GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Technical Thermodynamics, PG_00048913		
Field of study	Chemistry in Construction Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2020/2021
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	2.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Anna Kuczyńska-Łażewska	
	Teachers	dr inż. Anna Kuczyńska-Łażewska	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=13465
Adresy na platformie eNauczanie:

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	3.0	17.0	50

Subject objectives

To familiarize students with the basics of technical thermodynamics, linking concepts and relationships of the thermodynamic properties of substances and technical applications.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_U08	The student knows how to distinguish between basic devices for measuring temperatures and pressures. He knows the types of these devices and knows how to measure basic quantities.	[SU4] Assessment of ability to use methods and tools
K6_W07	Student can solve the practical problems associated with the heat exchange. Student knows how to apply thermodynamics to the modeling and optimization of technological processes.	[SW1] Assessment of factual knowledge
K6_W02	Student knows how to define the basic concepts of thermodynamics. Student knows the basis of technical thermodynamics. Student is able to link concepts and relationships of the thermodynamic properties of substances and technical applications.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents	1. Basic concepts and the ability to use: Basic concepts of general thermodynamics: internal energy, state of thermodynamic state function, the function of the process, thermodynamic potentials, pressure, temperature, volume, heat, specific heat, enthalpy, entropy, egzergy, thermodynamic system, the system Isolated. Laws of thermodynamics: Zeroth law of thermodynamics, first law of thermodynamics in isolated and open systems, second law of thermodynamics. Classification of thermodynamic processes: reversible, irreversible, spontaneous, quasi-static. 2. Scales and measuring temperature. 3. Properties of gases: Gas Models Equation of state Avogadro"s law Warm molar ideal gas Mixtures of gases. 4. Thermodynamics of reversible processes. 5. Basics of thermodynamics of irreversible processes. 6. Properties of real gases, the characteristic changes. Thermodynamic cycles. 7. Heat transfer by convection, conduction and radiation. 8. Technical thermodynamic calculations.
Prerequisites and co-requisites	mathematics, physics
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
egzam	60.0%	50.0%
midterm colloquium	60.0%	50.0%

Recommended reading	Basic literature	1. Klugmann-Radziemska E., Termodynamika Techniczna, Wyd. PG 2009 2. Wiśniewski S: Termodynamika techniczna, Warszawa WNT 1987 3. Staniszewski B.: Termodynamika, PWN 1982 4. Pudlik W.: Termodynamika, Wydawnictwo PG 1998 5. Gumiński K: Termodynamika, PWN 1982
	Supplementary literature	1. Kalinowski E.: Termodynamika, PW Wrocław, 1994 2. Szarawara J.: Termodynamika Chemiczna, WNT 1985 3. Michałowski S, Wańkowicz K.: Termodynamika procesowa, WNT 1993
	eResources addresses	

Example issues/ example questions/ tasks being completed	1. The temperature scales, temperature measurement. 2. The ideal gas model, the semi perfect, real gases 3. Specific heat of ideal gases and półdoskonałych 4. The kinetic energy and the absolute temperature 5. The pressure of an ideal gas 6. Mixtures of ideal gases 7. Heat molar gases and gas mixtures excellent 8. The first law of thermodynamics in a closed system 9. The first law of thermodynamics in the flow system 1. The second law of thermodynamics 2. Work and technical work 3. Entropy for ideal gases and T-s diagram 4. Isothermal transformation of an ideal gas 5. Isobaric transformation of an ideal gas 6. Isochoric process of an ideal gas 7. The adiabatic transformation of an ideal gas 8.The polytropic transformation of an ideal gas 9. Thermodynamic cycles
Work placement	Not applicable