GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	POLLUTANT TRANSFER PHENOMENON, PG_00048952						
Field of study	Green Technologies						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2023/2024			
Education level	second-cycle studies		Subject group	Obligatory subject group 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	2		ECTS credits	3.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Hydraulic Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Wojciech Artichowicz					
	Teachers	dr inż. Wojciech Artichowicz					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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		5.0	40.0		75
Subject objectives	The aim of the subject is to introduce students to the flow and transport phenomena and their mathematical description.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W01] a broader and deeper knowledge of certain branches of mathematics, including elements of applied mathematics and optimization methods including mathematical methods, useful to formulate and solve complex tasks in the field of environmental technologies and modern analytical methods	The student knows the basics of tensor calculus and numerical methods.	[SW1] Assessment of factual knowledge
	[K7_W04] is aware of the importance of environmental protection and has a detailed knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors	Student has the knowledge on the Streeter-Phelps model.	[SW1] Assessment of factual knowledge
	[K7_U04] can be used to formulate and solve engineering tasks analytical methods, simulation and experimental, can make a critical analysis of the methods of operation and evaluate the existing technical solutions, in particular equipment, facilities, systems, processes, services in the field of environmental technology and make a preliminary economic analysis of engineering activities undertaken	The student knows the basic methods (phenomenological, structural method) and tools (differential equations: Reynolds, diffusion) of the description of the transport process. In addition, he or she knows how to solve them (the basics of numerical methods).	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
	[K7_U03] capable of formulating and solving design tasks in the field of environmental technology to recognize their non-technical aspects, including environmental, economic and legal. Applies the principles of occupational health and safety	Student has the ability to connect the mathematical and technical aspects of the subject with the enviromental aspects.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>1. Fluid mechanics as an engineering field

2. Scalar quantities and fields

3. Vector quantities and fields

4. Tensor quantities and fields

5. Vector analysis and basics of the tensor analysis

6. Differential operators (Grad, Div, Rot), material derivative

7. Description of the heterogenous systems

8. Movement (flow) description methods

9. Phenomenological method, conservation principles

10. Phenomenological method - practical remarks

11. Phenomenological method - averaging

12. Introduction to numerical methods

13. Numerical methods (derivatives and integrals, accuracy)

14. Numerical methods (solution of differential equations)

15. Test</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic mathematical analysis, geometry and physics</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Projects</td><td>100.0%</td><td>50.0%</td></tr>
<tr><td>Test</td><td>60.0%</td><td>50.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>Heat and Mass Transfer, second ed., Baehr, H., D., Stephan, K., 2006. Springer-Verlag, Berlin.</td></tr>
<tr><td>Supplementary literature</td><td>Heat and Mass Transfer, second ed., Baehr, H., D., Stephan, K., 2006. Springer-Verlag, Berlin.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Solution of the diffusion equation

Using streeter-Phelps model for determination of solved oxygen in water.</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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