



Subject card

Subject name and code	Thermodynamics, PG_00062723						
Field of study	Technologies for Industry 5.0						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study 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		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jakub Karczewski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	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	60		5.0		60.0	125
Subject objectives	Understanding the basic principles of thermodynamics, Enabling students to use theoretical knowledge in the context of industrial applications, including the design and optimization of technological processes. Developing skills in the analysis and evaluation of the performance of energy systems, including thermodynamic cycles, heat machines and heat transfer processes.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U01] applies knowledge of mathematics, physics, chemistry, IT tools and other engineering disciplines to solve theoretical, engineering and technological problems		The student understands the importance of thermodynamic problems in the context of industrial applications.		[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K6_W01] demonstrates knowledge and understanding of mathematics, physics, chemistry and IT tools at the level necessary to formulate and solve typical engineering and technological problems		Student has basic knowledge of technical thermodynamics		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
	[K6_K01] is aware of the need to constantly update and enrich knowledge and practical skills, and improve professional, personal and social competences		The student is aware of the existence of many aspects and problems of thermodynamic nature in technological processes and understands the need to deepen his/her knowledge in the context of specific applications		[SK5] Assessment of ability to solve problems that arise in practice		
Subject contents	<ul style="list-style-type: none">• classical mechanics• fluid mechanics• first law of thermodynamics• ideal and real gases• second law of thermodynamics• compressible flows of a thermodynamic medium• combustion and heat exchange• compressors, fans and refrigerators• steam and combustion engines• steam-gas power plants and combined heat and power plants						

Prerequisites and co-requisites	Basic knowledge of physics at the secondary school level		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		50.0%	40.0%
		50.0%	20.0%
		50.0%	40.0%
Recommended reading	Basic literature	<ul style="list-style-type: none">Jan Szargut "Termodynamika" wydawnictwo naukowe PWN Warszawa 2000Andrzej Teodorczyk "Termodynamika Techniczna" Wydawnictwo Szkolne i Pedagogiczne Warszawa 1995	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none">explain the principle of operation of the Carnot enginecalculate the efficiency of the refrigerator during one cyclecalculate the change in entropy of gases under the assumed conditions		
Work placement	Not applicable		

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