



Subject card

Subject name and code	, PG_00059946						
Field of study	Environmental Engineering						
Date of commencement of studies	February 2025			Academic year of realisation of subject		2024/2025	
Education level	second-cycle studies			Subject group		Optional subject group 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		2.0	
Learning profile	general academic profile			Assessment form		assessment	
Conducting unit	Department of Geotechnical and Hydraulic Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor			dr hab. inż. Michał Szydłowski			
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	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		20.0	55
Subject objectives	Getting to know the basic mathematical models used in environmental engineering for the analysis of surface and groundwater resources, and introduction to numerical methods of solving them.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	K7_U06		The student applies basic mathematical models to solve environmental engineering problems.			[SU4] Assessment of ability to use methods and tools	
	K7_W01		The student formulates the problem of solving differential equations with ordinary and partial derivatives describing selected issues in the field of environmental engineering, such as water flow with a free surface, water flow in a system of tanks, transport of pollutants in channels, water flow in a porous medium.			[SW1] Assessment of factual knowledge	
	[K7_W12] has knowledge of contemporary and useful principles on data acquisition, filtration, processing and analysis		The student has knowledge of publicly available databases about the environment and computing packages.			[SW1] Assessment of factual knowledge	
	[K7_U05] can rely on scientific sources for modern methods and technologies, and propose trends in the development of methods and rules for acquiring, filtering, processing and analyzing data		The student uses available scientific sources to describe the solution to an engineering problem using mathematical modeling.			[SU2] Assessment of ability to analyse information	
Subject contents	Basic mathematical models of surface and underground water flow. Solving ordinary differential equations: initial and boundary problems. Methods of numerical solution of the initial problem. Solution of the steady-state non-uniform flow equation in an open channel. Solving differential equations with partial derivatives. Solving groundwater flow equations.						
Prerequisites and co-requisites	Knowledge of basic computer operation and operating system. Knowledge of subjects: Mathematics, Fundamentals of computer science and Hydraulics.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	practical exercises		60.0%		100.0%		

Recommended reading	Basic literature	1. Szymkiewicz R.: Mathematical modeling of flows in rivers and canals, Wyd. Scientific PWN Warsaw 2000. 2. Szymkiewicz R.: Numerical methods in water engineering. ed. Gdańsk University of Technology, 2007. 3. Szymkiewicz R.: Numerical modeling in open channel hydraulics. Springer, 2010.
	Supplementary literature	1. Fletcher C.A.J.: Computational techniques for fluid mechanics. Springer, 1991
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Open channel flow analysis. Ground flow simulation. Urban flood.	
Work placement	Not applicable	

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