



Subject card

Subject name and code	, PG_00059946						
Field of study	Environmental Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2022/2023		
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	<ol style="list-style-type: none"> 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 eNauczenie: Modelowanie w Inżynierii Środowiska 2022/2023 - Moodle ID: 29598 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29598
Example issues/ example questions/ tasks being completed	Open channel flow analysis. Ground flow simulation. Urban flood.	
Work placement	Not applicable	