GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	MEASUREMENT AND CONTROL IN SANITARY ENGINEERING, PG_00043418		
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 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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
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. Maria Orłowska-Szostak dr inż. Ryszard Orłowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	15.0	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	5.0	35.0	85

Subject objectives

The aim of the course is to familiarize students with the subject of control and measurements in installations and networks of sanitary industry that are performed with the use of modern technologies. An important objective of the course is also to explain specific technical issues occurring in controlled installations and networks, control algorithms, hydraulic issues and used in this control static fittings, direct action fittings, free-program controllers et al. The aim of the course is also to familiarize students with a wide range of measurements performed in sanitary engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	Has a structured and founded knowledge of the networks and installations of the sanitary industry. This knowledge allows him to properly design control and regulations of these systems.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
[K6_W11] has elementary knowledge of electrical devices and installations as well as basics of control and automation	Has extended knowledge in the field of control and adjustment of sanitary installations and so the devices and fittings used in control and adjustment.	[SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects

Subject contents	LECTURES: 1. Stepless control of pump operations, theoretical principle; Seashell characteristics of the pump as an introduction to issues related to installation control. 2.The issue of controlling flows in Water Transport & Distribution Systems (WT&DS) using a stepless regulation of pump operation (pressure control and control in systems with storage tanks; Intelligent control). 3. Cold water installations: required pressure on the street network, ways of connecting to the street network depending on the pressure on the network and the height of the building, aggregates with stepless pump operation regulation, pressure reduction valves; hydraulics, control, technical and economic advantages of stepless control. 4. Central heating installations**:** installation diagrams, weather regulation - a five-stage cascade of installation regulation. 5. Central hot potable water installations**:** Installation diagrams, circulation adjustment in central hot potable water installations (adjustment of the circulating pump operation, fittings under verticals). 6. Basic elements of traditional issues related to the field of sanitary technology, i.e. the hygienic and sanitary rooms, mainly in industrial plants. Design exercises and laboratory classes: 1. Individual presentations on a wide range of the regulatory fittings in installations. 2.Individual presentations on a wide range of the drivers used to control installations. 3.Individual presentations on a wide range of measurements performed in sanitary engineering.
Prerequisites and co-requisites	Passed courses of study including: Sanitary installation, Central heating, Water supply systems Sevage systems, Hydraulics.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
written work on the subject of the lectures	90.0%	50.0%
preparation and presentation of a paper	90.0%	25.0%
design exercise	90.0%	25.0%

Recommended reading	Basic literature	Orłowska-Szostak M., Orłowski R.: Cyrkulacja w instalacjach centralnej ciepłej wody użytkowej; budowa modelu komputerowego, algorytmy wymiarowania i sposoby regulacji, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2016 r. Ewa Zaborowska: Zasady projektowania wodnych węzłów ciepłowniczych , Wydawnictwo Politechniki Gdańskiej, Gdańsk (wyd.7) 2019 Orłowski R.: Przegląd operacji dokonywanych na charakterystykach przy doborze pomp. Gaz, Woda i Technika Sanitarna, nr 8/1982, 135-137. Orłowski R.: Techniczne i ekonomiczne aspekty płynnego sterowania pracą pomp w systemach i instalacjach wodociągowych, kanalizacyjnych, ciepłej wody i c. o.. Gaz Woda i Technika Sanitarna, nr 12/1999. p. 449-458. Wyd. WILO: Kanalizacja ciśnieniowa w systemie WILO PORADNIK dla projektantów, Warszawa 2012r. Wyd. ROEDIGER POLSKA: System kanalizacji próżniowej przeznaczony do odprowadzania ścieków z obszarów zabudowanych, Białystok, Gdańsk, Bielsko-Biała, 2008 r. L. Kołodziejczyk, S. Mańkowski, M. Rubik: Pomiary w inżynierii sanitarnej(sugerowane nowsze wydania, raczej z 2000 roku lub nowsze) C. Madryas, B. Przybyła, L. Wysocki: Badania i ocena stanu technicznego przewodów kanalizacyjnych (2010)
	Supplementary literature	Firmowe katalogi techniczne aktualnej armatury regulacyjnej i automatyki instalacyjnej oraz firmowe poradniki dla inżynierów dostępne m.in. w Internecie**:** instalacji i sieci wodociągowych (głównie GRUNDFOS**:** https://pl.grundfos.com/support/dokumentacja-techniczna/katalogi-techniczne.html), instalacji wodnych grzewczych i cieplej wody (głównie Danfoss**:** https://www.automatyka.pl/produkty/producent:Danfos?page=1#paginator). Dz. U. RP Nr 75 z dn. 15 czerwca 2002r.: Rozporządzenie Nr 690 Min. Infrastruktury z dn. 12 kwietnia 2002r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie (patrz rozdz. 4 i 6 dot. pomieszczeń higieniczno-sanitarnych). Goliszewski J.: Technika sanitarna, PWN, Wrocław-Poznań,1999r. Goliszewski J., Piotrowska H.: Technika sanitarna, Wyd. Szkolne i Pedagogiczne, Warszawa, 1998r.
	eResources addresses	Podstawowe https://pl.grundfos.com/support/dokumentacja-techniczna/katalogi-techniczne.html - technical catalogs of control fittings and installation automation as well as guides for engineers in the field of water supply installations and networks Uzupełniające Adresy na platformie eNauczanie: Pomiary i Sterow. w Inż.Sanit., stacjon., VIsem inż. 2023/2024 - Moodle ID: 35976 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35976

Example issues/ example questions/ tasks being completed	Discussion of the Weather Adjustment Design of Central Heating. Discussion of the control of the central hot potable water circulation regulation project (Classic variant and variant with TOCCW). Discussion of the pressure regulation project in the water supply installation. Individual presentations on the regulatory fittings in installations. Individual presentations on the drivers used to control installations. Individual presentations on a wide range of measurements performed in sanitary engineering.
Work placement	Not applicable