GDAŃSK UNIVERSITY OF TECHNOLOGY

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 mgr inż. Aleksandra Gołąbek prof. dr hab. inż. Jan Stąsiek	

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 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