



## Subject card

Subject name and code	Heat Exchange and Heat Exchangers, PG_00033008						
Field of study	Nanotechnology						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2024/2025		
Education level	first-cycle studies		Subject group		Optional subject group 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		3.0		
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		dr inż. Marek Augustyniak				
	Teachers		dr inż. Marek Augustyniak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	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		8.0		37.0	75
Subject objectives	Presentation of principal mechanisms and laws of heat transfer. Lecture familiarises with methods of solving problems in technical applications, conduction and heat transfer problems as well as radiative heat transfer. Presents foundations to sizing of heat exchangers.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U01		Increased ability to learn independently and obtain information from literature, databases and other properly selected sources.		[SU1] Assessment of task fulfilment		
	K6_W06		This teaching effect is not applicable here.		[SW1] Assessment of factual knowledge		
	K6_U04		The instructor tries to ensure that the student has to independently plan and conduct experiments, at least to a basic extent, critically analyze their results, draw conclusions and formulate opinions.		[SU4] Assessment of ability to use methods and tools		
	K6_W02		Enhanced skills related to the calculation of typical heat transfer problems.		[SW1] Assessment of factual knowledge		
Subject contents	Presentation of the main mechanisms and laws relating to heat transfer. Methods of solving problems occurring in technology in the field of conduction, heat transfer and radiative heat exchange. Market research - thermal problems in various industries, everyday products and specialized products.						
	Laboratory exercises: Learning experimental and accounting methods for determining heat transfer problems, as a function of available equipment and creative arrangements with students.						
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%	80.0%
	Laboratory classes	60.0%	20.0%
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.Wiśniewski S., Wiśniewski T., Wymiana ciepła, WNT, 2007. 4.Pudlik W., Wymiana i wymienniki ciepła, Wydawnictwo PG, Gdańsk 1996	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie: Wymiana i wymienniki ciepła - MA, 2024/25 - Moodle ID: 41781 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41781">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=41781</a>	
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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