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, 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 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_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 mechanics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	60.0%	60.0%
Presentation	60.0%	40.0%

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