GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Heat Exchange and Heat Exchangers, PG_00033008		
Field of study	Nanotechnology		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
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	Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej		
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

eNauczanie source addresses:

Moodle ID: 1224 Wymiana i wymienniki ciepła
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1224

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

A presentation of the main mechanisms and laws of heat transfer. Lectures and exercises introduce students to methods for solving technical problems and issues related to heat conduction and transfer in solids and fluids. An overview of market issues and products related to the topics discussed. Optional visits to companies designing/manufacturing heat exchangers.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W02	Enhanced skills related to the calculation of typical heat transfer problems.	[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_W06	This teaching effect is not applicable here.	[SW1] Assessment of factual knowledge
K6_U01	Increased ability to learn independently and obtain information from literature, databases and other properly selected sources.	[SU1] Assessment of task fulfilment

Subject contents

Presentation of the main mechanisms and laws of heat transfer. Methods for solving technical problems related to conduction, heat transfer, and radiative heat transfer manual and computer calculations (FEM, optional CFD). Market research thermal problems in various industries, everyday products, and specialized products. Laboratory exercises: Exploration of experimental and computational methods for determining heat transfer problems, based on available equipment and creative collaboration with students. Optional: company visits (e.g., KLIMOR, ENBIO, HEXONIC, BIBUS-MENOS).

Prerequisites and co-requisites

maths I, II, III, physics, fluid mechanics

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Laboratory classes</td><td>60.0%</td><td>20.0%</td></tr>
<tr><td>Written exam</td><td>60.0%</td><td>80.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>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, Wydzwnictwo PG, Gdańsk 1996</td></tr>
<tr><td>Supplementary literature</td><td>No requirements</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">- The instructor's industrial experience in heat transfer
- Visit to a company manufacturing heat exchangers
- Review and consolidation of orders of magnitude for typical thermal parameters
- Review: conduction in structures (metals, glasses...): steady and transient
- Fluid mechanics - especially from a CFD perspective - introduction
- Heat in the ecosystem: physics, technology, and geopolitics - author's lecture
- Computer/experimental laboratories: ANSYS (boiling an egg); mini Mars base; CFD exercise
- Introduction to preparing NCBiR or PARP grants and basic knowledge of patenting in the context of heat transfer (especially renewable energy)</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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