



Subject card

Subject name and code	Heat and mass transport, PG_00057364						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2024	Academic year of realisation of subject			2023/2024		
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			Polish		
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						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Blanka Jakubowska					
	Teachers	dr inż. Blanka Jakubowska					
Lesson types and methods of instruction	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	8.0		47.0		100
Subject objectives	Presentation of theoretical basics of heat and mass transfer processes. Paying attention to the analogy of heat and mass transfer processes. Supporting theoretical considerations with examples of calculations.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W08] possesses widened knowledge within the range of design methods of hydraulic systems, heating and fluid-flow machines and transport devices		The student knows and understands the mechanisms of heat and mass transport.		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U08] is able to design a procedural equipment or device compliant with the specifications using a design aid system in the form of a design documentation, selecting the appropriate model, performing critical analysis with the proper selection of tools and technologies		The student knows the procedures for calculating surface area of heat and mass exchangers		[SU4] Assessment of ability to use methods and tools		
	[K7_W03] possesses a profound knowledge on thermodynamic processes and their simulation, knows simulation methods and programs aiding the design and operation of power generating machines and process equipment, including renewable energy sources, air conditioning and cooling renewable energy sources, air conditioning and cooling		The student knows the procedures for calculating heat and mass flux.		[SW1] Assessment of factual knowledge		

Subject contents	<p>A. Heat transfer</p> <p>1. Conduction, convection, radiation</p> <p>2. Common heat transfer</p> <p>3. Heat transfer with phase change</p> <p>4. Heat exchangers</p> <p>B. Mass transfer</p> <p>1. Diffusion, convection,</p> <p>2. Analogy between heat and mass transfer</p> <p>3. Simultaneous heat and mass transfer</p>		
Prerequisites and co-requisites	Applied thermodynamics, heat transfer		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture	56.0%	50.0%
	numerical exercises	56.0%	50.0%
Recommended reading	Basic literature	<p>1. Bergman T.L., Lavine A.S., Incropera F.P., Dewitt D.P.: Fundamentals of heat and mass transfer, J. Wiley&Sons, 2011</p> <p>2. Bird R.B., Stewart W.E., Lightfoot E.N.: Transport phenomena, John Wiley&Sons, 1960</p> <p>3. Kreith F., Manglik R.M., Bohn M.S., Tiwari S.: Principles of heat transfer, Cengage Learning, 2011</p> <p>4. Serth R.W., Lestina T.G.: Process heat transfer, Elsevier, 2014</p> <p>5. Gupta J.P.: Heat exchanger and pressure vessel technology, Hemisphere Publishing Corporation, 1986</p>	
	Supplementary literature	<p>1. Bird R.B., Stewart W.E., Lightfoot E.N.: Transport phenomena, John Wiley&Sons, 1960</p> <p>2. Brodowicz K.: Wymienniki ciepła i masy, Wydawn. PW, 1980</p>	
	eResources addresses	<p>Adresy na platformie eNauczenie:</p> <p>Transport ciepła i masy, W, sem.1, letni 23/24 - Moodle ID: 36487 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=36487</p> <p>Transport ciepła i masy, W, sem.1, letni 23/24 - Moodle ID: 36487 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=36487</p>	

Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none">1. Diffusion mechanism of heat and mass transport..2. Equation of conservation of energy and mass.3. Thermal and concentration boundary layers4. Heat and mass transfer analogy5. Lewis number6. Mean log temperature
Work placement	Not applicable