



## Subject card

Subject name and code	, PG_00058886						
Field of study	Mechanical 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	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			4.0		
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	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		0.0		0.0	45
Subject objectives	Advanced knowledge on refrigerating technology in the scope of automatics.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_U01] is able to acquire information from specialist literary sources and other sources regarding the construction and operation of machines and related disciplines in Polish and in a foreign language, is able to conduct a self-learning process, is able to synthesize the information, form conclusions and justify opinions	The student is able to obtain information from professional literature and other sources in the field of construction and operation of machines and related sciences in Polish and foreign languages and conduct the process of self-education, can synthesize information as well as formulate conclusions and justify opinions.			[SU2] Assessment of ability to analyse information		
	[K7_W11] possesses organized knowledge useful in understanding ex-technical conditioning connected with performing the profession of an engineer and taking it into consideration in engineering practice; possesses well-established knowledge within the range of intellectual property, management and organization of manufacturing processes, including the management and life-cycle of a product	The student has structured knowledge useful for understanding non-technical conditions related to the profession of engineer and their inclusion in engineering practice; has well-established knowledge in the field of intellectual property, management and organization of manufacturing processes, including quality and product life cycle management.			[SW1] Assessment of factual knowledge		
[K7_W06] possesses organized, profound knowledge necessary for designing and optimization of complex technological processes, modelling and calculations using numerical methods, knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices, their elements and components	The student has structured in-depth knowledge necessary to design and optimize complex technological processes, modeling and calculations using numerical methods; knows modern manufacturing methods and tools for designing manufacturing processes of machines, devices and their elements and subassemblies.			[SW1] Assessment of factual knowledge			

Subject contents	Features of refrigeration and air conditioning facilities. Tasks, distribution and structure of automatic control systems used in refrigeration and air conditioning. Automation components to supply evaporators - Expansion Valves: automatic, thermostatic, adaptive, and electronics. Regulators liquid level: float (high and low pressure), thermostatic and electronic capacitive probe. Automatic valves, constant pressure: direct action throttle controls and auxiliary power. Regulators of the discontinuous action: pressure switches, thermostats, solenoid valves. Examples of the use of automated controls in the refrigeration and air conditioning. Electronic control systems, control and monitoring systems used in refrigeration and air conditioning. Temperature control in refrigerated facilities. Automating the process of defrosting air coolers. Integrated automatic cooling vents. Adjusting the condensing pressure in air and water condensers. Automation of work of refrigeration compressors. Automation systems of ventilation units and air conditioning. Automatic control system of central air conditioning and ventilation with heat recovery. Design rules for the operation of control systems and air cooling.		
Prerequisites and co-requisites	REFRIGERATION, AIR CONDITIONING, HEAT PUMPS, AUTOMATICS		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60.0%	70.0%
	Reports from the laboratory experiments	100.0%	30.0%
Recommended reading	Basic literature	1. Bielecki A., Chorowski B.: Automatykacja urządzeń wentylacyjnych i klimatyzacyjnych. Wyd. Politechniki Wrocławskiej, Wrocław 1974./ 2. Wesołowski A., Dworski F.: Automatykacja urządzeń chłodniczych. Wyd. Naukowo-Techniczne, Warszawa 1984. 3. Bonca Z.: Automatyka chłodnicza i klimatyzacyjna. Wyd. Wyższej Szkoły Morskiej w Gdyni, wyd. V, 2000. 4. Recknagel, Sprenger, Honmann, Schramek: Ogrzewanie + Klimatyzacja. Wyd. EWFE, Gdańsk 1994. 5. Ullrich H.-J.: Technika Chłodnicza Poradnik. IPPU MASTA. Gdańsk 1998 (Tom I). 6. Ullrich H.-J.: Technika Klimatyzacyjna Poradnik. IPPU MASTA. Gdańsk 2001.	
	Supplementary literature	Papers in branch magazines	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		