GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Heat and mass transport, PG_00064824		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study 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	1	Language of instruction	English
Semester of study	1	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Janusz Cieśliński	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	0.0	45

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	45	15.0	40.0	100

Subject objectives

Presentation of the theoretical foundations of heat and mass transfer processes. Pointing out the analogy heat and mass transfer processes. Supporting theoretical considerations with examples of calculations

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W11] interprets social, economic, legal (including industrial and intellectual property laws), and other non-technical aspects of engineering activities, and includes them into engineering practice	The student demonstrates knowledge of the impact of technology on the understanding of beauty and elegance	[SW2] Assessment of knowledge contained in presentation
[K7_U11] communicates and justifies opinions on specialized topics in a manner understandable to diverse audiences, including the use of modern techniques, including information technology	The student is able to explain the choice of calculation procedure	[SU5] Assessment of ability to present the results of task
[K7_K12] is ready for fullfiling social commitement and initation of actions for public interest including entrepreneurial thinking and acting	The student demonstrates knowledge of the relationship between the calculations performed and the consumption of raw materials	[SK5] Assessment of ability to solve problems that arise in practice
[K7_W03] demonstrates a well-structured and theoretically grounded knowledge of the key issues in Mechanical Engineering to enable the design and diagnosis of mechanical systems, processes and devices	The student demonstrates knowledge of calculation procedures of the surface area of the heat and mass exchangers	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

A. Heat transport 1. Conduction, convection, radiation 2. Heat transfer 3. Heat transfer with phase change 4. Heat exchangers B. Mass transport 1. Diffusion, convection 2. Analogy between heat and mass transfer 3. Simultaneous heat and mass transfer

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Applied thermodynamics, heat transfer</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Numerical exercises</td><td>50.0%</td><td>50.0%</td></tr><tr><td>Lecture</td><td>50.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Bergman T.L., Lavine A.S., Incropera F.P., Dewitt D.P.: Fundamentals of heat and mass transfer, J. Wiley&Sons, 2011
2. Bird R.B., Stewart W.E., Lightfoot E.N.: Transport phenomena, John Wiley&Sons, 1960
3. Kreith F., Manglik R.M., Bohn M.S., Tiwari S.: Principles of heat transfer, Cengage Learning, 2011</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Serth R.W., Lestina T.G.: Process heat transfer, Elsevier, 2014
2. Gupta J.P.: Heat exchanger and pressure vessel technology, Hemisphere Publishing Corporation, 1986</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Diffusion mechanism of heat and mass transport. 2. Equation of conservation of energy and mass. 3. Thermal and concentration boundary layer. 4. Lewis's law 5. Lewis number 6. Peclet's law. Logarithmic mean temperature difference</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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