

## 。 GDAŃSK UNIVERSITY OF TECHNOLOGY

## Subject card

| Subject name and code                          | Water Technology I, PG_00059089   |   |   |                                     |         |  |            |     |
|--|---|---|---|-------------------------------------|---------|--|------------|-----|
| Field of study                                 | Environmental Engineering   |   |   |                                     |         |  |            |     |
| Date of commencement of studies                | October 2022  |   | Academic year of<br>realisation of subject  |                                     |         | 2024/2025  |            |     |
| Education level                                | first-cycle studies   |   | Subject group   |                                     |         | Obligatory subject group in the<br>field of study<br>Subject group related to scientific<br>research in the field of study   |            |     |
| Mode of study                                  | Part-time studies   |   | Mode of delivery  |                                     |         | at the university  |            |     |
| Year of study                                  | 3   |   | Language of instruction   |                                     |         | Polish   |            |     |
| Semester of study                              | 5   |   | ECTS credits  |                                     |         | 4.0  |            |     |
| Learning profile                               | general academic profile  |   | Assessment form   |                                     |         | assessment   |            |     |
| Conducting unit                                | Department of Enviro  | Department of Environmental Engineering Technology -> Faculty of Civil and Environmental Engine |   |                                     |         |  | igineering |     |
| Name and surname                               | Subject supervisor  |   | dr hab. inż. Ra   | afał Bray                           |         |  |            |     |
| of lecturer (lecturers)                        | Teachers  |   |   |                                     |         |  |            |     |
| Lesson types and methods                       | Lesson type   | Lecture   | Tutorial  | Laboratory                          | Project |  | Seminar    | SUM |
| of instruction                                 | Number of study hours   | 16.0  | 0.0   | 16.0                                | 3.0 0.0 |  | 0.0        | 32  |
|  | E-learning hours included: 0.0  |   |   |                                     |         |  |            |     |
| Learning activity<br>and number of study hours | Learning activity   | Participation in<br>classes includ  | n didactic<br>ed in study   | Participation in consultation hours |         | Self-study   |            | SUM |
|  | Number of study hours   | 32  |   | 1.0                                 |         |  |            | 101 |
| Subject objectives                             | Student will acquire the necessary knowledge on issues related to the implementation of unit processes used in water treatment plants.  |   |   |                                     |         |  |            |     |
| Learning outcomes                              | Course outcome  |   | Subject outcome   |                                     |         | Method of verification   |            |     |
|  | [K6_U09] is able to use well-<br>chosen methods and measuring<br>devices that enable determination<br>of basic parameters of the water<br>treatment process and wastewater<br>treatment; can perform simple<br>laboratory tests leading to the<br>assessment of water quality,<br>pollutant load in sewage                      |   | The student is able to use properly<br>selected methods and measuring<br>devices to determine the basic<br>parameters of the water treatment<br>process; can perform simple<br>laboratory tests leading to water<br>quality assessment.   |                                     |         | [SU1] Assessment of task<br>fulfilment<br>[SU2] Assessment of ability to<br>analyse information<br>[SU3] Assessment of ability to<br>use knowledge gained from the<br>subject<br>[SU4] Assessment of ability to<br>use methods and tools |            |     |
|  | [K6_U10] can design basic<br>equipment for water treatment,<br>wastewater treatment and sludge<br>and waste management  |   | The student is able to design basic water treatment devices.  |                                     |         | [SU3] Assessment of ability to<br>use knowledge gained from the<br>subject   |            |     |
|  | [K6_U01] has the ability to self-<br>education, can obtain information<br>from literature, databases and<br>other sources, uses information<br>technology, Internet resources;<br>can integrate the obtained<br>information, make their<br>interpretation, as well as draw<br>conclusions and formulate and<br>justify opinions |   | The student has the ability to self-<br>study, is able to obtain information<br>from literature, databases and<br>other sources, uses information<br>technologies, Internet resources;<br>is able to integrate the obtained<br>information, interpret it, as well as<br>draw conclusions and formulate<br>and justify opinions. |                                     |         | [SU2] Assessment of ability to<br>analyse information<br>[SU3] Assessment of ability to<br>use knowledge gained from the<br>subject  |            |     |
|  | [K6_W03] has a structured and<br>theoretically founded knowledge in<br>the field of chemistry and biology,<br>including knowledge necessary to<br>understand the technological<br>processes related to water<br>treatment, wastewater treatment,<br>waste management and sludge<br>management                                   |   | The student has structured and<br>theoretically founded knowledge in<br>the field of chemistry and biology,<br>including the knowledge<br>necessary to understand the<br>technological processes related to<br>water treatment.   |                                     |         | [SW3] Assessment of knowledge<br>contained in written work and<br>projects<br>[SW1] Assessment of factual<br>knowledge   |            |     |

