



## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          |                                                                                                                                                                                           |                                     |                                                                                                                                 |            |     |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | , PG_00058833                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |                                                                                                                                                                                           |                                     |                                                                                                                                 |            |     |
| Field of study                              | Environmental Engineering                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          |                                                                                                                                                                                           |                                     |                                                                                                                                 |            |     |
| Date of commencement of studies             | October 2023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          | Academic year of realisation of subject                                                                                                                                                   |                                     | 2025/2026                                                                                                                       |            |     |
| Education level                             | first-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                               | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                          | Language of instruction                                                                                                                                                                   |                                     | Polish                                                                                                                          |            |     |
| Semester of study                           | 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                          | ECTS credits                                                                                                                                                                              |                                     | 2.0                                                                                                                             |            |     |
| Learning profile                            | general academic profile                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                          | Assessment form                                                                                                                                                                           |                                     | assessment                                                                                                                      |            |     |
| Conducting unit                             | Department of Sanitary Engineering -> Faculty of Civil and Environmental Engineering -> Faculties of Gdańsk University of Technology                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                          |                                                                                                                                                                                           |                                     |                                                                                                                                 |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                          | prof. dr hab. inż. Jacek Maćkonia                                                                                                                                                         |                                     |                                                                                                                                 |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                          |                                                                                                                                                                                           |                                     |                                                                                                                                 |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Lecture                                                  | Tutorial                                                                                                                                                                                  | Laboratory                          | Project                                                                                                                         | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15.0                                                     | 15.0                                                                                                                                                                                      | 0.0                                 | 0.0                                                                                                                             | 0.0        | 30  |
|                                             | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 30                                                       |                                                                                                                                                                                           | 4.0                                 |                                                                                                                                 | 20.0       | 54  |
| 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. |                                     | [SW3] Assessment of knowledge contained in written work and projects<br>[SW1] Assessment of factual knowledge                   |            |     |
|                                             | [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.                                   |                                     | [SW3] Assessment of knowledge contained in written work and projects<br>[SW2] Assessment of knowledge contained in presentation |            |     |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                   |                               |
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| Subject contents                | Course content – lecture<br>LECTURES:<br><br>1. Stepless control of pump operations, theoretical principle; Seashell characteristics of the pump as an introduction to issues related to installation control.<br><br>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).<br><br>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.<br><br>4. Central heating installations: installation diagrams, weather regulation - a five-stage cascade of installation regulation.<br><br>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).<br><br>6. Basic elements of traditional issues related to the field of sanitary technology, i.e. the hygienic and sanitary rooms, mainly in industrial plants.<br><br>Design exercises and laboratory classes:<br><br>1. Individual presentations on a wide range of the regulatory fittings in installations.<br><br>2.Individual presentations on a wide range of the drivers used to control installations.<br><br>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 Sewage 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%                         |

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| Recommended reading | Basic literature         | <p>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.</p> <p>Ewa Zaborowska: Zasady projektowania wodnych węzłów ciepłowniczych, Wydawnictwo Politechniki Gdańskiej, Gdańsk (wyd.7) 2019</p> <p>Orłowski R.: Przegląd operacji dokonywanych na charakterystykach przy doborze pomp. Gaz, Woda i Technika Sanitarna, nr 8/1982, 135-137.</p> <p>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.</p> <p>Wyd. WIŁO: Kanalizacja ciśnieniowa w systemie WIŁO PORADNIK dla projektantów, Warszawa 2012r.</p> <p>Wyd. ROEDIGER POLSKA: System kanalizacji próżniowej przeznaczony do odprowadzania ścieków z obszarów zabudowanych, Białystok, Gdańsk, Bielsko-Biała, 2008 r.</p> <p>L. Kołodziejczyk, S. Mańkowski, M. Rubik: Pomiary w inżynierii sanitarnej(sugerowane nowsze wydania, raczej z 2000 roku lub nowsze)</p> <p>C. Madryas, B. Przybyła, L. Wysocki: Badania i ocena stanu technicznego przewodów kanalizacyjnych (2010)</p> |
|                     | Supplementary literature | <p>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: <a href="https://pl.grundfos.com/support/dokumentacja-techniczna/katalogi-techniczne.html">https://pl.grundfos.com/support/dokumentacja-techniczna/katalogi-techniczne.html</a> ),</p> <p>instalacji wodnych grzewczych i ciepłej wody (głównie Danfoss: <a href="https://www.automatyka.pl/produkty/producent:Danfos?page=1#paginator">https://www.automatyka.pl/produkty/producent:Danfos?page=1#paginator</a> ).</p> <p>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).</p> <p>Goliszewski J.: Technika sanitarna, PWN, Wrocław-Poznań, 1999r.</p> <p>Goliszewski J., Piotrowska H.: Technika sanitarna, Wyd. Szkolne i Pedagogiczne, Warszawa, 1998r.</p>                                                                                                                                                                                       |
|                     | eResources addresses     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

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

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