vapour cooling cycles and cascade systems with CO2. Refrigerants and heat carriers for refrigeration devices: selected physical, chemical and operational properties. The influence of basic operating parameters on the operation of a cooling unit. Direct and indirect cooling systems: design, operation, technical evaluation. Components of cooling units and installations: compressors, condensers, evaporators, auxiliary devices. Basic elements of refrigeration automation: thermostatic and electronic expansion valves, constant pressure throttle valves, thermostats, pressure switches, solenoid valves. Examples of automatic refrigeration plants. Thermal load of the cold room and its changes. Principles of selection of basic elements of a cooling device. Principles of selection and routing of pipelines in cooling installations. Thermal and vapor-proof insulations: types and selection. Selected operational problems of cooling units. Research of refrigeration equipment and cooling systems.		
Prerequisites and co-requisites	Thermodynamics, Heat transfer and heat exchangers, Basics of refrigerating and air conditioning systems.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Examination	75.0%	70.0%
	Laboratory reports	75.0%	30.0%
Recommended reading	Basic literature	Miller R., Miller M.: Air conditioning and refrigeration. McGraw Hill, 2006.	
	Supplementary literature	Papers in branch journals.	
	eResources addresses	Adresy na platformie eNauczanie: Technika chłodnicza, W/L, MiBM, sem. 5, zimowy 22/23 - Moodle ID: 26541 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26541">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26541</a>	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		