

Subject card

Subject name and code	Hydraulics and hydromechanics - laboratory exercises, PG_00091476						
Field of study	Water Management and Protection of Water Resources						
Date of commencement of studies	October 2024	Academic year of realisation of subject			2025/2026		
Education level	undergraduate studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study Subject group related to practical vocational preparation		
Mode of study	full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			1.0		
Learning profile	practical	Assessment form					
Conducting unit	Pracownia Hydrologii -> Katedra Hydrologii -> Faculty of Oceanography and Geography						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Małgorzata Robakiewicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	0.0	0.0	15
	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	15		5.0		10.0	30
Subject objectives	1. To expand students' knowledge of the behavior of water under the action of external forces (laws governing statics or fluid motion).2. To familiarize students with the characteristics of water flow in pipes, open troughs, channels and soil (laws of fluid mechanics).3. To indicate the practical application and use of water and its physical properties in engineering.4. To educate the basics of engineering calculation methods of river hydraulics.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[GWOZWL3-W04] research techniques, methods and tools currently used in water management and protection of water resources both in the field of natural sciences and social sciences, including basic statistical and information technology tools that make it possible to describe, model and interpret data on phenomena and processes occurring in the aquatic environment, as well as tools for describing relationships in social-ecological systems	K_W04 - knows and understands research techniques and methods used in hydraulics, including basic statistical tools to describe and interpret data on phenomena and processes in the aquatic environment	[SW1] oral statement/ conversation/discussion
	[GWOZWL3-U01] make basic observations of processes and phenomena occurring in the hydrosphere and carry out basic measurements of selected processes of water purification on a laboratory scale	K_U01 - is able to make basic observations related to fluid mobility and perform basic laboratory measurements	[SU1] oral statement/conversation/ discussion [SU6] demonstration of practical skills
	[GWOZWL3-U07] use literature and other available sources of information, including information technology, multimedia, Internet, databases, and select and critically evaluate information	K_U07 - can use and critically evaluate information on practical aspects of hydraulics and hydraulic engineering from literature and other available sources of information	[SU1] oral statement/conversation/ discussion [SU6] demonstration of practical skills
	[GWOZWL3-U08] use basic mathematical and statistical methods to analyze data and describe phenomena and processes occurring in the environment, as well as methods of information technology to assess the risk of threats to the of the environment, especially the hydrosphere	K_U08 - use basic mathematical and statistical methods used in hydraulics and hydromechanics to analyze data and describe processes and phenomena occurring in the aquatic environment	[SU1] oral statement/conversation/ discussion [SU6] demonstration of practical skills
	[GWOZWL3-U02] select and independently apply basic research techniques and tools, with adhering to established analytical procedures in the field of environmental research in water management, adequately to the considered research problem	K_U02 - is able to select and independently apply basic techniques and research tools, with established analytical procedures, in the field of fluid mechanics	[SU1] oral statement/conversation/ discussion [SU6] demonstration of practical skills
	[GWOZWL3-K03] systematic further education and professional development, updating and expand their knowledge and skills, understands the limitations of his own knowledge in the context of civilization progress and recognizes authorities in the professional and scientific environment	K_K03 - is ready to systematically update and expand his knowledge and skills	[SK1] oral statement/conversation/ discussion [SK6] demonstration of practical skills
Subject contents	1. Methods of calculation of flow in uncontrolled sections.2. The laws of fluid mechanics in the construction and operation of technical equipment.3. Determination of the soil filtration coefficient - movement of water in a porous medium.4. Calculation of the limiting Reynolds number - flow of viscous fluid in pipelines.5. Determination of water velocity and characteristics in open channels.6. Operation of storage reservoirs - outflow of liquid through openings.		
Prerequisites and co-requisites			

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test - presentation of practical skills	51.0%	50.0%
	evaluation of oral statements	51.0%	50.0%
Recommended reading	Basic literature	<p>Jarosz A., 1998, Hydraulika. Hortpress.</p> <p>Jeżowiecka-Kabsch K., Szewczyk H., 2001, Mechanika płynów. Oficyna Wydawnicza PWr, Wrocław.</p> <p>Kługiewicz J., 1999, Hydromechanika i hydrologia inżynierska. Oficyna wydawnicza Projprzem-EKO Bydgoszcz.</p> <p>Weinerowska K. (red.) 2004, Laboratorium z mechaniki płynów i hydrauliki. Politechnika Gdańska, Gdańsk.</p> <p>Rogala R., Machajski J., Rędowicz W., 1991, Hydraulika stosowana: przykłady obliczeń; Wyd. P. Wrocławskiej, Wrocław.</p>	
	Supplementary literature	<p>Bukowski J., Kijkowski P., 1980, Kurs mechaniki płynów. PWN Warszawa.</p> <p>Cebulak K., 1963, Budownictwo wodne. Regulacja rzek cz. 1. Państwowe Wydawnictwo Rolnicze i Leśne.</p> <p>Czetwertyński E., Utrysko B., 1969, Hydraulika i hydromechanika. PWN Warszawa. Wyd. P. Krakowskiej, Kraków.</p> <p>Gręplowska Z., 2001, Zbiór zadań z przepływów w przewodach pod ciśnieniem.</p> <p>Prystaj A. 1999, Zadania z hydrostatyki, Wyd. P. Krakowskiej, Kraków.</p> <p>Radlicz-Rühlowa H., Szuster A., 1997, Hydrologia i hydraulika z elementami hydrogeologii. Wyd. Szkol. i Pedagog., Warszawa</p> <p>Kubrak J., 1998, Hydraulika techniczna. Wyd. SGGW, Warszawa.</p> <p>Ozga-Zielińska M., Brzeziński J., 1997, Hydrologia stosowana. PWN Warszawa.</p> <p>Szuster A., Utrysko B., 2008, Hydraulika i hydrologia. Oficyna Wydawnicza Politechniki Warszawskiej.</p> <p>Zieliński A., 2011, Wybrane zagadnienia z mechaniki płynów. Oficyna Wydawnicza PWr, Wrocław.</p> <p>Żmigrodzki Z., Michalski A., Fiedler K., 1961, Budownictwo wodne, wiadomości encyklopedyczne. Wyd. Arkady, Warszawa.</p>	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		

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