



Subject card

Subject name and code	Pollutant Transfer Phenomenon, PG_00065954						
Field of study	Green Technologies						
Date of commencement of studies	February 2027		Academic year of realisation of subject		2026/2027		
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-Wasyłka				
	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		

Subject contents	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.			
Prerequisites and co-requisites	Basic knowledge of the atmosphere, hydrosphere and lithosphere. Typical pollutants in the environment and their behavior in the environment. Basics of vector calculus.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	seminar / project: completion of all exercises	50.0%	50.0%
	lecture: class attendance, positive assessment of the final test	60.0%	50.0%
Recommended reading	Basic literature	Migracja zanieczyszczeń, Jerzy M. Sawicki, Wydawnictwo PG, Gdańsk 2003	
		Przenoszenie masy i energii, Jerzy M. Sawicki, Wydawnictwo PG, Gdańsk 1993	
	Supplementary literature	Mechanics of pollutants transfer, Jerzy M. Sawicki, Wydawnictwo PG, Gdańsk 1997	
	eResources addresses		
Example issues/ example questions/ tasks being completed	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.		
Practical activities within the subject	Not applicable		

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