



## Subject card

Subject name and code	Thermodynamics, PG_00055384						
Field of study	Mechatronics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2022/2023		
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			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jan Wajs					
	Teachers	dr hab. inż. Jan Wajs dr inż. Marcin Jewartowski dr hab. inż. Michał Klugmann dr inż. Waldemar Targański mgr inż. Michał Pysz dr inż. Paweł Dąbrowski					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	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	30	8.0		37.0		75
Subject objectives	Student acquire basic knowledge of thermodynamics in the dimension of theory and practice.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_U03] has self-learning skills		Student broadens his knowledge in areas related to the thermodynamics.		[SU2] Assessment of ability to analyse information		
	[K6_U01] is able to acquire information from literature, databases and other, properly chosen sources, integrate these information, interpret them, draw conclusions and formulate opinions		Student uses graphs and tables of the physical properties to prepare laboratory reports. Student is able to interpret the results of energy balance of various machines.		[SU1] Assessment of task fulfilment		
	[K6_W02] has a knowledge in term of physics that includes mechanics, thermodynamics, optics, electricity, magnetism, atomic physics, nuclear physics, solid state physics, including the knowledge necessary to understand basic phenomena occurring in mechatronic elements and systems and its surroundings		Student defines the concepts of thermodynamics, 1st and 2nd Law of Thermodynamics and thermal/caloric equations of state. Student understands the energy conversion processes in the mechatronic systems.		[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE: Basic concepts. The first law of thermodynamics for closed and open systems. Properties of ideal gases and the gas laws. Thermal and caloric equation of state. Thermodynamic processes of ideal gas. Thermodynamics gas cycles. Entropy. The second law of thermodynamics.</p> <p>LABORATORIES: Measurements of thermodynamic parameters: temperature and pressure. Determination of mass flow rate and enthalpy. Energy balance of piston engine. Testing of the refrigerating unit or heat pump.</p>		
Prerequisites and co-requisites	Knowledge from course of physics and mathematics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory reports	100.0%	30.0%
	Written test	56.0%	70.0%
Recommended reading	Basic literature	<p>1. Mayhew R.: Engineering thermodynamics/Work &amp; Heat Transfer. Wiley &amp; Sons Inc. 1993, USA.</p>	
	Supplementary literature	No requirements	
	eResources addresses	<p>Adresy na platformie eNauczenie:          Termodynamika, L, MTR, sem.02, letni 22/23 - Moodle ID: 29741  <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29741">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29741</a></p>	
Example issues/ example questions/ tasks being completed	Present equations of first law of thermodynamics. Describe Carnot Cycle. Describe Otto/Sabathe Cycle. Present definitions of second law of thermodynamics.		
Work placement	Not applicable		