GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Measurements and Monitoring in Environmental Engineering, PG_00059978 | | |
| 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<br>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 -> Faculties of Gdańsk University of Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Piotr Zima | |
| | Teachers | | |

**Lesson types**

| 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 |

<table>
<tr><td>Subject contents</td><td>Course content – lecture<br><br>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.<br>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.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of basic computer skills, knowledge in the subject of mathematics, physics and plumbing.</td></tr>
<tr><td>Assessment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Practical exercises</td><td>60.0%</td><td>50.0%</td></tr><tr><td>Written exam</td><td>60.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td>Recommended reading</td><td><table><tr><td>Basic literature</td><td>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.</td></tr><tr><td>Supplementary literature</td><td>Grant D.M., Dawson B.D., (2001), Open Channel Flow Measurement Handbook, Lincoln, Nebraska, Isco Inc.</td></tr><tr><td>eResources addresses</td><td></td></tr></table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Temperature measurement methodsPressure measurement methodsMethods for measuring the speed and flow of water and sewageFlow rate measurement by means of hydraulic devicesPhysico-chemical measurements</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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