| Subject contents   | Lectures: Water in nature and its physical an chemical characteritic. The quality of groundwater and surface water. The requirements concerning the quality of drinking water and industrial water. The removal of admixtures and contaminant forming heterogeneous body. Water clarification and sedimentation. The coagulation of water contaminants. Coagulants, flocculants and substances supporting the coagulation. The factor limiting coagulations. Volumetric coagulation. Surface coagulation. Contact coagulation in suspended precipitate. Water filtration. Pressure and gravity filter. Organic mikrocontaminants removal in sorption processes. Water desinfection. Physical methods of desinfection. Chemical oxidizing substances in water disinfection: chlorine, dioxide chlorine, ozone. The removal of admixtures and contaminants forming homogenous body. Iron compounds removal. manganese compounds removal. The equipment applied to the iron and manganese removal from water. Ion exchange processes, the types of ion exchange. Removing of carbonate hardness and demineralization of water in ion exchanging processes. Water degasification. Water stabilization. Laboratories: The introduction to the laboratory classes. Physical-chemical determination of selected contaminants of natural waters. Thermical and chemical degasification. Ion exchange. Coagulation. Removal of iron in water. The revision. Test |   |                               |  |  |  |  |
|--|---|---|-------------------------------|--|--|--|--|
| Prerequisites<br>and co-requisites                             | Good knowledge of subject Environmental protection (SSPK15), Chemistry (SSPK7) and Environmental biology and ecology (SSPK18)   |   |                               |  |  |  |  |
| Assessment methods and criteria                                | Subject passing criteria  | Passing threshold   | Percentage of the final grade |  |  |  |  |
|  | Written exam  | 60.0%   | 60.0%                         |  |  |  |  |
|  | Practical exercise  | 60.0%   | 40.0%                         |  |  |  |  |
| Recommended reading  | Basic literature  | <ul> <li>[1] Heidrich Z.: Urządzenia w uzdatnianiu wody. Warszawa: Arkady</li> <li>1987. [2] Kowal A. L., Świderska-Bróż M.: Oczyszczanie wody.</li> <li>Warszawa: PWN 2008. [3] Obarska-Pempkowiak H.: Technologia</li> <li>Wody. Gdańsk: Wyd. Politechniki Gdańskiej 1997. [4] Nawrocki J.,</li> <li>Biłozor S.: Uzdatnianie wody. Procesy chemiczne i biologiczne.</li> <li>Warszawa: PWN 2000.</li> </ul> |                               |  |  |  |  |
|  | Supplementary literature  | [5] Magrel L.: Uzdatnianie wody i oczyszczanie ścieków. Białystok:<br>Wyd. Ekonomia i Środowisko 2000. [6] M. Sozański, P.M. Huck.:<br>Badania doświadczalne w rozwoju technologii uzdatniania wody.<br>Monografie PAN, vol.42, Lublin 2007. [7] A. Bauer, G. Dietze, W.<br>Muller, K. J. Soine, D. Weideling.: Poradnik eksploatatora systemów<br>zaopatrzenia w wodę. Wyd. Seidel-Przywecki, Warszawa 2005. |                               |  |  |  |  |
|  | eResources addresses  | Adresy na platformie eNauczanie:  |                               |  |  |  |  |
|  |   | Technologia wody I (niest.zima 2024/2025) - Moodle ID: 42351<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=42351  |                               |  |  |  |  |
| Example issues/<br>example questions/<br>tasks being completed | 1) Select and arrange the processes used on the underground WTP (removal of Fe, or Mn, or NH3).2)<br>Select and arrange the processes used on the WTP surface water in the proper order.3) List the methods of<br>water disinfection used at the WTP.   |   |                               |  |  |  |  |
| Work placement   | Not applicable  |   |                               |  |  |  |  |

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