GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Environmental Measurements and Monitoring, PG_00071929 | | |
| Field of study | Circular economy and water management | | |
| Date of commencement of studies | October 2026 | Academic year of realisation of subject | 2026/2027 |
| Education level | second-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 | 1 | Language of instruction | English |
| Semester of study | 1 | ECTS credits | 3.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Department of Geotechnical and Hydraulic Engineering -> 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 | 15.0 | 0.0 | 30.0 | 0.0 | 0.0 | 45 |

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=7952

**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 | 25.0 | 75 |

**Subject objectives**

Acquaint the student with the techniques and measuring devices used in environmental engineering

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_W03] demonstrates an advanced understanding of the applications of analytical, numerical, and conceptual methods and tools for solving problems related to both water management and the circular economy, including the analysis and regulation of resource flows (water, energy, materials) in environmental and technical systems. | The student possesses in-depth, structured, and theoretically grounded knowledge related to environmental measurements, management, and monitoring. | [SW1] Assessment of factual knowledge |
| [K7_U03] applies analytical, numerical, and experimental tools and methods at an advanced level to solve practical problems related to both water management and the circular economy, including the optimization of resource flows and technological processes. | The student applies analytical, numerical, and experimental tools and methods in an in-depth manner to solve practical problems related to both water management and the circular economy, including the optimization of resource flows and technological processes. | [SU2] Assessment of ability to analyse information |
| [K7_K03] clearly communicates the results of their work and activities, engages in lifelong learning, and adheres to professional ethics. | The student clearly communicates the results of their work and activities, engages in lifelong learning, and adheres to the principles of professional ethics. | [SK5] Assessment of ability to solve problems that arise in practice |

<table>
<tr><td>Subject contents</td><td>Course content – lecture<br><br>The measurement definition and terms associated with it. Development of performance measurement, basic concepts, elements of the calculus of errors. Measurements of the temperature, measurement methodology, measuring instruments, temperature scales. Measurements of pressure and humidity, measurements methodology, classification of instruments for measuring pressure, units. Level measurement of liquids and solids, measurements in the reservoirs and channels. Measurement of fluid velocity, measurements methods, instruments for measuring water velocity. Point and average measurement of water velocity. Measurements of volume and liquid flow rate. Measurements in the artificial and natural channels. Measurements of the flow of water and wastewater. Methods of measurement, measuring instruments. Measurements in the unlimited space, in the open channels, in the pressure lines. Measurements of pulsating flow. Measurements of certain physical properties of bodies. Measurements of density and viscosity. Measurement of density and location of the activated sludge. Physico-chemical measurements. Basic concepts, research methodology, measuring instruments. Sampling device. Selected aspects of the complex measurements.<br><br>Course content – laboratory<br><br>Execution of exercises to develop measurements of the various instruments. The measurement errors calculus, the definition of confidence, uncertainty and repeatability. Converting the results to the so-called. normal conditions. Taking into account the environmental conditions during the measurements. Development of point measurements, calculating the average values. Determining the discharge in cross-section from point measurements of water velocity. Characteristic curve of natural flows in the natural channels and flumes. Physico-chemical measurements. The development of complex measurement results. Laboratory program: Laboratory course will take place in groups. Six exercises are expected. Measurements of temperature, pressure and humidity in different ways. Velocity measurements in the open channel by measuring the average velocity in the channel using devices that use different methods to measure water velocity. Flow measurement using the primary elements such as weirs, thresholds, Venturi flumes. Determination of the velocity distribution in cross section, the calculation of flow rates in different ways. Determining the concentration and load of the fundamental physico-chemical properties.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of basics computer and mathematics, physics and hydraulics.</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>Written exam</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Practical exercise</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></td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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