



Subject card

Subject name and code	Hydraulics II, PG_00043537						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2022/2023		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study 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	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Hydraulic Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Jerzy Sawicki				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		4.0		39.0	103
Subject objectives	Presentation of fundamental methods of hydraulic, applied in the environmental engineering, necessary in technical practice.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K01] can think and act in a creative and enterprising way; can set priorities for the implementation of an individual or group task; understands the need for continuous training and professional responsibility for their activities and team	Student is able to cooperate in a team. He understands the question of professional responsibility.	
	[K6_W05] knows the theoretical basis of hydromechanics and its practical models, necessary to solve technical problems in the field of environmental engineering (sanitary engineering, water melioration, water management and flood protection, pollution spread)	Student has an arranged and deepen knowledge in the scope of hydraulics, is able to apply technical methods of calculations and solves problems of hydraulics.	
	[K6_U08] can use properly selected methods and devices of hydraulics and hydrology, enabling determination of basic quantities characterizing the flow of water in open channels and rivers, pipelines and flow objects of environmental engineering	Student has an arranged and deepen knowledge in the scope of hydraulics, is able to apply technical methods of calculations and solves problems of hydraulics.	
	[K6_W15] knows and understands the methods of measuring basic quantities characteristic for fluid mechanics and hydraulics, hydrology; knows the calculation methods and IT tools necessary to analyze the results of laboratory and field work	Student knows, understands and is able to apply basic methods of the hydraulic values measurements, and the methods of the measurements results analysis as well.	
[K6_U02] can work individually and in a team; knows how to estimate the time needed to complete the task ordered; is able to develop and implement a work schedule that ensures deadlines	Student is able to work individually and in a task team, according to the work time table.		
Subject contents	Practical methods of groundwater flow phenomena (wells, porous banks, ditches, drains). Open-channels hydraulics (general equations of one-dimensional flow in open channels, Manning formula, non-uniform flow, swelling curve, de Saint-Venant equations). Free-jets of a liquid (submerged and non-submerged, Abramovich formulae). Hydrodynamic thrust. Modelling and similarity of hydraulic phenomena. Measurements in hydraulics.		
Prerequisites and co-requisites	Polytechnical course of mathematics, fluid mechanics and first part of the subject (Hydraulics I)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	control works during tutorials	60.0%	30.0%
	Written exam (possibility of additional talk)	60.0%	70.0%
Recommended reading	Basic literature	1) Sawicki J.M., "Mechanics of flows", Wydawnictwo PG, Gdańsk 2009, 2) Orzechowski Z., Prywer J., Zarzycki R., "Mechanics of fluids in environmental engineering", WNT, Warszawa 1997. 3) Walden H., Stasiak J., "Mechanics of liquids and gases in sanitary engineering", Arkady, Warszawa 1971.	
	Supplementary literature	1) Grabarczyk Cz., "Liquids flows in conduits. Methods of calculations", Envirotech, Poznań 1997. 2) Kubrak E., Kubrak J., "Technical hydraulics", SGGW, Warszawa 2004.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1, Dimensioning of wells and trenches. 2. Hydraulic calculations of open channels. 3. Hydraulic aspects of waste-water outfalls		
Work placement	Not applicable		