



Subject card

Subject name and code	Thermodynamics I, PG_00039877						
Field of study	Mechanical Engineering, Mechanical Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022		
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	2		Language of instruction		Polish		
Semester of study	3		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Jan Stąsiek				
	Teachers		dr inż. Marcin Jewartowski				
			dr inż. Paweł Dąbrowski				
			mgr inż. Piotr Jasiukiewicz				
			dr hab. inż. Michał Klugmann				
Lesson types and methods of instruction			mgr inż. Aleksandra Gołąbek				
			prof. dr hab. inż. Jan Stąsiek				
	Adresy na platformie eNauczanie:						
	Termodynamika I, W, MiBM, sem.03, zimowy 21/22, (M:31540W0) - Moodle ID: 18627 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18627 Termodynamika I, W, MiBM, sem.03, zimowy 21/22, (M:31540W0) - Moodle ID: 18627 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18627 Termodynamika I, W, MiBM, sem.03, zimowy 21/22, (M:31540W0) - Moodle ID: 18627 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18627						
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		6.0		59.0	125
Subject objectives	Students acquire basic knowledge of thermodynamics in the dimension of theory and practice						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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	Student defines basic concepts of thermodynamic, 1st and 2nd Law of Thermodynamic and equations of state of gases.	[SW1] Assessment of factual knowledge
	[K6_U06] is able to use mathematical and physical models for analysing the processes and phenomena occurring in mechanical devices within the range of material strength, thermodynamics and fluid mechanics	Student describes and analyses gas and steam thermodynamic processes and cycles and heat transport mechanisms. Student calculates gas and steam cycles and simple cases of heat transport. Student measures basic thermodynamic parameters and analysis energy balance of heat engines and devices.	[SU1] Assessment of task fulfilment
Subject contents	LECTURE: Basic concepts. The first law of thermodynamics for closed and open systems. Properties of ideal, semi-ideal and real gases. Gas laws. Thermal and caloric equation of state. Thermodynamic processes of ideal gas. Thermodynamics gas cycles. The second law of thermodynamics. Entropy. Steam and steam cycles. Exergy. Fundamentals of heat transfer. TUTORIALS: Pressure. Simple conversion of energy. Heat. Work. 1st Law of Thermodynamic. State and functions of state of ideal and semi-ideal gases. Gas mixtures. Thermodynamic processes. Gas thermodynamic cycles. Steam and steam cycles. Basic methods of heat transfer. LABORATORY: Measurements of thermodynamic parameters: temperature and pressure. Determination of mass flow rate and enthalpy. Energy balance of heat pump and combustion engine or compressor. Gas analysis.		
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
	Middterm colloquiums	56.0%	30.0%
	Written exam	56.0%	40.0%
	Reports and oral or written test from laboratories	56.0%	30.0%
Recommended reading	Basic literature	1. Pudlik W., Termodynamika. Wyd. PG, 1998. 2. Wiśniewski S., Termodynamika techniczna. WNT, 2005 3. Pudlik W. (red.), Termodynamika - zadania i przykłady obliczeniowe. Wyd. PG, 2000. 4. Pudlik W. (red.), Termodynamika - Laboratorium I miernictwa cieplnego. Wyd. PG, 1993. 5. Pudlik W. (red.), Termodynamika - Laboratorium II badania maszyn i urządzeń. Wyd. PG, 1991.	
	Supplementary literature	1. Mayhew R., Engineering thermodynamics/Work & Heat Transfer. J. Wiley & Sons Inc. 1993. USA.	
	eResources addresses	Termodynamika I, W, MiBM, sem.03, zimowy 21/22, (M:31540W0) - Moodle ID: 18627 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18627 Termodynamika I, W, MiBM, sem.03, zimowy 21/22, (M:31540W0) - Moodle ID: 18627 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18627 Termodynamika I, W, MiBM, sem.03, zimowy 21/22, (M:31540W0) - Moodle ID: 18627 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18627	
Example issues/ example questions/ tasks being completed	Present equations of first low of thermodynamics. Describe Carnot Cycle. Describe Rankine Cycle. Present definitions of second low of thermodynamics. Present basic mechanisms of heat transfer.		
Work placement	Not applicable		