GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Heat transfer and heat exchangers (WM), PG_00042085		
Field of study	Power Engineering, Power Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	English
Semester of study	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
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. Rafał Andrzejczyk	
	Teachers		

Lesson types and methods of instruction							
	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	15.0	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	5.0	65.0	100

Subject objectives	The course will give an introductory treatment of the governing laws for heat and mass transfer. The following topics are covered: Fourier's law. Steady-state conduction, forced convection heat transfer, natural convection heat transfer, radiation heat transfer, transient heat transfer, one-dimensional heat transfer in semi-infinite bodies with finite heat transfer coefficient, nomogram solutions for plates, cylinders and spheres., fundamentals and engineering treatment of heat exchangers. As part of the project, students carry out a computational analysis for a simple case of heat exchangers.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W09] knows the dangers of electrical devices and the principles of protection against them, has basic knowledge of heat exchangers, has basic knowledge of power equipment such as pumps, compressors, turbines, combustion engines, boilers, pipelines and their accessories and methods of their selection depending on the needs		
	[K6_W14] has a theoretical knowledge in the field of chemistry, biology, physics and mathematics including knowledge necessary to understand the technological processes related to water treatment, wastewater treatment, waste management in energy facilities, circular economy		
	[K6_W17] has an elementary knowledge on land mechanics, ground science, land reclamation and geotechnics; has basic knowledge about the composition of air, water and soil, environmental pollution and processes responsible for their formation and ways to reduce them, student knows the principles and organization of sustainable resource management within a circular economy		
	[K6_U09] knows and applies the basic provisions of construction law, water law and environmental law; can determine the impact of construction investments on the environment		
Subject contents	Presentation of mechanisms and laws governing the flow of heat. Presentation of methods of solving of technical problems incorporating heat conduction, heat convection and radiative heat transfer. Methods of heat transfer intensification. Boiling and condensation. Basics of heat exchanger design.		
Prerequisites and co-requisites	maths I, II, III, physics, fluid mechanics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Presentation	60.0%	40.0%
	Written exam	60.0%	60.0%
Recommended reading	Basic literature	1.Mikielewicz J., Grochal B., Gumkowski S., Polesek-Karczewska S., Mikielewicz D., Wymiana ciepła, Wydawnictwo IMP PAN, 1996 2.F. Incropera, D. deWitt, Fundamentals of heat and mass transfer, 5th edition, CRC Press, 2007. 3.B. Sundén, Lund University, Sweden; C.A. Brebbia, Wessex, Heat Transfer XIII Simulation and Experiments in Heat and Mass Transfer, Wessex Institute of Technology, UK 2014 4. Frank P. Incropera, Introduction to Heat Transfer, (5th edition), 2006 5.R. C. Sachdeva, Fundamentals of Engineering Heat and Mass Transfer (SI Units) 4th Edition, New Age International 2012	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	What is conduction? How does the vacuum between the two walls reduce conduction? How does the vacuum between the two walls reduce convection? What is radiation? What is convection?
Work placement	Not applicable

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