



## Subject card

|                                             |                                                                                                                                                                    |                                                          |                                         |                                     |                                                |            |     |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|------------------------------------------------|------------|-----|
| Subject name and code                       | Laboratory of inorganic technologies, PG_00060874                                                                                                                  |                                                          |                                         |                                     |                                                |            |     |
| Field of study                              | Laboratorium technologii nieorganicznych                                                                                                                           |                                                          |                                         |                                     |                                                |            |     |
| 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 |            |     |
| 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 Process Engineering and Chemical Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology                                  |                                                          |                                         |                                     |                                                |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                 |                                                          | dr hab. inż. Marek Lieder               |                                     |                                                |            |     |
|                                             | Teachers                                                                                                                                                           |                                                          |                                         |                                     |                                                |            |     |
| Lesson types                                | Lesson type                                                                                                                                                        | Lecture                                                  | Tutorial                                | Laboratory                          | Project                                        | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                              | 0.0                                                      | 0.0                                     | 30.0                                | 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                                                       |                                         | 2.0                                 |                                                | 18.0       | 50  |
| Subject objectives                          | Students broaden their knowledge of selected inorganic technologies through their own research<br><br>in the laboratory and contact with industrial installations. |                                                          |                                         |                                     |                                                |            |     |

| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Subject outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Method of verification                                                                                                                             |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | [K6_W05] has knowledge of chemical technology based on mineral or energy resources and modern energy sources, understands the concept of sustainable development, knows the principles of green chemistry and environmentally friendly process engineering, has knowledge of occupational safety in the chemical industry                                                                                                                                                                                                                                                            | Students learn about real technological installations for the production of phosphoric acid, sulphuric acid, artificial fertilisers, water treatment and paper production. They are able to carry out technological processes in laboratory conditions. They are familiar with REACH regulations on chemical safety, i.e. a high level of protection of human health and the environment against the risks posed by chemical substances/preparations during production and use. | [SW1] Ocena wiedzy faktograficznej                                                                                                                 |
|                                 | [K6_K02] understands the non-technical aspects and implications of the activities of a chemical engineer, including the impact on the environment, is aware of professional behaviour, observance of professional ethics and respect for diversity of views and cultures                                                                                                                                                                                                                                                                                                             | Knows and understands the responsibility of a chemical engineer for the consequences of their actions in terms of caring for the environment, professionalism, ethical behaviour and respect for other opinions.                                                                                                                                                                                                                                                                | [SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce                                                                          |
|                                 | [K6_U12] applies the principles of health and safety at work                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Knows the principles of professional and safe laboratory practice.                                                                                                                                                                                                                                                                                                                                                                                                              | [SU1] Ocena realizacji zadania<br>[SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu                                      |
|                                 | [K6_U03] is able to apply knowledge of inorganic, organic, physical and analytical chemistry and identify appropriate sources of information to design and synthesize simple chemical compounds, carry out basic physicochemical and analytical measurements                                                                                                                                                                                                                                                                                                                         | Knows and understands the physical and chemical fundamentals of known inorganic technologies. Understands the significance of basic processes and unit operations.                                                                                                                                                                                                                                                                                                              | [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach przedmiotu<br>[SU5] Ocena umiejętności zaprezentowania wyników realizacji zadania |
| Subject contents                | <p>Course content – laboratory</p> <p>Inorganic technology in practice: combustion, exhaust gas purification and water management at the Gdańsk combined heat and power plant field classes</p> <p>Obtaining superphosphate,</p> <p>Carbon monoxide capture (IV),</p> <p>Hydrogen production by alkaline water electrolysis</p> <p>Inorganic chemistry processes in industrial technology field classes at the Malbork Sugar Factory</p> <p>Inorganic technology in the paper industry field laboratory classes at Mondi Świecie Sp. z o.o.</p> <p>Obtaining sodium chlorate (I)</p> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                    |
| Prerequisites and co-requisites | <p>Inorganic technology, lecture. Passed exam in technology: soda, sulphuric acid, phosphoric acid</p> <p>and artificial fertilisers, nitrogen compounds (ammonia, nitric acid, urea, ammonium nitrate), fuel combustion,</p> <p>water treatment, functional coatings on metals, chlorine production, metallurgy.</p>                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                    |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Passing threshold                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Percentage of the final grade                                                                                                                      |
|                                 | Written tests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 60.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 50.0%                                                                                                                                              |
|                                 | Lab report                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.0%                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 50.0%                                                                                                                                              |

|                                                                |                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                | 1. Schmidt-Szawłowski, K; Szafran, M.; Bobryk, E.; Sentek, J: Technologia Chemiczna. Przemysł Nieorganiczny, PWN, Warszawa, 2013.<br>2. Bretsznajder S., Podstawy ogólne technologii chemicznej, WNT, Warszawa, 1973<br>3. Kępiński J., Technologia chemiczna nieorganiczna, PWN, Warszawa, 1984.<br>4. Bortel E., Koneczny H , Zarys technologii chemicznej, PWN, Warszawa, 1992. |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                        | 1. Praca zbiorowa, Soda i produkty towarzyszące, WNT, Warszawa, 1978.<br>2. Dylewski R., Gnot W., Gonet M., Elektrochemia przemysłowa, Wydawnictwo Politechniki Śląskiej, Gliwice, 1999.<br>3. Głowiński J. (Red.), Przykłady i zadania do przedmiotu Podstawy Technologii Chemicznej, Wydawnictwo Politechniki Wrocławskiej, Wrocław, 1991.                                       |
|                                                                | eResources addresses                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                    |
| Example issues/<br>example questions/<br>tasks being completed | 1. Draw a schematic diagram of the process of obtaining NPK fertiliser.<br><br>2. Describe the advantages and disadvantages of obtaining hydrogen by electrolysis.<br><br>3. Present the most important chemical and technological challenges in the production of chlorate(I). |                                                                                                                                                                                                                                                                                                                                                                                    |
| Practical activities within the subject                        | Not applicable                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                    |

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