GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Hydro engineering facilities in the energy sector, PG_00055975						
Field of study	Power Engineering, Power Engineering, Power Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2026/2027			
Education level	first-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	3		Language of instruction	Polish			
Semester of study	5		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 -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Witold Sterpejkowicz-Wersocki				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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		2.0	18.0		50
Subject objectives	The objective of this course is to present the types of structures and the fundamental design principles for hydraulic engineering facilities associated with the energy sector.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U12] can correctly choose tools (analytical or numerical) to solve engineering problems filtration processes, and data analysis; is able to use photogrammetric and remote sensing tools in engineering tasks in the field of geodetic techniques and metrology	The student is able to select the appropriate calculation formula for determining the discharge through a spillway or outlet. The student is able to assess, using analytical or numerical methods, the potential for excessive seepage to occur within the foundation of hydraulic structures.	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[K6_W16] has an elementary knowledge about energy and environmental construction including building materials, their strength, construction mechanics and building physics, moisture migration in buildings, heat transfer through building partitions, has a basic knowledge of marine and inland hydrotechnical structures; has knowledge of the hydraulic and hydrological conditions of designing facilities and building structures, photogrammetry, remote sensing, hydrography, and spatial analysis.	The student describes the basic types of inland water structures and has knowledge of the hydrological and hydrotechnical conditions of these structures.	[SW1] Assessment of factual knowledge
[K6_U11] Can design and properly dimension basic foundations in hydrotechnical construction facilities; can evaluate and list the loads acting on constructions, knows the codes of modern geotechnical investigations and technologies, knows the principles of foundations and safe design of foundations of typical buildings	The student knows the basic principles of selecting and designing damming structures and other facilities related to hydropower. Is able to collect loads acting on selected hydrotechnical objects.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Course content – lecture

1. Water-retaining structures

2. Hydrotechnical facilities in hydropower generation: the example of hydropower cascades on the Radunia and Gwda rivers

3. Movable and fixed weirs

4. Seepage and uplift beneath water-retaining structures

5. Weir gates and closure mechanisms

6. Water intakes and inlets

7. Diversion canals (dimensioning, bank protection, and sealing)

8. Penstocks and power tunnels

9. Embankment dams – types, sealing, slope protection, and drainage systems

10. Hydropower plants – an introduction

Course content – project

1. Fundamentals of designing a movable weir with a water intake (basic hydraulic calculations for a weir with a water intake leading to a tunnel or power canal).

Prerequisites and co-requisites

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Design task	60.0%	50.0%
	Passing the lecture course	60.0%	50.0%
Recommended reading	Basic literature	1. Budownictwo betonowe tom XVII: Budowle wodne śródlądowe, Wydawnictwo Arkady, Warszawa 1969 2. Depczyński W., Szamowski A.,: Budowle i zbiorniki wodne, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1999 3. Bednarczyk S., Bolt A., Mackiewicz St., : Stateczność oraz bezpieczeństwo jazów i zapór, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2009	
	Supplementary literature	[1] Rozporządzenie Ministra Infrastruktury z dnia 4 maja 2026 r. w sprawie warunków technicznych, jakim powinny odpowiadać budowle hydrotechniczne i ich usytuowanie (Dz.U. 2026, poz. 692)	
	eResources addresses		
Example issues/ example questions/ tasks being completed	1. Selecting the spillway capacity of the weir. 2. Verifying the safe seepage lenght below the weir. 3. Calculating the fill level of the derivation channel.		
Practical activites within the subject	Not applicable		

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