



## Subject card

Subject name and code	Hydro and Marine Engineering [L], PG_00045889						
Field of study	Civil Engineering						
Date of commencement of studies	February 2023	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Optional subject group		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	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	dr inż. Witold Sterpejkowicz-Wersocki					
	Teachers	dr inż. Witold Sterpejkowicz-Wersocki					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	30.0	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	5.0		35.0		100
Subject objectives	Understanding the principles and ways of using the hydroelectric resources of rivers.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W15] has deep and adequate knowledge of civil engineering, within offered specialization and profile	The student deepens knowledge in the field of hydraulic engineering and learns the principles of operation of hydropower plants.			[SW1] Assessment of factual knowledge		
	[K7_W11] has deep knowledge of marine and inland hydrotechnical constructions; has knowledge about hydraulical and hydrological constrains in design and exploitation of buildings	The student describes the principles of selecting the power of hydropower plants and designing intakes and bringing water to the power plant building. The student analyzes the selection of the type of water turbine and the basic electrical and mechanical equipment of the hydroelectric power plant. The student explains the role and importance of hydropower in regulating the power system.			[SW1] Assessment of factual knowledge		
	[K7_W14] knows and applies building codes and obeys the Construction Law; has knowledge on environmental impact of investment realisation	The student knows and can apply the provisions related to technical conditions, which hydrotechnical constructions and their location should meet.			[SW1] Assessment of factual knowledge		
[K7_U14] is able to plan and to interpret the geotechnical investigations, to analyse the foundation stability; can design direct and deep foundations in complex soil conditions for complicated statical and dynamical loads	The student is able to design and check the stability of the foundation of the weir and hydroelectric power plant.			[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools			

Subject contents	<p>LECTURE. Sources and resources of the primary energy of the world. Potential and technical water and energy resources of the world and Poland. The share of hydropower in the production of electricity in the world and Poland. Historical view of use of hydropower. The development of water turbines. Types of hydropower plants (flow, reservoir and pumped-storage). Power selection of hydropower plants. Rules for selecting a turbine, and similarity of water turbines. Actional and reactional water turbines (Pelton, Francis, Kaplan, Deriaz, propeller type). Characteristics of water turbines. Hydroelectric equipment: generators, speed transmissions, power regulators, flywheels, transformers. Solutions of hydroelectric plants. Power channels and pressure pipelines. Hydraulic losses on the water intake to the power plant, on the grates and on the water turbine. Balancing chambers. Small hydropower plants. Water power plant functions in the power system. Selection of basic parameters of earth dams.</p> <p>PROJECT: Project of a flow hydropower plant with a weir. Selection of power, type of turbine and equipment of the hydropower plant.</p>														
Prerequisites and co-requisites	Knowledge in the field of Hydraulic Engineering or Hydro & Marine Civil Engineering.														
Assessment methods and criteria	<table border="1" data-bbox="453 584 1492 723"> <thead> <tr> <th data-bbox="453 584 794 618">Subject passing criteria</th> <th data-bbox="794 584 1139 618">Passing threshold</th> <th data-bbox="1139 584 1492 618">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 618 794 651"></td> <td data-bbox="794 618 1139 651">75.0%</td> <td data-bbox="1139 618 1492 651">40.0%</td> </tr> <tr> <td data-bbox="453 651 794 685"></td> <td data-bbox="794 651 1139 685">60.0%</td> <td data-bbox="1139 651 1492 685">20.0%</td> </tr> <tr> <td data-bbox="453 685 794 723"></td> <td data-bbox="794 685 1139 723">60.0%</td> <td data-bbox="1139 685 1492 723">40.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		75.0%	40.0%		60.0%	20.0%		60.0%	40.0%
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Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Jackowski K.: Elektrownie wodne. WNT Warszawa, 1971.</li> <li>2. Łaski A.: Elektrownie wodne. Rozwiązania i dobór parametrów, Wydawnictwo N-T, Warszawa 1971.</li> <li>3. Budownictwo betonowe. T. XVII Budowle wodne śródlądowe. Pod redakcją W. Balcerskiego. Wydawnictwo Arkady, Warszawa 1969.</li> <li>4. Michałowski S., Plutecki J.: Energetyka wodna, Wydawnictwo Naukowo Techniczne, Warszawa 1975</li> <li>5. Jak zbudować małą elektrownię wodną? Przewodnik inwestora wyd. European Small Hydropower Association ESHA, 2010 cz.1 i 2</li> </ol>													
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Krzyżanowski W.: Turbiny wodne. Konstrukcja i zasady regulacji. WNT Warszawa, 1971</li> <li>2. Hoffmann M.: Małe elektrownie wodne poradnik, Wydanie II, Towarzystwo Rozwoju Małych Elektrowni Wodnych, Gdańsk 1992</li> </ol>													
	eResources addresses	Adresy na platformie eNauczanie:													
Example issues/ example questions/ tasks being completed															
Work placement	Not applicable														