

GDAŃSK UNIVERSITY

Subject card

Subject name and code	Heat transfer and heat exchangers (WM), PG_00042085								
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			2022/2023			
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	Apparatus -> Faculty of Mechanical			Engineering and Ship Technology				
Name and surname	Subject supervisor		dr hab. inż. Rafał Andrzejczyk						
of lecturer (lecturers)	Teachers	ers							
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	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.								

Learning outcomes	Course outcome	Subject outcome	Method of verification				
	K6_U01	The student is able to use subject literature and others letter-based sources, especially from e-sources available through the PG library	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools				
	K6_W06	The student is able to make a simple computational analysis and the formation of technological aspects for typical heat exchanger structures. The student is able to analyze the impact of a specific type of heat exchanger design on the energy efficiency of the installation and its impact at the environment. He is able to analyze and select the appropriate technology of heat recovery and accumulation for renewable energy installations.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects				
	K6_U05	The student is able to make an energy balance of simple structures of heat exchangers that are a part of energy installations and HVAC installations for buildings. He can carry out a simple cost-effect analysis and investment life cycle analysis.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools				
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 mechan	ics					
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade				
and criteria	Written exam	60.0%	60.0%				
	Presentation	60.0%	40.0%				
Recommended reading	Basic literature	 Mikielewicz J., Grochal B., Gumkowski S., Polesek-Karczewska Wikielewicz D., Wymiana ciepła, Nydawnictwo IMP PAN, 1996 F. Incropera, D. deWitt, Fundamentals of heat and mass transfer edition, CRC Press, 2007. B. Sundén, Lund University, Sweden; C.A. Brebbia, Wessex, Heat Transfer XIII Simulation and Experiments in Heat and Mass Transf Wessex Institute of Technology, UK 2014 Frank P. Incropera, Introduction to Heat Transfer, (5th edition), 2 R. C. Sachdeva, Fundamentals of Engineering Heat and Mass Transfer (SI Units) 4th Edition, New Age International 2012 					
	eResources addresses Adress na nlatformia eNauczania						
		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