



Subject card

Subject name and code	Cryotechnics, PG_00057266						
Field of study	Power Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2024/2025		
Education level	second-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	1	Language of instruction			Polish		
Semester of study	2	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		7.0		23.0	75
Subject objectives	Deepening of acquaintance of question from physics and thermodynamics. Familiarization with specificity of domain and solutions applicable						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W08] as knowledge about development trends in the field of known technologies and non-technical aspects to solve simple engineering tasks in the field of power systems and equipment or transmission networks and internal installations	The student has knowledge of development trends in the field of learned technologies and non-technical aspects for solving simple engineering tasks in the field of energy systems and devices or transmission networks and internal installations.			[SW1] Assessment of factual knowledge		
	[K7_K05] is aware of the impact of engineering activities on the environment	The student is aware of the impact of engineering activities on the environment.			[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_W10] knows the basic installations of advanced energy systems, transmission networks and internal installations and their impact on the environment	The student knows the basic installations in the field of advanced energy systems, transmission networks and internal installations and their impact on the environment.			[SW1] Assessment of factual knowledge		
Subject contents	Area of interest kriotechniki and domains of its (her) utilization. Gas Rozprężanie as method of achievement of low temperature. Gas circulations joule, Ackeret - Kellera, philips () Stirlinga. Cascade fix-up in technique of low temperature. Effect joule - Thomsona; differential effect dławienia. Definition of bandy inversion. Structure and principle of operation skraplarki Lindego - Hampsona, with (from) two-gradual Lindego dławieniem. Claude, Heylandta, la rouge, Kapicy - structure, operation, comparison with circulation Lindego - Hampsona. Contaminating of gas and manners of their deletions. Techniques of divisions gas skraplanych. Fix-ups in technique of low temperature termoelektryczne. Phenomenon () magnetokaloryczne rozmagnesowanie adiabatyczne. Headers (tanks) - manner isolate, manners of definitions of levels (horizons) gas skroplonych. Basic specialistic endowment (outfit) zbiornikowców LNG and LPG.						
Prerequisites and co-requisites	Physics, Refrigeration technology, heat exchange						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Colloquium		56.0%		50.0%		
	Presentation/report		56.0%		50.0%		

Recommended reading	Basic literature	R.F. Barron: Cryogenic systems.
	Supplementary literature	Papers in journals
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<p>Design and operation of chosen gas cycle.</p> <p>Joule-Thomson effect.</p> <p>Definition of the inversion curve.</p> <p>Design and operation of chosen liquifier.</p> <p>Methods for separation of gases.</p>	
Work placement	Not applicable	