GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00059978		
Field of study	Environmental Engineering		
Date of commencement of studies	February 2024	Academic year of realisation of subject	2024/2025
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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Faculty of Civil and Environmental Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Piotr Zima	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	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	5.0	30.0	80

Subject objectives

To acquaint students with the techniques and measuring devices used in sanitary engineering. Objectives of State Environmental Monitoring.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U08] is able to assess risks in the implementation of engineering projects and implement appropriate safety rules	The student is able to assess the threats affecting the measurement and its accuracy. Can take this into account when estimating measurement uncertainty.	[SU3] Assessment of ability to use knowledge gained from the subject
K7_U07	The student is able to plan and conduct an experiment or laboratory or field study leading to the assessment of the effectiveness of the solutions used in environmental engineering.	[SU4] Assessment of ability to use methods and tools
K7_W03	The student has in-depth, structured and theoretically based knowledge related to environmental measurement, management and monitoring.	[SW1] Assessment of factual knowledge
K7_U02	The student is able to solve problems related to measurements while working in a team.	[SU1] Assessment of task fulfilment
K7_W05	The student is able to use knowledge of surveying in construction and determine their impact on the environment.	[SW1] Assessment of factual knowledge

Subject contents	Lecture:Definition of measurement and terms related to it. Development of measurement results, basic concepts, elements of error calculus. Temperature measurements, measurement methodology, measuring instruments, temperature scales. Measurement of air pressure and humidity, measurement methodology, classification of pressure measuring instruments, units. Measurements of the level of liquids and solids, measurements from the reservoir, measurements in the duct. Liquid velocity measurement, measurement methods, speed measuring instruments. Measurement of point speed and average velocity of flowing liquid. Measurements of the quantity and flow rate of liquids. Measurements in natural channels and streams. Measurements of water and sewage flow. Methodology of measurements, measuring instruments. Measurements in unlimited space, in open channels, in pressure ducts. Measurements of pulsation flows. Measurements of some physical properties of bodies. Density and viscosity measurements. Measurement of the density and location of the activated sludge. Physicochemical measurements. Basic concepts, research methodology, measuring instruments. Sampling equipment. Selected issues of complex measurements. Objectives of State Environmental Monitoring. Laboratory:Calculation of measurement errors, determination of the confidence interval, uncertainty and repeatability of the measurement. Measurements of temperature, pressure and humidity by various methods. Measurements of velocity in the open channel based on the measurement of the average velocity in the channel by means of various speed measurement methods. Flow rate measurements using primary elements, ie transfers, thresholds, orifice channels. Determining the velocity distribution in the cross-section, calculating the flow rate by various methods. Determining the concentration and charge of basic physico-chemical quantities.
Prerequisites and co-requisites	Knowledge of basic computer skills, knowledge in the subject of mathematics, physics and plumbing.
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Practical exercises	60.0%	50.0%
Written exam	60.0%	50.0%

Recommended reading	Basic literature	Kołodziejczyk L., Rubik M., (1980), Pomiary w inżynierii sanitarnej, Warszawa, Arkady. Piotrowski J. i wsp. (2009), Pomiary. Czujniki i metody pomiarowe wybranych wielkości fizycznych i składu chemicznego, Warszawa, WNT. Michalski A. (2004), Pomiary przepływu wody w kanałach otwartych, Warszawa, Oficyna Wydawnicza Politechniki Warszawskiej. Różdżyński K., (1998), Miernictwo hydrologiczne , Warszawa, IMGW. BIPM, (1999), Wyrażenie niepewności pomiaru. Przewodnik, Warszawa, GUM.
	Supplementary literature	Grant D.M., Dawson B.D., (2001), Open Channel Flow Measurement Handbook, Lincoln, Nebraska, Isco Inc.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Temperature measurement methodsPressure measurement methodsMethods for measuring the speed and flow of water and sewageFlow rate measurement by means of hydraulic devicesPhysico-chemical measurements	
Work placement	Not applicable	