GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Pollutant Transfer Phenomenon, PG_00065954		
Field of study	Green Technologies		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	Optional subject group
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	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Justyna Płotka-Wasylka	
	Teachers		

Lesson types

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 course is to familiarize students with the issues of environmental management and to prepare for work related to modeling the transport of pollutants in various elements of the environment. Introduction of issues related to the transport of pollutants, where the standard is tensor notation. To acquaint students with the rules of behavior for homogeneous fluids and methods of transport description.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W04] identifies chemical and biological threats to the environment, taking into account anthropogenic factors	The student has structured knowledge in the field of identifying basic environmental problems and ways of mitigating them.	[SW1] Assessment of factual knowledge
[K7_K01] is aware of the problems related to the profession of engineer, is able to assess the effects of the activities performed	The student is aware of the professional responsibilities of an engineer and is ready to solve simple technical problems.	[SK5] Assessment of ability to solve problems that arise in practice
[K7_U03] solves design tasks in the field of environmental protection technologies, taking into account their non-technical, environmental, economic and legal aspects as well as occupational health and safety principles	The student is able to solve simple problems related to fluid mechanics.	[SU3] Assessment of ability to use knowledge gained from the subject

<table>
<tr><td>Subject contents</td><td>Course content – lecture
Vector analysis

Tensor values.

Basic operations on tensors

Differential operators.

The state of the fluid. Principles of conservation of mass, energy and momentum.

Heterogeneous systems. Methods of describing fluid movement.

The phenomenological method. Phenomenological Method: Practical Versions of Equations.

Phenomenological method: simplification of the underlying system of equations.

Laminar and turbulent movement of fluids. An introduction to numerical calculations in the Mathematica environment

Algorithms for numerical calculations: solving nonlinear equations

Algorithms for numerical calculations: solving ordinary and partial differential equations.

Course content – project
Project work will be agreed upon with the students.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of the atmosphere, hydrosphere and lithosphere. Typical pollutants in the environment and their behavior in the environment. Basics of vector calculus.</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>seminar / project: completion of all exercises</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>lecture: class attendance, positive assessment of the final 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>Migracja zanieczyszczeń, Jerzy M. Sawicki, Wydawnictwo PG, Gdańsk 2003

Przenoszenie masy i energii, Jerzy M. Sawicki, Wydawnictwo PG, Gdańsk 1993</td></tr>
<tr><td>Supplementary literature</td><td>Mechanics of pollutants transfer, Jerzy M. Sawicki, Wydawnictwo PG, Gdańsk 1997</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>How to solve the diffusion equation

List the methods of describing the state of the fluid, and describe one chosen one.

List numerical methods, describe one chosen one.

List the basic physical laws used in the phenomenological method.

List the methods of describing the mixture movement and describe one chosen one.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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