



## Subject card

Subject name and code	Engineering Thermodynamics 1, PG_00042011						
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power 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			6.0		
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	dr hab. inż. Jan Wajs					
	Teachers	dr inż. Paweł Dąbrowski dr hab. inż. Jan Wajs mgr inż. Piotr Jasiukiewicz dr inż. Marcin Jewartowski mgr inż. Aleksandra Gołąbek					
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						
Adresy na platformie eNauczanie: Termodynamika techniczna I, C, Energetyka, sem.03, zimowy 21/22 (PG_00042011) - Moodle ID: 18664 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18664">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18664</a>							
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	84.0	150		
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_W02	Student defines basic concepts of thermodynamic, 1st and 2nd Law of Thermodynamic and state equations of gases. Student describes gas/steam cycles.			[SW1] Assessment of factual knowledge		
	K6_U04	Student describes and analyses gas and steam thermodynamic processes and cycles and heat transport mechanisms. Student calculates gas and steam cycles. Student measures basic thermodynamic parameters and analysis energy balance of heat engines.			[SU1] Assessment of task fulfilment		

Subject contents	LECTURE: Basic concepts. The first law of thermodynamics. Ideal gas model. Properties of ideal, semi-ideal and real gases. Gas laws, thermal and caloric equation of state. Characteristic processes of ideal gas. Gas mixtures. Thermodynamic gas cycles. The second law of thermodynamics and its consequences. Isobaric evaporation process. Properties of mono-component saturated steam. Properties of superheated steam. Characteristic processes of steam. Thermodynamic steam cycles. EXERCISES: Simple conversion of energy, heat, work. The balances of power of open or closed thermodynamics systems. State and functions of state of ideal and semi-ideal gases and gas mixtures. Characteristic processes of gases. Gas thermodynamic cycles. Characteristic changes of steam. Calculations thermodynamic steam cycles. LABORATORIES: Measurements of thermodynamic parameters: temperature and pressure. Determination of mass flow rate. Determination of air and water enthalpy. Energy balance of heat pump. Determination of calorific value of fuels.		
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
	Written examination	56.0%	50.0%
	Midterm colloquium	56.0%	30.0%
	Laboratory reports	100.0%	20.0%
Recommended reading	Basic literature	1. M.J. Moran, H.N. Shapiro, D.D. Boettner, M.B. Bailey, Fundamentals of Engineering Thermodynamics 8th Ed., Wiley, 2014 2. Y. Cengel, M. Boles, Thermodynamics An Engineering Approach, 8th Edition, Wiley, 2014	
	Supplementary literature	No requirements	
	eResources addresses	Termodynamika techniczna I, C, Energetyka, sem.03, zimowy 21/22 (PG_00042011) - Moodle ID: 18664 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18664">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18664</a>	
Example issues/ example questions/ tasks being completed	1. The first law of thermodynamics 2. The second law of thermodynamics 3. Thermodynamic gas cycles 4. Thermodynamic steam cycles		
Work placement	Not applicable		