



Subject card

Subject name and code	, PG_00072749						
Field of study	Civil Engineering						
Date of commencement of studies	October 2023		Academic year of realisation of subject		2026/2027		
Education level	first-cycle studies		Subject group		Optional subject group		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	4		Language of instruction		Polish		
Semester of study	7		ECTS credits		5.0		
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 hab. inż. Tomasz Kolerski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	30.0	0.0	0.0	0.0	45
	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	45		0.0		0.0	45
Subject objectives	The aim of the subject is to provide students with knowledge of water resources management, with particular emphasis on water retention, reservoir operation, and flood protection. The subject covers water resources management under normal conditions as well as during floods and droughts. The practical component aims to develop skills in hydrological and hydraulic analysis, flood hazard assessment, and the selection and evaluation of effective flood protection measures.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_K04] Engages in independent lifelong learning and individually follows the development of science and technology in the field of civil engineering.		Is ready to independently expand their knowledge and keep up to date with developments in methods and technologies used in water management and flood protection, particularly in hydrological analysis, hydraulic modelling, and flood hazard assessment.		[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills		
	[K6_K03] Can effectively, clearly and unambiguously convey information, describe activities and communicate their results/ outcomes to engineers or a wider audience using appropriate communication methods and tools.		Can clearly and effectively communicate the results of hydrological and hydraulic analyses, flood hazard assessments, and proposed flood protection measures using appropriate data presentation tools, including maps, charts, and numerical modelling results.		[SK1] Assessment of group work skills [SK2] Assessment of progress of work [SK4] Assessment of communication skills, including language correctness		

Subject contents	Course content – lecture		
	Water resources of the world and Poland, including precipitation and surface water resources and precipitation monitoring. Water retention and small-scale retention measures. Water resources in reservoirs, reservoir operating regimes and storage capacity classification. Characteristic and dependable flows. Principles of reservoir water management, classification of reservoir operating plans, and operational rules under normal conditions and water shortages. Water management during floods and droughts. Operating principles of dry flood retention reservoirs. Structural and non-structural flood protection measures, passive and active flood protection, and the role of flood embankments. Drought as a hydrological phenomenon. Impact of ice processes on water management. Examples of engineering solutions in water management and flood protection.		
	Course content – exercises		
	Comprehensive flood hazard assessment for a selected catchment. Delineation of catchment boundaries and determination of basic hydrographic characteristics. Identification of catchment parameters required for peak flow estimation. Calculation of peak flows for specified exceedance probabilities $Q_{max,p}$. Development of a river hydraulic model using HEC-RAS. Hydraulic simulations, determination of flood extents and inundation depths, and preparation of flood hazard maps. Selection and analysis of flood protection alternatives, including the construction or modernization of flood embankments, increased water retention, and improvements in river conveyance capacity. Comparison of the effectiveness of proposed measures and selection of the recommended flood protection alternative.		
Prerequisites and co-requisites	Basic knowledge of hydraulics and hydrology.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test	60.0%	50.0%
	Three interim reports	60.0%	50.0%
Recommended reading	Basic literature	1. Banasik K., Wałęga A., Węglarczyk S., Więzik B., <i>Aktualizacja metodyki obliczania przepływów i opadów maksymalnych o określonym prawdopodobieństwie przewyższenia dla zlewni kontrolowanych i niekontrolowanych oraz identyfikacji modeli transformacji opadu w odpływ</i> , Stowarzyszenie Hydrologów Polskich, Warszawa 2017. 2. Kolerski T., <i>Praktyczne aspekty gospodarki wodnej w projektowaniu zbiorników retencyjnych</i> , Wydawnictwo Politechniki Gdańskiej, Gdańsk 2014. 3. Ciepeliowski A., <i>Podstawy gospodarowania wodą</i> , SGGW, Warszawa 1999. 4. Państwowe Gospodarstwo Wodne Wody Polskie, <i>Raport z wykonania przeglądu i aktualizacji map zagrożenia powodziowego i map ryzyka powodziowego</i> , 2022, wraz z załącznikami metodycznymi. https://www.powodz.gov.pl/pl/160	
	Supplementary literature	1. Ozga-Zieliński B., <i>Modele probabilistyczne opadów maksymalnych o określonym czasie trwania i prawdopodobieństwie przewyższenia – projekt PMAOTP</i> , Instytut Meteorologii i Gospodarki Wodnej, Warszawa 2022. 2. Biernat B., Bogdanowicz E., Czarnecka H., Dobrzyńska I., Fal B., Karwowski S., Skorupska B., Stachy J., <i>Zasady obliczania maksymalnych rocznych przepływów rzek polskich o określonym prawdopodobieństwie pojawiania się</i> , Warszawa 1991.	
	eResources addresses		
	Example issues/ example questions/ tasks being completed	1. Determination of catchment hydrological parameters and calculation of peak flows for specified exceedance probabilities. 2. Development of a river hydraulic model using HEC-RAS and determination of flood extents for selected flood scenarios. 3. Analysis and comparison of the effectiveness of selected flood protection measures based on hydraulic modelling results.	
Practical activities within the subject	Not applicable		

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