



Subject card

Subject name and code	Sewerage systems, PG_00043651						
Field of study	Environmental Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Obligatory subject group 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	6	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	prof. dr hab. inż. Ewa Wojciechowska					
	Teachers	prof. dr hab. inż. Ewa Wojciechowska dr inż. Karolina Matej-Lukowicz					
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	8.0		60.0	128	
Subject objectives	The aim of this subject is to get the student acquainted with the basic knowledge concerning construction, design and operation of sewerage systems as well as sewer materials and exploitation equipment. The student should gain abilities to design and calculate sewerage systems, select necessary equipment, proper use of terminology, literature, data bases, producers' catalogues as well as understand the social and ecological aspects of sewerage systems construction, operation and maintenance.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U12] can design installations, networks and facilities: water supply, sewage, heating and gas	During realization of project in two-person teams the student plans and makes subsequent design stages and calculations according to the time-schedule.	
	[K6_U13] knows the rules of application and can choose the materials of the sanitary industry	Student knows the applications of materials in sanitary sector and understands the principles of material selection in sanitary and storm sewers.	
	[K6_W07] has a structured and theoretically founded knowledge in the field of materials used in the sanitary industry, their physico-chemical properties; knows and understands the basic processes of their production	Student knows the latest and the traditional technologies applied in sewerage systems.	
	[K6_W09] has ordered, theoretically founded knowledge in the field of water supply, sewage, heating, ventilation and air conditioning, and the principles of shaping the microclimate of rooms; knows legal regulations, standardization issues and recommendations for the design of water supply, sewage, heating and gas networks and installations	Student has systematic knowledge on the sewerage systems, the calculations and design principles.	
[K6_U03] can prepare documentation regarding the implementation of an engineering task/project and prepare a text or presentation including a discussion of the results of the implementation	Student can prepare conceptual project of different size sewerage system.		
Subject contents	<p>Lectures: Classification of sewerage systems depending on combined and separate transport of wastewater and stormwater. Gravitational sewers, pressure and vacuum sewers. Quantitative estimations of sanitary wastewater, industrial wastewater and stormwater. Types and shapes of sewer cross-sections. Material and construction of sewers - traditional and new. The sewers foundation in the ground. Hydraulic calculations of gravitational sewers. Sewerage equipment: manholes, stormwater overflows, siphones, separators. Pumping and lift stations. Operation and exploitation of sewer systems. Trenchless technologies of construction and renovation of sewers. Sustainable stormwater management.</p> <p>DESIGN: Design of gravitational separate sewer system for a medium-size city. Sewer routing, location of wastewater treatment plant, location of calculation nodes. Division into sub-catchments due to spatial management and terrain configuration. Calculation of wastewater and stormwater flow rates. Sewer profiles and hydraulic calculation of sewers. Design of pumping station and pump selection. Technical description.</p>		
Prerequisites and co-requisites	Does not apply		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	exam	50.0%	50.0%
	design project	50.0%	50.0%
Recommended reading	Basic literature	<p>Edel R.: Odwodnienia drogowe. WKiŁ Warszawa 2008 Imhoff K., Imhoff K.-R.: Kanalizacja miast i oczyszczanie ścieków. Poradnik. Projprzem-EKO, Bydgoszcz 1996 Kotowski A.: Podstawy bezpiecznego projektowania kanalizacji. Wydawnictwo Seidel Przywecki, Warszawa 2012 Weinerowska Bords K.: Rola uproszczeń w modelach obliczeniowych kanalizacji deszczowej. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2010 Kanalizacja. Praca zbiorowa pod red. Z.Suligowskiego. Wydawnictwo Seidel Przywecki, Warszawa 2012 Technologie bezwykopowe w inżynierii środowiska. Praca zbiorowa pod red. A.Kuliczowskiego. Wydawnictwo Seidel Przywecki, Warszawa 2010 Madryas C., Kolonko A., Wysocki L.: Konstrukcje przewodów kanalizacyjnych. Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2002</p>	

	Supplementary literature	<p>Producentów Rur i Kształtek z Tworzyw Sztucznych. Toruń 2010 Kotowski A., Kaźmierczak B., Damcewicz A.: Modelowanie opadów do wymiarowania kanalizacji Polska Akademia Nauk. Komitet Inżynierii Lądowej i Wodnej. Instytut Podstawowych Problemów Techniki. Studia z zakresu inżynierii. Nr 68. Warszawa 2010 Dziopak J.: Analiza teoretyczna i modelowanie wielokomorowych zbiorników kanalizacyjnych. Politechnika Krakowska, Kraków 1992 Kisiel A.: Hydrauliczna analiza działania grawitacyjno - podciśnieniowych zbiorników kanalizacyjnych. Politechnika Krakowska, Kraków 1998 Kwietniewski M.: GIS w wodociągach i kanalizacji. PWN Warszawa 2008 Licznar P.: Generatory syntetycznych szeregów opadowych. Wydawnictwo Uniwersytetu Przyrodniczego, Wrocław 2009 Mielcarzewicz E.: Odwadnianie terenów zurbanizowanych i przemysłowych. Systemy odwadniania. PWN, Warszawa 1990 Dziopak J.: Modelowanie wielokomorowych zbiorników retencyjnych w kanalizacji. Monografia Politechniki Rzeszowskiej. Rzeszów, 2004 Kuliczkowski A.: Rury kanalizacyjne t. I: Własności materiałowe. Politechnika Świętokrzyska - Monografie, Kielce 2001 Weismann D.: Komunalne przepompownie ścieków. Seidel Przywecki, Warszawa 2000 Zwierzchowska A.: Optymalizacja doboru metod bezwykopowej budowy rurociągów. Monografia nr 38. Wydawnictwo Politechniki Świętokrzyskiej, Kielce 2003</p>
	eResources addresses	<p>Adresy na platformie eNauczenie: Kanalizacja - 6 semestr rok akad 2023/24 - Moodle ID: 29879 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29879</p>
Example issues/ example questions/ tasks being completed	<p>Design of separate sewerage system for a medium-size city</p> <p>Routing of sewers.</p> <p>Calculation of flow rates (sanitary and stor sewers).</p> <p>Sewer dimensioning.</p> <p>Sewer profiles drawing</p>	
Work placement	Not applicable	