



Subject card

Subject name and code	Sewerage Systems, PG_00042530						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	3	ECTS credits			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Ryszard Orłowski					
	Teachers	dr inż. Ryszard Orłowski dr inż. Maria Orłowska-Szostak					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	10.0	10.0	0.0	0.0	35
	E-learning hours included: 0.0						
Additional information: in accordance with the approval of the application, lectures are delivered partly online							
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	35		5.0		85.0	125
Subject objectives	The focus of the subject is to supply students with the ordered, possibly complete knowledge and ability enabling carrying out design as well as analytical works for sanitary and storm water sewage systems with the use of professional computer subroutines. Some special focus of the subject is teaching students some proper use of the subroutines basing on dipped knowledge from the area of peak outflow diversity and peak flow requirement in pipes creating sewage network and also from the area of hydraulics and technical properties of some state of the art sewage systems.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_W04] knows the basic automation methods, techniques, tools and systems used to solve complex engineering tasks in modeling, optimization and control of processes, objects and systems in environmental engineering	He has a knowledge in the scope of methods of the computer modelling of the sewer networks, of automation, remote control and of optimization methods and analysis of the reliability of engineering systems.	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge
	[K7_U06] can use the known mathematical methods and models, if needed, to modify them, for: analysis and design of water systems and their components or water flows, migration of pollutants or water and wastewater treatment and sewage sludge handling	He can use computer models for solving problems of analysis or design of the sewer systems.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
	[K7_U14] can technically and economically analyze and evaluate the solutions and functioning of facilities and systems in the sanitary engineering or flood protection, water intakes and water infrastructure or water and wastewater treatment plants; can assess the suitability and potential of using new achievements in materials, fixtures, devices and methodologies for designing and modeling the analyzed technical infrastructure and industrial objects, including innovative solutions	He has some widened and deepened knowledge in a range of sewer systems design and the systems draining off water from the urbanized area; he knows modern technologies in the object systems and professional computer programs assisting the design.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information
	[K7_W06] has deepened, structured and theoretical knowledge related to hydraulics used in the construction, operation, operation of networks and plumbing, sewage, heating, ventilation or water treatment plants and wastewater treatment facilities	When designing developed system of a sanitary sewage system and the systems draining off water from the urbanized area he is using the deepened knowledge in the range of applied hydraulics	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
	[K7_U12] can design: developed water and sewage system, complex heat source, pool water treatment technology, mechanical ventilation installation or underground water intake, drainage of urban water catchment, reservoir control system during flood seizure or water treatment technology, domestic waste water treatment plant	He is able to analyze functioning of the sanitary sewage system and the systems draining off water from the urbanized area using the computer modelling.	[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
Subject contents	LECTURES (A) Mathematical modeling and dimensioning systems transporting wastewater. Gravity sewerage network: The content of a set of calculations: (amount of sewage flowing into the sewage system, hydraulic calculations), classification of well known mathematical methods used in sewage and storm water drainage system. A method of aggregation of discharges in the nodes and a uniform flow. The method of aggregation of discharges in the nodes and the determination of swelling curves. Computer modeling of unsteady flows in the network. Gravity drainage network: A method of constant rain intensity. Method based on some conceptual model. Computer modeling of unsteady runoff in urban catchments. Sanitary sewers systems other than gravity: Dimensioning sewerage pressure systems by simulating extreme situations. Dimensioning of the vacuum sewerage system by simulating extreme situations. (B) Mathematical methods in optimization of sewer systems. The problem of global optimization of the sewage system. Optimization of the gravity-pumping system for the given routes of sewage transport. AUDITORIAL CLASSES Overview of professional software for computer-aided-design sewage system. Principles and examples of use of this software in designing the network and sewage pumping stations. LABORATORY CLASSES Individual fragments of sewage projects constructed with the use of professional software company directories matched equipped devices.		
Prerequisites and co-requisites	Passed the basic program of Sewage systems. Knowledge of basis of hydraulics, description of channel flow. Basic knowledge of numerical methods; general knowledge of methods of solving of sets of nonlinear equations. Knowledge of Auto Cad program.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	65.0%	55.0%
	Elaborating and passing the design work (laboratory)	65.0%	45.0%

Recommended reading	Basic literature	1. Błaszczyk Wł. i in. Kanalizacje t. I: Sieci i pompownie, Warszawa: Arkady 1979r. i kolejne wznowienia 2. wyd. WILO: Kanalizacja ciśnieniowa w systemie WILO PORADNIK dla projektantów, Warszawa 2002r. 3. wyd. ROEDIGER POLSKA: System kanalizacji próżniowej przeznaczony do odprowadzania ścieków z obszarów zabudowanych, Białystok, Gdańsk, Bielsko-Biała, 2001r. 4. Katalogi firmowe / poradniki dla projektantów dostępne w Internecie: PipeLife, WAVIN, HOBAS, GRUNDFOS, WILO in. 5. Orłowska M., Orłowski R.: Wymiarowanie kanalizacji ciśnieniowej. W: materiałach II Konferencji Naukowo Technicznej INSTALACJE WODOCIĄGOWE I KANALIZACYJNE PROJEKTOWANIE WYKONAWSTWO EKSPLOATACJA. Warszawa Dębe, 15-16.05.2007r.
	Supplementary literature	1. Findeisen, Wł. (1985). Analiza systemowa. PWN, Warsaw, Poland. 2. Szymkiewicz R.: Metody numeryczne w inżynierii wodnej, Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2007  2. Nowogoński Ireneusz: Epa SWMM 5.1Wykorzystanie i rozbudowa modelu sieci kanalizacyjnej, 2018-04-25
	eResources addresses	Adresy na platformie eNauczanie: Kanalizacje (z projektem komputerowym) - niestacjonar_2023/2024 - Moodle ID: 32471 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32471">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32471</a>
Example issues/ example questions/ tasks being completed	Dimensioning sewerage pressure systems by simulating extreme situations.  Elaboration of design of sewage network with the use of professional software.	
Work placement	Not applicable	