GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Water intakes and water treatment plants. , PG_00059988		
Field of study	Environmental Engineering		
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
Education level	second-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	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
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. Beata Jaworska-Szulc	
	Teachers		

Lesson types	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	38.0	103

Subject objectives	
	Familiarize students with water intakes and treatment issues. The types of water intakes (surface, geoundwater and sea water). Students design a small groundwater intake using a drilled well. Water intakes in the Gdańsk area. The student acquires the necessary knowledge regarding issues related to the purpose, construction and principles of operation of devices at water treatment plants.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_W07	Students are able to select the treatment technology depending on the quality, composition and origin of the treated water. They design a water treatment plant, select and calculate the station's equipment.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
K7_U10	Students design a water intake, carry out a technical project, select pipes, filter, pump and drilling technology depending on the hydrogeological conditions found. Students becomes acquainted with water intakes in the Tricity region, they analyze the methods of water collection and treatment.	[SU5] Assessment of ability to present the results of task [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
K7_U06	Student are able to select the type of intake to the existing environmental conditions. Design a water intake, calculate intake resources, analyze water quality and propose a treatment method. Based on geological databases they describe the hydrogeological conditions of the groundwater intake, identifie threats and analyze the possibilities of water protection.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
K7_W06	Students design a water treatment plant, perform calculations of selected treatment devices, prepare a site and height plan and a height diagram.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge

Subject contents

Course content – lecture

LECTURE

Types of water intakes: surface water intakes, groundwater intakes, sea water intake systems. Examples of different types of intakes in Poland and around the world. Designing a groundwater intake using a drilled well. Water intakes in the Tri-City area.

Surface water treatment - basic principles, technological lines. Groundwater treatment - basic principles, technological lines. General basics of SUW design. Selected water treatment devices (purpose, types, structure, operating principle, design guidelines): mixers, reaction (flocculation) chambers, settling tanks, filters, aerators, water disinfection devices, clean water tanks.

PROJECT

Students design an intake: determine the geological profile in the location of the planned intake, prepare a technical design of the well (selection of filter, pipes, pump, drilling methods). Students use geological databases to describe the hydrogeological conditions of water intakes and to assess the groundwater protection zones. Trips to water intakes.

Construction of a height plan, Construction of a height diagram. Calculations and selection of devices and facilities: mixers, reaction chambers, settling tanks, rapid filters, clean water storage tanks, technological pipelines.

Prerequisites and co-requisites

Mastered knowledge of the subject Water technology and Hydrogeology course

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	SUW project	60.0%	20.0%
	SUW test	60.0%	30.0%
	Water inteke project	60.0%	20.0%
	Water intakes test	60.0%	30.0%
Recommended reading	Basic literature	1. Budziło B., Wieczysty A., 2007, Projektowanie ujęć wody powierzchniowej. 2. Suszczewski, 1968 Ujęcia wody powierzchniowej. 3. Gabryszewski, Wieczysty 1985, Ujęcia wód podziemnych. 4. Gonet i in.,2011, Instrukcja obsługi wierceń hydrogeologicznych. 5. Kovalevsky, Kruseman, Rushton, UNESCO, 2004, Groundwater studies, An international guide for hydrogeological investigations. 6. Heidrich Z.: Urządzenia w uzdatnianiu wody. Warszawa: Arkady 1987. 7. Kowal A., Świderska-Bróż M.: Oczyszczanie wody. Warszawa-Wrocław: Wyd. Nauk. PWN 1996. 7. Nawrocki J., Biłozor S.: Uzdatnianie wody. Procesy chemiczne i biologiczne. Warszawa: PWN 2000	
	Supplementary literature	1. V.GNANESWAR GUDE, 2018, SUSTAINABLE DESALINATION HANDBOOK, Plant Selection, Design and Implementation. 2. Gonet i Macuda 2004, Wiertnictwo hydrogeologiczne, Wydawnictwo AGH. 3. Obarska-Pempkowiak H.: Technologia Wody. Gdańsk: Wyd. Politechniki Gdańskiej 1997. 4. M. Sozański, P.M. Huck.: Badania doświadczalne w rozwoju technologii uzdatniania wody. Monografie PAN, vol.42, Lublin 2007. 5. A. Bauer, G. Dietze, W. Muller, K. J. Soine, D. Weideling.: Poradnik eksploatatora systemów zaopatrzenia w wodę. Wyd. Seidel-Przywecki, Warszawa 2005. 6. Z. Heidrich.: Wodociągi i Kanalizacja cz. 1. Wodociągi. Wyd. Szkolne i Pedagogiczne, Warszawa 1992.	
	eResources addresses		

Example issues/ example questions/ tasks being completed	What are the applications of MAR systems in water intakes (managed aquifer recharge)? What should be the distance between the well and infiltration basin in shore intakes? Give examples of a radial well intake / drainage intake / infiltration intake. What are the advantages of open / underground systems capturing sea water? Select and arrange in the appropriate order the devices used at the underground water treatment plant Select and arrange in the appropriate order the devices used at the surface water treatment plant Sketch a hydraulic partition mixer (or other device from among those discussed during the lectures)
Practical activites within the subject	Not applicable

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