GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fluid Mechanics and Hydraulics II, PG_00042729		
Field of study	Environmental Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2025/2026
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	Part-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	assessment
Conducting unit	Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Katarzyna Weinerowska-Bords	
	Teachers	mgr inż. Paweł Wielgat dr hab. inż. Katarzyna Weinerowska-Bords	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	20.0	10.0	0.0	0.0	30

E-learning hours included: 0.0

Additional information:

Supporting materials for the classes are included in the e-course: Kurs: Mechanika płynów i hydraulika II (dla IŚ sem.4 niestacj. I stopnia) 2025_26 LATO | eNauczanie : https://enauczanie.pg.edu.pl/2025/course/view.php?id=3872

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	4.0	68.0	102

Subject objectives

Mastering the basic concepts of water flow in pipelines, porous media and open channels, and mastering the basic principles of calculating discharge from holes and flow through weirs.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	The student is able to select a method (formula) for the purpose of calculations, choose a method of obtaining data and conducting analyses for basic tasks in the field of flows under pressure, in porous media, in open channels and through holes and weirs.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information
[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	The student is able to plan his/her work during classes to complete the required tasks (independently or in a team) and is able to plan preparatory work for the final exam.	[SU1] Assessment of task fulfilment
[K6_W14] 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	The student knows the basic devices and methods of measuring pressure, is able to perform and interpret the results, velocities and flow rates, is able to calculate basic flow parameters within the scope of the program and understands the importance of such calculations for various applications in the field of environmental engineering.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[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)	The student knows the basic formulas and equations in the field of hydraulics and fluid mechanics, and also knows the effects of simplifications introduced in calculations.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[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	The student can identify and prepare the basic material needed to complete a task (computational in labs or experimental in the laboratory), and can complete a specific task individually or in a group. The student understands the purpose of calculations and the need for careful selection and assembly of data, as well as the interpretation of results.	[SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work

Subject contents

Course content – exercises
AUDITORIUM EXERCISES: Calculating relative and absolute pressure. Applying the continuity equation and Bernoulli's equation to a real fluid flow. Calculating hydraulic losses in fluid flow in pressurized pipes. Calculating velocity and flow rate in pressurized pipes. Pump-pipeline interaction.

Determining filtration velocity and flow rate, and percolation time in flow through porous media. Calculating the parameters of steady-state uniform flow in open channels. Calculating the capacity of open channels. Determining and applying critical flow in open channels. Calculating overflow and orifice flow rates for various hydraulic systems.

Course content – laboratory
LABORATORY EXERCISES Determination of the friction factors for flow in pipe. Analysis of water flow in Venturi flume. Analysis of filtration. Analysis of the open channel flow, and flow through a weir. Determination of the parameters of hydraulic jump.

Prerequisites and co-requisites

The knowledge of Mathematics, Fluid Mechanics and Hydraulics I

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test of the auditorium exercises	60.0%	60.0%
Assesment of the practical part (entries and reports from laboratory tasks and final test)	60.0%	40.0%

Recommended reading	Basic literature	Chadwick A., Morfett J.: Hydraulics in civil and environmental engineering, E&FN Spn, London 1999. Ven Te Chow: Open-channek hydraulics, McGraw-Hill, 1959.
	Supplementary literature	Szymkiewicz R.: Numerical modeling in open channel hydraulics, Springer 2010. Abbott M.B., Basco D.R.:Computational fluid dynamics, Longma 1989.
	eResources addresses	Basic https://pbc.gda.pl/dlibra/publication/8704/edition/4809/content - Weinerowska K. (ed.): Laboratory of fluid mechanics and hydraulics, PG script, Gdańsk 2004.(in Polish) Supplementary https://pbc.gda.pl/dlibra/publication/51384/edition/44645?language=pl - Sawicki M.J.: Flow Mechanics, PG Publishing House, Gdańsk 2009. (in Polish)
Example issues/ example questions/ tasks being completed	Calculating pressure head. Determining average velocity and flow rate in a pipeline. Drawing pressure and energy lines in a pipeline. Analyzing the effect of changes in channel shape and roughness on changes in average velocity and flow rate in an open channel. Determining the soil permeability coefficient. Determining water permeation time. measurements of flow discharge and flow velocity.	
Practical activites within the subject	Not applicable	

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